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David Austen-Smith

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**“Campaign Contributions and  
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**David Austen-Smith**

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Political Economy Research Group,  
Department of Economics,  
Social Science Centre,  
London, Ontario, Canada N6A 5C2  
phone: (519) 661-3877  
fax: (519) 661-3292

**Campaign Contributions and Access\***

David Austen-Smith  
Department of Political Science  
University of Rochester

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\*Earlier drafts of the paper were titled "An Access Model of Campaign Contributions". This version has benefited from the comments of Jack Wright, who bears no responsibility for any its shortcomings. And I am grateful to the NSF for financial support.

### Abstract

An important and pervasive view of campaign contributions is that they are given to promote access to successful candidates under circumstances when such access would not ordinarily be given. And in this story, access is valuable as it offers groups the opportunity to influence legislative decisions through the provision of policy relevant information. Under complete information regarding donors' policy preferences, I argue that this model predicts a negative relationship between contributions and the extent to which the groups' and the recipient legislators' preferences are similar. However, one of the more robust empirical findings in the literature is that this relationship is positive. Relaxing the informational assumption on donors' preferences, this paper reexamines the access story with a simple model in which campaign contributions can act as signals of policy preference. In the model, the value of access to any agent is endogenous. The main result is that, although contributions can generate at best noisy information on donors' preferences, when it does lead to access the prediction is that groups with preferences close to those of the target legislator will on average offer the larger contributions. However, while consistent with the empirical data, this prediction is statistical; the actual pattern of this relationship can be U-shaped. Moreover, to the extent that donors' preferences are known, the canonic story connecting money to access is suspect.

## 1. Introduction

The relationship between campaign contributions and access to legislators is typically seen as a close one, although exactly what it is that makes access worth "buying" is subject to some debate (Hall and Wayman, 1990: 800). There are (at least) three, by no means mutually exclusive, perspectives on what access secures. From the first perspective, the one most studied in the formal literature, "access" is simply a euphemism for a donor securing the given private return on an investment of a contribution; indeed, access is typically implicit (Baron, 1989, 1993; Snyder, 1990; McCarty and Rothenberg, 1993). A second perspective is that access is primarily symbolic; groups seek access to signal their importance and so maintain and increase their membership. Under this view, access is granted by a legislator purely to secure contributions and any consequent group influence over legislators is largely incidental: "groups that pressure or antagonize policymakers may forfeit access and thus lose the symbolic benefits of being consulted and the opportunities for credit-claiming that go with it" (Hayes, 1981: 86). Finally from the third perspective, access is essential and has little to do with any more-or-less implicit *quid pro quo* model of contributor decisions or with symbolic concerns; instead the focus is on information (Bauer, Pool and Dexter, 1963; Milbrath, 1960; Hansen, 1992; Rothenberg, 1992; Wright, 1990). And this is the dominant perspective within the descriptive literature: "PAC officials are adamant that all they get for their investment is access to congressmen — a chance to "tell their story". Political analysts have long agreed that access is the principal goal of most interest groups, and lobbyists have always recognized that access is the key to persuasion" (Sabato, 1985: 127).<sup>1</sup> This paper is concerned with the third perspective on access.

The canonic story connecting campaign contributions to access is predicated on

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<sup>1</sup>See also Schlozman and Tierney (1986: 253), Herndon (1982), Langbein (1986), and Drew (1983) among others.

the premise that both time and information are valuable. When an issue arises about which a legislator is uncertain, he or she will seek information from more-or-less interested parties; and given that the legislator cannot see everyone with something to say about any given issue, he or she will choose to whom to listen at least in part on the basis of who provided campaign contributions (Herndon, 1982; Shlozman and Tierney, 1986: 246; Langbein, 1986). However, although intuitively plausible, there are some difficulties with the story.

Given a legislator is uncertain about what position to adopt on some issue, the legislator will, other things being equal, seek information. Since legislators' actions depend in part on their information regarding the consequences of actions, information provision by interested groups is inherently strategic. And, if information is costly to verify, it is known that the amount of information an informed agent (lobbyist) can credibly transmit information to an uninformed decision maker (legislator) is increasing in the extent to which these individuals' preferences over final consequences are coincident.<sup>2</sup> That is, the more like the legislator is the lobbyist, the more valuable will be that lobbyist to the legislator on informational grounds and the more influence can that lobbyist be expected to exert on the legislator's decisions. Consequently, if legislators know the preferences of the prospective lobbyists, they will (*ceteris paribus*) choose to listen to those lobbyists whose underlying preferences most closely reflect their own; and this will be true *irrespective* of any campaign contributions. Moreover, if a group knows that its preferences are far enough away from those of the legislator that, even granted access, it cannot be influential, then that group has no incentive to devote costly resources to securing access. In sum, if the rationale for access is informational, access will only be granted to groups whose

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<sup>2</sup>Crawford and Sobel (1982). Informational models of lobbying include Ainsworth (1993), Austen-Smith (1993), Austen-Smith and Wright (1992, 1993), and Potters and Van Winden (1992).

preferences over consequences are sufficiently close to those of the legislator to permit credible information transmission and who may thus be influential (i.e. offer information that can affect the legislator's decisions); only those groups who fall within this category will be willing to pay for access; but given information is valuable, the legislator will be willing to grant access to such groups independent of any financial incentive.

For money to alter the preceding conclusion there must at least be some tradeoff for the legislator between informational gains and dollars. But then, up to the point at which preferences are sufficiently disparate to preclude any credible information transmission, there should exist a negative correlation between campaign contributions and the degree to which contributors' and legislators' preferences coincide, and beyond this point contributions (for access) should be zero: see Figure 1.<sup>3</sup>

[Figure 1 here]

However, to the extent that legislators' ideologies act as indicators of their legislative preferences, empirical work has consistently estimated the relationship between contribution and preference similarity to be positive (see, among others, Saltzman, 1987; Poole and Romer, 1985; Kau, Keenan and Rubin, 1982; and Welch, 1980).<sup>4</sup> Moreover, according to at least one estimate, only one in three of those interest groups with lobbying organizations in Washington DC has a PAC (Gais, 1983), suggesting that contributions are by no means necessary for securing access.

Insofar as the value of access to interest groups and legislators is informational

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<sup>3</sup>See Lohmann (1993) for a formalisation of this argument.

<sup>4</sup>The main empirical focus of models adopting the first perspective on access, mentioned above, is on the relationship between a candidate's probability of electoral success, rather than any notion of policy preferences, and the level of contributions he or she can attract. Typically, the prediction is that the relationship is positive, except possibly at very high estimates of electoral success (Baron, 1989; Snyder, 1990).

— the value for interest groups deriving from the possibility of influencing legislative decisions through the strategic provision of information, and that for legislators deriving from the possibility of making more informed decisions — the preceding discussion indicates a conflict between the canonic theory and the empirical pattern of contributions. There are basically two approaches to dealing with the conflict, short of rejecting the access model of campaign contributions entirely. The first is to argue that in fact purely access-oriented contributions *are* negatively correlated with preference similarity but other, positively related, motivations for contributing dominate this relationship statistically. But while such a claim might indeed be correct, the operational difficulties of subjecting it to empirical test are transparent. The second approach is to build on the observation that, *ceteris paribus*, the expected value of access is increasing with the extent to which the legislator's and the interest group's preferences are similar. In particular, suppose there is some uncertainty on the part of the legislator regarding the underlying preferences of the donor. Under such uncertainty campaign contributions can fulfill a role other than simply purchasing legislators' time; specifically, they can signal the extent to which any informational lobbying by the group would be valuable to the legislator.<sup>5</sup> *Prima facie*, the signaling role of money can be expected to yield a positive empirical relationship between preference similarity and contribution size because, as discussed above, the value of access is increasing in the extent to which groups' and legislators' preferences are similar. However, the value of access depends at least in part on legislators' beliefs about this preference similarity, which in turn depend on the contributions offered. In other words, given that access is sought purely to provide

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<sup>5</sup>In Lohmann (1993) there is no such uncertainty and contributions do not signal anything about the value of access. Instead, campaign contributions in her model signal already acquired, issue-specific technical information. And with this formulation access is irrelevant to any group that gives a positive contribution: since group preferences are common knowledge, all of the relevant information held by such a group is revealed by its equilibrium contribution per se.

information and given that such information provision is strategic, the value of access to a group and the willingness of the group to contribute campaign contributions to secure access are jointly determined.

In what follows, I consider the signaling role for campaign contributions more formally with a stylized model in which a group, with preferences known surely only by the group itself, chooses a campaign contribution to give to an incumbent legislator prior to knowing whether or not the issue of concern to the group will arise in the legislature. If the issue arises then the group alone becomes informed and the legislator chooses whether or not to grant (costly) access to the group; if access is denied the legislator simply acts on her prior beliefs about what best to do with the respect to the issue, but if access is granted the group advises the legislator about the action to take and the legislator uses this advice to update her beliefs and arrive at a decision. The focus of the model is then on the relationship between campaign contributions, preferences, and the value of access.

The key premise of the model is that the legislator has some uncertainty about the policy preferences of the group. To the extent that this is not a reasonable approximation to the truth, the model, along with the motivating discussion above, suggests the informational perspective connecting contributions to access is suspect. However, there are circumstances under which the premise is plausible. For example, internists and specialists within the AMA frequently hold distinct views on particular health policy issues, and exactly what the "AMA position" is on such issues will reflect compromise and bargains internal to the organization as a whole; it is then reasonable to assume that these compromises and bargains are not common knowledge and, therefore, that the "AMA position" is subject to uncertainty. This kind of uncertainty is reflected in the surprise of legislators at the NRA's neutral position on the Bork nomination (McGuigan and Weyrich, 1990: 78-80); although the NRA's general policy preferences are no secret, their stance on this particular issue was

clearly subject to uncertainty for the politicians. Similarly, there is evidence of groups lobbying on issues outside their imputed interests (Browne, 1990, 1991), which almost surely induces some uncertainty about the groups' preferences over such issues. Finally, and perhaps most important, is that the sheer numbers of groups involved in lobbying prohibits legislators and the staffs from possessing complete knowledge of groups' preferences. In discussing his survey results on lobbying over agricultural policy, Browne (1991: 359) remarks that "The most striking point that these officials raised about the expanded universe of agricultural interests was about the confusion it creates, 'Who are these guys?' was the often-repeated question."

Given that there is some uncertainty on the part of legislators regarding donors basic preferences, it turns out that the expectation regarding campaign contributions and preference similarity is essentially fulfilled in the model subject, however, to three qualifications. First, campaign contributions are incapable of fully revealing group preferences; so when access is granted the legislator remains under some uncertainty as to the exact preferences of the lobbyist. Second, the equilibrium contribution schedule can be U-shaped, with relative extremists making the same contribution as groups whose preferences closely reflect those of the legislator; but since, in this case, the probability mass is on preferences "close" to the legislator, the statistically observed relationship will be positive. And third, if groups are known to be informed prior to making a contribution, then access is essentially irrelevant. Each of the three qualifications has substantive implications for the access model of contributions, and these are considered further in the concluding discussion.

Sections 2 and 3, respectively, describe the model and the principal results assuming contributions are given prior to the group becoming informed; section 4 considers what happens if the group is known to be informed prior to any contribution being offered; and section 5 concludes. Formal arguments supporting all of the results are confined to an appendix.

## 2. Model

### *Agents and preferences.*

There are two agents in the model: a group and an incumbent legislator. Both the group and legislator have preferences over the consequences of a particular policy issue that may or may not arise in the coming legislative session. (For example, the issue may be health insurance and both the AMA and legislators have preferences over the final cost of health care induced by any legislation on rates.) Assume the issue and its consequences are one-dimensional objects and assume further that, at least *ex ante*, the consequences of any legislation are known only with uncertainty. Specifically, let  $t \in [0,1]$  be the realization of some random variable and let  $a \in \mathbb{R}$  denote the legislative action taken (if necessary) on the issue. Let  $g(t|\cdot)$  be a pdf characterizing the legislator's beliefs over  $t$  conditional on any information he or she might have. Then the legislator's *ex ante* evaluation of the action  $a$  is given by,

$$(1) \quad E[u(a,t)|\cdot] = -\int_0^1 (t-a)^2 g(t|\cdot) dt.$$

If the legislator knew the value of  $t$  for sure, therefore, she would choose the action  $a = t \in \mathbb{R}$ , since this maximizes her payoff. A natural interpretation here is that the legislator's preferences are induced from some more general concerns of representation and reelection and, with respect to the issue at hand,  $t$  is the (*ex ante* unknown) most preferred action of the pivotal voter, or group of voters, in the legislator's district. Similarly, the group's *ex ante* evaluation of action  $a$  is given by,

$$(2) \quad E[v(a,t;x)|\cdot] = -\int_0^1 (x+t-a)^2 h(t|\cdot) dt;$$

where  $h(t|\cdot)$  is the pdf describing the group's conditional beliefs regarding  $t$ , and  $x \in X \subseteq (-\infty, \infty)$  is the group's most preferred consequence from any legislative action. For any value of  $t$ , the group's most preferred legislative action is thus  $x+t$ . It follows that the parameter  $x$  measures the extent to which the group and the legislator have diverse preferences: for any given value of  $t$ , the group's most preferred action is strictly increasing in  $x$ . So when  $x$  is positive the group prefers higher actions than those most preferred by the legislator and conversely when  $x$  is negative, with the difference between the two most preferred actions given by the absolute value of  $x$ .

If no action has to be taken on the issue, both the legislator's and the group's payoffs are normalized to zero.

### *Decisions.*

The sequence of decisions in this case is given in Figure 2.

[Figure 2 here]

The group moves first by giving a campaign contribution  $c \in \mathbb{R}_+$  to the incumbent. Because the focus here is on contributing to secure access, I abstract away from electoral complications attenuating the link between access and contributions. Specifically, assume there is negligible doubt that the incumbent will be reelected. Although this assumption has some empirical justification, it is clearly one that should be relaxed in a richer model.

Once the contribution is given and the incumbent returned to office, Nature decides with probability  $q \in (0,1)$  whether the issue requiring legislative action arises. The idea here is that money is given before details of the legislative agenda are revealed. For example, while it may be common knowledge that the health care industry is to come under scrutiny during the next legislative session, it is less clear exactly which aspects of the industry, or what sort of policy issues falling under the

health care rubric, will receive specific attention. Thus potentially interested groups give money in an effort to secure access to key legislators should the need arise (Sabato, 1985).

If the issue does not arise (which occurs with probability  $1-q$ ) then the game is over; but if it does arise (with probability  $q$ ), Nature reveals the true value of the unknown parameter  $t$  privately to the group.<sup>6</sup> As discussed later, to support any access role for contributions in the model, it is important that the group not be (or, at least, not be known to be) informed at the time it chooses its campaign contribution. Conditional on the issue arising and the group becoming informed, the legislator decides whether or not to grant access to the group. If the legislator does not grant access, she simply chooses an action on the basis of her prior beliefs concerning the value of  $t$  and the game ends with all players receiving their respective payoffs. On the other hand, if she does grant access the group lobbies the legislator by making a speech about its information on  $t$ , following which the legislator takes an action, the game ends, and payoffs are distributed. The group's lobbying speech is costless; in particular, it is free to say anything it wishes about the value of  $t$  or anything else, and lying is no more difficult for the group than is telling the truth (Crawford and Sobel, 1982).

Assume granting access is costly to the legislator; she has a positive opportunity cost of time. Consequently, access will only be granted if the expected value of any subsequent information transmission at the resulting lobbying stage exceeds the cost of granting the time to listen to the group. Because campaign money is itself valuable and is in part a substitute resource for time, the legislator's opportunity cost of granting access may be decreasing in campaign contributions. In

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<sup>6</sup>In an earlier version of this paper, the group was allowed to choose whether or not to become informed at some cost. However, since the group becomes informed if and only if access is granted, making this decision explicit in the model added little but notation.

sum, let  $k(c)$  denote the cost of granting access conditional on receiving a contribution  $c \geq 0$ , and assume  $k(0) > 0$  and  $k'(c) \leq 0 \forall c \geq 0$ .

*Information.*

The legislator's preferences are common knowledge. The group's preferences are common knowledge up to the value of its ideal point,  $x$ , which is private information to the group. The legislator has common knowledge prior beliefs about  $x$  described by a distribution function  $F(x)$ ; I put no further restrictions on  $F$  at this stage. Both the group and the legislator know the probability,  $q$ , that the issue of concern will become legislatively relevant. If it does become so relevant, then Nature reveals the true value of  $t$  privately to the group, which therefore is asymmetrically informed relative to the legislator; both agents share a common prior on  $t$ , given by the uniform distribution on  $[0,1]$ .

*Strategies and equilibrium.*

The group's *contribution strategy* is a map

$$(3) \quad \gamma: X \rightarrow \mathbb{R}_+.$$

Thus for any group with ideal point  $x \in X$ ,  $\gamma(x) \geq 0$  is the contribution donated by the group to the legislator. The restriction to pure strategies here is without loss of generality. Nature then, with probability  $q$ , chooses whether the issue of concern becomes legislatively relevant and the group becomes informed. Conditional on the issue arising, the legislator decides whether to grant access to the group; the legislator's *access strategy* is a map

$$(4) \quad \alpha: \mathbb{R}_+ \rightarrow [0,1]$$

where  $\alpha(c)$  is the probability that the legislator grants access to a group that has contributed  $c$  to her campaign fund.

If access is denied, the legislator simply makes a decision about what action to take; but if access is granted, the group and the legislator play the Crawford and Sobel (1982) Sender/Receiver game. Specifically, *given* access is granted (so the issue is relevant and the group is informed), the group sends a cheap talk message about its information according to a *lobbying strategy*

$$(5) \quad \lambda: X \times \mathbb{R}_+ \times [0,1] \rightarrow M$$

where  $M$  is some arbitrary uncountable message space. Thus  $\lambda(x,c,t)$  is the speech made by an informed group of type  $x$  that has made contribution  $c$  and observed the true value  $t$ . To save on notation, write  $\lambda \equiv \emptyset \in M$  to describe the message "heard" by the legislator if she denies access and there is no lobbying by the group. Then the legislator's *decision strategy* is a map

$$(6) \quad \delta: \mathbb{R}_+ \times M \rightarrow \mathbb{R}.$$

Recall that by convention  $\lambda(\cdot) \equiv \emptyset$  if the group is denied access; therefore the dependency of  $\delta$  on the legislator's access strategy is implicit in  $M$ . Because the legislator's preferences over consequences are quadratic, the restriction to pure decision strategies is without loss of generality.

The equilibrium concept used is sequential equilibrium: loosely, a list of strategies  $(\gamma^*, \alpha^*, \lambda^*, \delta^*)$  and a set of beliefs is an equilibrium if (1) at every decision stage each agent takes an expected utility maximizing action conditional on the other's behaviour and on the agent's beliefs at that stage; and (2) beliefs are derived

from Bayes rule where defined. A formal definition is given in the appendix.

If access is granted, I shall refer to the lobbying and decision strategies jointly as the *lobbying subgame*  $(\lambda, \delta)$ . It is well-known that in the lobbying subgame there exists an equilibrium in which no information on  $t$  is transmitted and the legislator simply chooses an action on the basis of her prior beliefs (Crawford and Sobel, 1982). In such circumstances, no type of group would seek access. Consequently, I shall focus on *influential* equilibria; i.e. equilibria in which the legislator's decision strategy is not constant in the message she receives. Thus in any influential equilibrium to the lobbying subgame, at least two actions are elicited by the lobbying strategy,  $\lambda$ . And say that an equilibrium lobbying strategy  $\lambda$  is *most influential* if there is no other equilibrium lobbying strategy that elicits more actions from the legislator.

### 3. Equilibrium

The lobbying subgame, played conditional on the issue being relevant and the legislator granting access, is essentially the canonic Sender/Receiver cheap-talk game introduced by Crawford and Sobel (1982). The one difference here is that the legislator (Receiver) may be uncertain about the group's (Sender's) preferences over the consequences of actions. Because the willingness of the legislator to grant access depends entirely on the expected (informational) value from listening to the group's lobbying speech, it is necessary first to identify the circumstances under which there can exist an influential equilibrium to the lobbying subgame.

Let  $X(c) \subseteq X$  denote the support of the legislator's posterior beliefs about the parameter  $x$ , given contribution  $c \geq 0$ , at the start of the lobbying subgame.

**Proposition 1:** Let  $F(\cdot|c)$  denote the legislator's posterior df over  $X(c)$ . Then there exists an influential equilibrium to the lobbying subgame iff  $\exists Y \subseteq X(c)$  such that:

$$(*) \quad \int_Y (1/4 - |x|) dF(x|c) > 0.$$

Thus, if the legislator's beliefs over the group's ideal point,  $x$ , following the campaign contribution,  $c$ , put positive weight on  $x$  being within a distance of  $1/4$  from her own ideal point, then there exists an influential equilibrium to the lobbying subgame and granting access can lead to informational gains for the legislator. Of course, these gains may not be sufficient to warrant bearing the cost,  $k(c)$ , of granting access at all. Indeed, as the proof to the result makes apparent, the maximal value of access is increasing in the extent to which the weight of the legislator's posterior beliefs,  $F(\cdot|c)$ , is concentrated on low values of  $|x|$ . In other words, the more confident is the legislator that the group's ideal point is close to her own (at zero), the larger is the anticipated value of access. Having said this, however, it is important to note that there are typically multiple influential equilibria to the lobbying subgame available given any such equilibrium is available, some of which may not yield sufficient gains to insure access whereas others might.

Let  $(\lambda^*, \delta^*)$  be the lobbying subgame strategies for some specified equilibrium. Let  $U^*(\lambda^*, \delta^*; c)$  denote the legislator's *ex ante* expected payoff from  $(\lambda^*, \delta^*)$ , given a campaign contribution  $c$  and given the legislator grants access. To save on notation, when there is no ambiguity about the structure of  $(\lambda^*, \delta^*)$ , I shall write  $U^*(\lambda^*, \delta^*; c) \equiv U^*(c)$  if and only if  $\lambda^* \neq \emptyset$ ; and, throughout, write  $U^*(\emptyset, \delta^*; c) \equiv U^o(c)$ . Then the legislator will grant access if and only if she expects to benefit by so doing:

$$(7) \quad \alpha^*(c) > 0 \Leftrightarrow U^*(c) - k(c) \geq U^o(c).$$

Let  $V^*(\lambda^*, \delta^*; c, x)$  denote the type- $x$  group's *ex ante* expected payoff from the specified lobbying subgame equilibrium, given a contribution of  $c$ . As for the case of the legislator, when there is no ambiguity about  $(\lambda^*, \delta^*)$ , I shall write,  $V^*(\lambda^*, \delta^*; c, x) \equiv V^*(c, x)$  if and only if  $\lambda^* \neq \emptyset$ ; and write  $V^*(\emptyset, \delta^*; c, x) \equiv V^0(c, x)$  throughout. Because campaign contributions have to be made prior to Nature choosing (with probability  $q$ ) whether the policy issue becomes legislatively relevant, we have

$$(8) \quad \gamma^*(x) = c > 0 \Leftrightarrow q[\alpha^*(c)V^*(c, x) + (1-\alpha^*(c))V^0(0, x)] - c \geq qV^0(0, x) \\ \Leftrightarrow q\alpha^*(c)[V^*(c, x) - V^0(0, x)] - c \geq 0.$$

Evidently, no group makes an equilibrium contribution unless there is positive probability of being granted access to the legislator. The converse statement is not necessarily true. For sufficiently low cost of access,  $k(0)$ , the fact that a group is informed might induce access to be granted even though no campaign contribution is made. However, since  $k(0) > 0$  by assumption, Proposition 1 implies that if  $\alpha^*(0) > 0$  then necessarily the probability weight on  $X$  is concentrated about zero — this is because  $\alpha^*(0) > 0$  implies  $\alpha^*(0) = 1$  is also a best response and the lobbying subgame is expected to be worth at least  $k(0) > 0$  to the legislator irrespective of her learning anything new about the group's preferences: if access is guaranteed with no contribution, no group will make a contribution.

In equilibrium, strategies are required to be subgame perfect. Because contribution strategies are pure, this implies that if  $c > 0$  and the legislator is indifferent between granting and not granting access, she must grant access with probability one. Consequently,  $\alpha^*(c) \in \{0, 1\}$  always and we can set  $\alpha^*(c) = 1$  in (8).

The focus of concern here is on the signaling role of campaign contributions in securing access to legislators. There are three possibilities in this respect. First, the

equilibrium contribution strategy  $\gamma^*(\cdot)$  might be *pooling*, in which  $\gamma^*(x) = \gamma^*(x')$  all  $x, x'$  and no information regarding  $x$  (and therefore the value of access) is transmitted; second, the strategy might be *separating*, in which  $\gamma^*(x) \neq \gamma^*(x')$  all  $x \neq x'$  and the true value of  $x$  is completely revealed; and third, the strategy might be *semi-pooling*, in which  $\gamma^*(x) \neq \gamma^*(x')$  for some, but not all,  $x \neq x'$  and some information is signaled. Consider these in turn.

### 3.1 Pooling equilibria.

The possibilities here are easily stated. As remarked above, there is always an equilibrium to the lobbying subgame in which no information is transmitted. Consequently, for all parameterizations of the model, there exists a pooling equilibrium in which no contributions are given, access is never granted and the legislator chooses an action (if necessary) on the basis of her prior beliefs alone. More interesting is the second possibility.

**Proposition 2:** There exists an equilibrium such that  $\gamma^*(x) = c > 0 \forall x \in X$  iff, for some lobbying subgame equilibrium  $(\lambda^*(x,0,\cdot), \delta^*(0,\cdot))$ ,

- (i)  $V^*(0,x) - V^o(0,x) > 0 \forall x \in X$ ;
- (ii)  $U^*(0) - U^o(0) \geq k(\min_x q(V^*(0,x) - V^o(0,x)))$ .

Moreover, for each influential lobbying equilibrium  $(\lambda^*(x,0,\cdot), \delta^*(0,\cdot))$  satisfying (i) and (ii), there exists a continuum of equilibria in which,

$$\gamma^*(x) = c \in (k^{-1}(U^*(0) - U^o(0)), \min_x q(V^*(0,x) - V^o(0,x))].$$

In these sort of pooling equilibria contributions may be given and access is granted although the legislator's beliefs about the group's preferences are unaffected by any giving. Condition (i) of Proposition 2 insures that there exists an influential

lobbying subgame equilibrium that yields positive net benefits against the no-lobbying situation for the group, irrespective of its ideal point; and condition (ii) says that granting access under such circumstances is worth the cost to the legislator of so doing. (Clearly, (i) and (ii) each imply that condition (\*) of Proposition 1 must hold.) The two conditions are stated for the case of no contributions being offered; this is because pooling equilibria generate no information about the group's ideal point, and so the conditions must hold independent of any contribution. The equilibrium only occurs when the legislator is sufficiently confident *ex ante* that the group's preferences are close to her own, and contributions serve only to lower the cost of granting access and fail to discriminate among groups. Other things being equal, that is, the legislator would choose to grant access to the group irrespective of any financial incentive; insofar as the contribution matters, therefore, it is only because access is costly to grant for the legislator. In particular, for a sufficiently low (positive) cost of access, access will be surely be granted irrespective of any contribution.

The situation is consistent with some of the descriptive statements about the access role of money recorded by Sabato (1985), Shlozman and Tierney (1986) and others. However, since all types of group give the same contribution in equilibrium, the situation is inconsistent both with the positive correlation between contributions and the extent of access (Langbein, 1986), and with the positive correlation between contributions and preference similarity (Poole and Romer, 1985; etc.).

### 3.2 *Separating equilibria.*

Strictly speaking, there can be no separation over all of  $X$  in general. If  $\gamma^*(\cdot)$  is separating with respect to ideal points  $x \in X$ , then the legislator knows the group's preferences ( $x$ ) for sure when deciding on access. By Proposition 1, the value of access to the legislator is positive only if the group's ideal point is sufficiently

close to the legislator's; specifically,  $|x| < 1/4$ . Consequently, because the value of granting access to any group with  $|x| \geq 1/4$  is zero to the legislator, no such group will pay a positive campaign contribution if by so doing the group's type is revealed. So at most,  $\gamma^*$  can be separating on the subset  $\hat{X} = \{x \in X \mid |x| < 1/4\}$ , with  $\gamma^*(x) = 0 \forall x \notin \hat{X}$ . However, it is important to note that such a strategy *does* separate on  $X$  with respect to the value of access, since this is zero for all  $x \notin X^*$ . To avoid any confusion in this respect, say that " $\gamma^*$  is separating on  $Y$ " for any  $Y \subseteq X$  if and only if, for all  $x, x' \in Y$  with  $x \neq x'$ ,  $\gamma^*(x) \neq \gamma^*(x')$ .

**Proposition 3:** Assume  $Y \subseteq \hat{X} \cap (0, \bar{x})$  is a nondegenerate interval and suppose that  $F$  is strictly increasing on  $(0, \bar{x})$ . Then there exists no equilibrium in which  $\gamma^*$  is separating on  $Y$ .

By symmetry, the same result holds for any nondegenerate interval  $Y \subseteq \hat{X} \cap (\underline{x}, 0)$ . Hence Proposition 3 implies that campaign contributions are incapable of unequivocally signaling a group's preferences whenever the set of possible ideal points is not discrete. This result holds even when the legislator knows *ex ante* that the group's ideal point is (say) strictly positive. Moreover, if attention is restricted to most influential equilibria to the lobbying subgame, then there is no equilibrium contribution strategy that distinguishes between a group with ideal point  $x$  and one with ideal point  $-x$ . This follows because the expected payoffs from most informative equilibria depend exclusively on  $|x|$ .<sup>7</sup> Thus, if campaign contributions do distinguish between such pairs of types, then the lobbying subgame equilibrium played in at

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<sup>7</sup>In a richer model, the issue of whether a group is on one side or other of the legislator in terms of their relative preferences might matter. For instance, if the legislator needs any action approved by a committee then whether group's preferences lie between those of the legislator and the committee, or are more extreme than either, is likely to be important (Austen-Smith, 1993).

least one case cannot be the most influential available.

### 3.3 Semi-pooling equilibria.

In view of Proposition 3, if there are any informative contribution strategies in equilibrium then they must be semi-pooling. When the group's ideal point,  $x$ , is common knowledge, the expected value of the most influential equilibrium to both group and legislator is decreasing in the distance between their respective preferences; i.e. decreasing in  $|x|$ . This suggests that if  $\gamma^*$  is semi-pooling, then it will have a partition structure in which groups with ideal points closer to that of the legislator make higher contributions than those with relatively extreme ideal points. However, this is only possible when the support of  $F$  is relatively concentrated about zero; for sufficiently wide support, it turns out that low and high types make a common contribution while intermediate types do not.

**Proposition 4:** Assume  $[0, \bar{x}] \subseteq X$  with  $\bar{x} > 1$ ; suppose  $F'$  exists and is single-peaked around zero. Consider an equilibrium in which  $\gamma^*$  is semi-pooling and  $(\lambda^*, \delta^*)$  is most influential. Then  $\gamma^*$  is step-wise U-shaped on  $[0, \bar{x}]$ .

A similar statement holds if  $(\underline{x}, 0] \subseteq X$ . Figure 3 illustrates the result when  $X = (-\bar{x}, \bar{x})$  and  $\bar{x}$  is sufficiently extreme.

[Figure 3 here]

The intuition for Proposition 4 is that if access is granted to a group that reveals its preferences to be relatively close to those of the legislator, then there must be a message given at the lobbying stage that elicits an action greater than that taken in the absence of any lobbying. So for any group with sufficiently extreme preferences (say, with  $x > 1$ ), this action is *always* strictly preferable to that taken in the absence of any lobbying. Furthermore, groups are strictly risk-averse.

Therefore, the utility difference for a group with such extreme preferences between obtaining the highest elicitable action with lobbying and the no-lobbying action is strictly increasing with  $x$ . Consequently, for any contribution that secures access there will be a set of extreme preferences for the group that makes it worthwhile for the group to mimic the behaviour of a group with preferences very close to those of the legislator. By the assumption that the prior density function  $F'$  is single-peaked about zero, however, the legislator's beliefs conditional on receiving a given contribution must put most weight on the group's ideal point being relatively close to her own. Therefore, the observed statistical relationship between contribution size,  $c_i$ , and preference similarity, measured by  $\int_{X(c_i)} -|x|dF(x|c_i)$ , is positive. Moreover, although the single-peakedness assumption is stated only as a sufficient condition for the result, the remarks following Proposition 1 suggest it is likely to be (at least nearly) necessary too. For if the legislator's posterior beliefs about  $x$ ,  $F(\cdot|c)$ , put most weight on high ideal points, then the expected value of access is very low and access would not typically be granted or sought.

The argument for Proposition 4 immediately yields,

**Corollary 1:** Assume  $[0, \bar{x}] \subseteq X$ . There exists  $\hat{x} > 1/4$  such that if  $\bar{x} < \hat{x}$  with  $F'$  single-peaked about zero, then in any equilibrium in which  $\gamma^*$  is semi-pooling and  $(\lambda^*, \delta^*)$  is most influential,  $\gamma^*$  is step-wise decreasing on  $[0, \bar{x}]$ .

And as for the proposition, a symmetric result holds when  $(\underline{x}, 0] \subseteq X$ . Thus, so long as a group's preferences are not too extreme, then the relationship between contribution size and preference proximity is unequivocally positive.

Putting the propositions together, the result is that if campaign contributions promote access insofar as they signal information about the value of access, then the

signal is necessarily noisy and the value of access to the legislator, and to groups close to the legislator, is accordingly depressed.

That semi-pooling contribution strategies of the sort identified in Proposition 4 can exist is shown in the example below.<sup>8</sup> Here the very low and the very high types contribute a fixed amount to the legislator, while the intermediate types offer nothing; access is granted if and only if a contribution is made, and there is some credible information transmission in the consequent lobbying subgame. Campaign contributions thus secure access both by signaling information about the value of subsequent lobbying and by lowering the legislator's cost of granting access.

**Example 1:**<sup>9</sup> Assume:  $X = [0, 3.037]$ ;  $F(x) = 0.02 + x^{1/4}/1.347$ ;  $q = 0.9$ ; and  $k(c) = 0.086 - c$ . Then the following is a semi-pooling equilibrium.

- (I) 
$$\gamma^*(x) = \begin{cases} 0.036 & \forall x \in \{0\} \cup [1.258, 3.037] \\ 0 & \text{otherwise} \end{cases};$$
- $\alpha^*(\gamma^*(x)) = 1$  (0) if  $\gamma^*(x) \geq$  (<) 0.036;
- (II) If access is *not* granted:  $\lambda^* \equiv \emptyset$  and  $\delta^*(\cdot, \emptyset) = 1/2$ ;
- (III) If access *is* granted:
- $\lambda^*(0, 0.036, t) = m_1 \quad \forall t \leq 0.343$ ;  $\lambda^*(0, 0.036, t) = m_2 \quad \forall t > 0.343$ ;
- $\lambda^*(x, 0.036, t) = m_2 \quad \forall t, \forall x \in [1.258, 3.037]$ ;
- $\delta^*(0.036, m_1) = 0.172$ ;  $\delta^*(0.036, m_2) = 0.516$ ;

(all numbers rounded to 3 decimal places).

There is an influential equilibrium to the lobbying subgame if the legislator grants access when  $\gamma^*(x) = 0$ . However, the expected payoff if no access is granted is  $-0.083$ ; since  $k(0) = 0.086$  and the maximal gross value of access to the legislator

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<sup>8</sup>The equilibrium described in Example 1 is only one of several semi-pooling equilibria here; it is offered because it is the easiest to compute and illustrates the proposition most starkly.

<sup>9</sup>Computational details are given in the appendix.

is less than zero, granting access with no contribution is not a best response.

Figure 4a illustrates the equilibrium contribution schedule and Figure 4b illustrates the subsequent equilibrium lobbying and decision strategies.□

[Figure 4 here]

#### 4. Contributions by an Informed Group

The argument of the preceding sections presumes that contributions are offered prior to the group becoming informed (if ever) concerning the relevant policy issue. Although the assumption is often reasonable (for instance, while the Sierra Club's general position on environmental issues is well-known and its informational resources widespread, there are issues about which its detailed position is uncertain and its knowledge incomplete), it is not an empirical necessity. And if the group is known to be informed prior to making any contribution, it is not immediately obvious whether the conclusions above continue to obtain.

To address the issue, assume it is common knowledge that the group is informed about the true value of the parameter  $t$  at the start of the process. The legislator continues to have a uniform prior over  $t \in [0,1]$ , and Nature now only chooses, with probability  $q$ , whether the issue is legislatively relevant. The contribution strategy for the group now depends both on the group's ideal point and on the true value of  $t$ , both of which are private knowledge to the group. Thus, a contribution strategy is a map,

$$(9) \quad \xi: X \times [0,1] \rightarrow \mathbb{R}_+$$

where  $\xi(x,t)$  is the contribution given by a group with preferences parameterized by  $x$  and knowledge that the technical parameter is  $t$ . All else remains as described in

section 2.

Because contributions are one-dimensional objects ( $c \in \mathbb{R}_+$ ) and the group's private information is now two-dimensional ( $(x,t) \in X \times [0,1]$ ), the possibility of contributions signaling sufficient information to secure access here is attenuated. In particular, if  $\xi^*$  is informative, the signal necessarily compounds information on  $x$  with information on  $t$  (see the appendix for a proof). On the other hand, the contribution schedule *per se* can, under some circumstances, be influential in the absence of any access; i.e. the legislator's decision strategy is not constant in the contribution received, irrespective of any lobbying taking place. These claims are illustrated by the following example.

**Example 2:**<sup>10</sup> Assume  $X = [0,1]$  with  $F(x) = x$ . Let  $\epsilon > 0$  be arbitrarily small.

Then the following is an equilibrium (to three decimal places):

*Either:* (I)  $\xi^*(x,t) = 0 \forall (x,t) \in X \times [0,1]$  such that  $x+t \geq [-\epsilon/(0.447)q]+0.298$ ;

$\xi^*(x,t) = \epsilon \forall (x,t) \in X \times [0,1]$  such that  $x+t < [-\epsilon/(0.447)q]+0.298$ ;

*Or:* (I')  $\xi^*(x,t) = \epsilon \forall (x,t) \in X \times [0,1]$  such that  $x+t \geq [\epsilon/(0.447)q]+0.298$ ;

$\xi^*(x,t) = 0 \forall (x,t) \in X \times [0,1]$  such that  $x+t < [\epsilon/(0.447)q]+0.298$ ;

(II) Access is never granted so  $\lambda^*(\cdot) \equiv \emptyset$ . However, if (I) holds  $\delta^*(0,\emptyset) = 0.522$  and  $\delta^*(\epsilon,\emptyset) = 0.075$ ; and if (I') holds  $\delta^*(0,\emptyset) = 0.075$  and  $\delta^*(\epsilon,\emptyset) = 0.522$ .

Figure 5 illustrates the example for (I).□

[Figure 5 here]

Although decision relevant information is conveyed in Example 2, it is not the case that contributions play any role in securing access — there is no access. Moreover, there is no necessary relationship between the level of contribution and the expected

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<sup>10</sup>Computational details are given in the appendix.

location of the group's ideal point relative to that of the legislator. Indeed, access is irrelevant in the current setting. This observation generalizes.

Let  $\sigma^\circ \equiv (\xi^\circ, \delta^\circ)$  denote an equilibrium in which access is never granted (i.e.  $\alpha^\circ(c) = 0 \forall c$ ) and let  $\sigma^* \equiv (\xi^*, \alpha^*, \lambda^*, \delta^*)$  be an equilibrium in which access is sometimes granted (i.e.  $\alpha^*(c) > 0$  for at least some  $c$  given under  $\xi^*$ ). Then say that  $\sigma^\circ$  is  $\epsilon$ -equivalent to  $\sigma^*$  if, loosely speaking, the set of actions the legislator takes in  $\sigma^\circ$  is essentially the same as the set of actions she takes in  $\sigma^*$  (a formal definition is in the appendix). Thus, if  $\sigma^\circ$  is  $\epsilon$ -equivalent to  $\sigma^*$  there is, to all intents and purposes, no necessity for access to be granted: all the information that can be credibly transmitted to the legislator can be so transmitted through the contribution schedule alone.

**Proposition 5:** Assume  $X$  is an interval and  $F$  is smooth and strictly increasing on  $X$ . Let  $\sigma^*$  be any equilibrium in which access is (at least sometimes) granted. Then there exists an  $\epsilon$ -equivalent equilibrium  $\sigma^\circ$  in which access is never granted. Moreover, there is no necessary relationship between contribution size and preference proximity with respect to the group and the legislator.

Thus it is essential for the group to make contributions prior to becoming informed if such contributions are to play an access role of the sort studied here.

### 5. Discussion

Under complete information about an interest group's preferences over legislative decisions, the canonic information-based story connecting campaign contributions to access predicts, as illustrated in Figure 1, a negative relationship between campaign contributions and preference similarity between donor and recipient. However, one of the more robust empirical findings in the literature is that this relationship is

positive. I argued in the Introduction that the prediction of the canonic story is due largely to the complete information assumption on groups' preferences. So, rather than reject the access story out of hand, within the context of a simple model the paper reexamines the argument without this assumption. In this environment, contributions can in principle provide a signal of the value of access to the legislator, in which case the observed empirical pattern of contributions could be generated since the expected value of access is *prima facie* increasing in the extent to which the legislator's and the group's preferences are similar.

The results (Propositions 2, 3 and 4) suggest that when contributions do provide some information on group preferences and so induce access when none would otherwise be forthcoming, they do so only noisily. In particular, if the possible ideal points of groups are sufficiently widely dispersed, groups with preferences that very closely reflect those of the legislator will make the same contribution as groups whose preferences are very distant from those of the legislator. Consequently, while access can be induced by such contributions, the extent to which information can be transmitted through the lobbying process is attenuated and the legislator always faces the prospect of listening to a group with essentially state-independent preferences. On the other hand, first, if the domain of possible group ideal points is quite constrained (in particular, in this model, if the most extreme group ideal point is within one standard deviation of the prior distribution of the unknown policy parameter,  $t$ ) then contributions will still be noisy signals but the lowest types (those closest to the legislator) will give the highest contributions, the next size contribution will come from the next lowest set of types, and so forth; and second, the prospect of facing a group with essentially state-independent preferences is small. So in both cases, when contributions are informative the statistical expectation is that the preferences of groups granted access are close to those of the legislator. Thus, as conjectured, the model generates a positive observed relationship between preference

similarity and contributions.

The preceding claims are predicated on the assumption that contributions are given before details of the legislative agenda are revealed and before the group becomes asymmetrically informed relative to the legislator. In the model, this is motivated by the descriptive stories that describe securing access as securing an option to talk to a legislator should the need arise, and the empirical fact that most details of legislative agendas only emerge over the course of the legislative session. However, it turns out that the particular sequencing of decisions is substantively important. Proposition 5 says that if groups are known to be informed prior to making any contribution, gaining access for purposes of information transmission is irrelevant; the equilibrium contribution schedule *per se* is capable of revealing all of the information that can be credibly revealed. In other words, for contributions to secure access purely for purposes of informational lobbying, legislators must at least be unsure about whether a donor is well-informed on the particular issue of concern at the time of the contribution. If this is not the case and if granting access has substantive value for either the legislator or the group, then such value is not derived from any policy-relevant information transmission. However, whether or not this result holds when a group is known to have information on multiple issues, but Nature selects (say) at most one of these as legislatively relevant in any given session, is unclear.

The model here does not include any electoral considerations, and when these are explicitly introduced a variety of additional issues arise (McCarty and Rothenberg, 1993). In particular, the decision to invest in securing access will be influenced by the probability of any candidate's electoral success. Under such circumstances, it is quite possible to find money and access correlated but not directly connected in any *quid pro quo* sense. As argued earlier, if information is valuable, a legislator will seek data from those informed agents whose preferences

most closely reflect his or her own; knowing this, interest groups prefer legislatures consisting of more people with preferences close to their own, to legislature with fewer such people; therefore, groups give money to candidates who are relatively like themselves to increase the probability of such legislatures arising. *De facto*, therefore, to the extent that money influences electoral outcomes, it will appear that money buys access — and in an indirect way, it does. As it stands, however, this story is itself incomplete: there is evidently a free-rider problem with respect to donors.

## Appendix

**Definition:** A list of strategies,  $\sigma^* \equiv (\gamma^*, \alpha^*, \lambda^*, \delta^*)$ , and a set of beliefs constitute an equilibrium if:

$$(e1) \quad \forall x \in X, \forall c \neq \gamma^*(x),$$

$$E[v(\delta^*(\gamma^*(x), m), t; x) - \gamma^*(x) | \alpha^*, \lambda^*] \geq E[v(\delta^*(c, m), t; x) - c | \alpha^*, \lambda^*];$$

$$(e2) \quad \forall c \in \mathbb{R}_+, \alpha^*(c) > 0 \text{ iff,}$$

$$E[u(\delta^*(c, m), t) - k(c) | \lambda^*] \geq E[u(\delta^*(c, \emptyset), t)];$$

$$(e3) \quad \forall (x, c, t) \in X \times \mathbb{R}_+ \times [0, 1], \forall \lambda \neq \lambda^*(x, c, t),$$

$$v(\delta^*(c, \lambda^*(x, c, t)), t; x) \geq v(\delta^*(c, \lambda(x, c, t)), t; x);$$

$$(e4) \quad \forall (c, m) \in \mathbb{R}_+ \times M, \forall \delta \neq \delta^*(c, m),$$

$$Eu(\delta^*(c, m), t) \geq Eu(\delta(c, m), t; x);$$

(e5) Beliefs at every stage are derived from  $\sigma^*$  and the priors using Bayes Rule, where this is defined.

**Lemma 1:** In any influential equilibrium  $(\lambda^*, \delta^*)$  to the lobbying subgame:

(.1)  $\forall x \in X(c)$ ,  $\lambda^*(x, c, \cdot)$  is characterized by a partition on  $[0, 1]$ ,  $\langle t_0(x) \equiv 0, t_1(x), \dots, t_{N(x)-1}(x), t_{N(x)}(x) \equiv 1 \rangle$ , such that:

(i)  $\forall i = 1, \dots, N(x)$ ,  $\forall s \in (t_{i-1}(x), t_i(x)]$ ,  $\lambda^*(x, c, s) = m_i$  with  $m_i$  distinct across  $i$ ;

(ii)  $\forall i = 1, \dots, N(x)-1$ ,  $t_i(x) = [\delta^*(c, m_i) + \delta^*(c, m_{i+1})] / 2 - x$ .

(.2)  $\forall m_i \in \bigcup_{s=0}^{s=1} \lambda^*(x, c, s)$ ,  $\delta^*(c, m_i) = E[t | m_i]$ .

**Proof:** Let  $x \in X(c)$ . Given  $\delta^*(\cdot)$ , (e3) and the fact that both the group and the legislator use pure strategies in the lobbying subgame imply,  $\forall s, t \in [0, 1]$ :

$$(a1) \quad v(\delta^*(c, \lambda^*(x, c, t)), t; x) \geq v(\delta^*(c, \lambda^*(x, c, s)), t; x)$$

$$(a2) \quad v(\delta^*(c, \lambda^*(x, c, s)), s; x) \geq v(\delta^*(c, \lambda^*(x, c, t)), s; x).$$

Without loss of generality, let  $t > s$ ; and write  $\lambda^*(x, c, t) = m$  and  $\lambda^*(x, c, s) = m'$ .

Using (2), (a1) and (a2) are then equivalent to:

$$(a1') \quad 2(x+t)[\delta^*(c,m)-\delta^*(c,m')] \geq \delta^*(c,m)^2 - \delta^*(c,m')^2;$$

$$(a2') \quad 2(x+s)[\delta^*(c,m)-\delta^*(c,m')] \leq \delta^*(c,m)^2 - \delta^*(c,m')^2.$$

Hence,  $[\delta^*(c,m)-\delta^*(c,m')](t-s) \geq 0$ ; in which case  $\delta^*(c,m) \geq \delta^*(c,m')$ . Moreover,  $\exists t(x,m,m')$  such that for  $\delta^*(c,m) > \delta^*(c,m')$  we have,

$$(a3) \quad \forall x \geq 0, t(x,m,m') = \max.\{0, [\delta^*(c,m)+\delta^*(c,m')]/2\};$$

$$\forall x < 0, t(x,m,m') = \min.\{[\delta^*(c,m)+\delta^*(c,m')]/2, 1\};$$

and,

$$\forall s < t(x,m,m'), v(\delta^*(c,m'),s;x) > v(\delta^*(c,m),s;x)$$

$$\forall s > t(x,m,m'), v(\delta^*(c,m'),s;x) < v(\delta^*(c,m),s;x).$$

Claim (.1) now follows.

Now fix  $\lambda^*(x,c,t)$ . By (1) and (e4), for any  $m_i \in \bigcup_{X(c)} \bigcup_{s=0}^{s=1} [\bigcup \lambda^*(x,c,s)]$ ,

$$(a4) \quad \delta^*(c,m_i) = \operatorname{argmax}_{b \in \mathbb{R}} -(E[s|m_i]-b)^2 - \operatorname{var}[s|m_i] = E[s|m_i]. \square$$

**Proof Proposition 1:** (necessity) If (\*) fails, then  $\forall Y \subseteq X(c)$ ,  $\int_Y (1/4 - |x|) dF(x|c) \leq 0$ ; in which case  $\{x \in X \mid |x| < 1/4\}$  has zero measure wrt  $F$  and, therefore, Crawford and Sobel (1982; p.1441) yields the result *a fortiori*.

(sufficiency) By (.1) and (.2) of Lemma 1, if there is any influential equilibrium to the lobbying subgame, there is an equilibrium in which exactly two actions are elicited; say,  $0 \leq a < a' \leq 1$ . Let  $X^+ = \{x \in X(c) \mid x \geq 0\}$ ;  $X^- = X(c) \setminus X^+$ .

Then given  $A = (a,a')$ , (a3) implies,

$$(a5) \quad \forall x \in X^+, t(x|A) = \max.\{0, [a+a']/2 - x\},$$

$$(a6) \quad \forall x \in X^-, t(x|A) = \min.\{[a+a']/2 - x, 1\};$$

where  $t(x|A) = t_1(x)$  as defined in Lemma 1 given  $A$ . By Lemma 1.1(i),  $\lambda(x,c,t|A) = m_1$  ( $m_2$ ) as  $t \leq (>) t(x|A)$ . Given  $\lambda(\cdot)$ , Lemma 1.2 implies,

$$(a7) \quad t(x|A) \in \{0,1\} \quad \forall x \in X(c) \Rightarrow E[t|m_i] = 1/2, \quad i = 1,2.$$

Let  $Y(A) = \{x \in X(c) \mid t(x|A) \notin \{0,1\}\}$ ; then  $a < a'$  only if  $Y(A)$  has positive measure wrt  $F$ . Let  $Z(A) = X(c) \setminus Y(A)$ . By Lemma 1.1 and  $a < a'$ : (i)  $\forall x \in Y(A)$ ,  $\lambda(x,c,t|A) = m_1 \forall t \leq t(x|A)$  &  $\lambda(x,c,t|A) = m_2 \forall t > t(x|A)$ ; (ii)  $\forall x \in Z(A) \cap X^+$ ,  $\lambda(x,c,t|A) = m_2 \forall t \in [0,1]$ ; and (iii)  $\forall x \in Z(A) \cap X^-$ ,  $\lambda(x,c,t|A) = m_1 \forall t \in [0,1]$ . Then, by Bayes Rule:

$$\text{Pr.}[x \in Y(A) | m_1] = \int_{Y(A)} t(x|A) dF(x|c) / p(A),$$

where  $p(A) \equiv \left[ \int_{Y(A)} t(x|A) dF(x|c) + \int_{Z(A) \cap X^-} dF(x|c) \right]$ . By Lemma 1.2:

$$(a8) \quad \delta(\cdot, m_1) = \left[ \left( \int_{Y(A)} t(x|A) dF(x|c) \right)^2 + \int_{Z(A) \cap X^-} dF(x|c) \right] / 2p(A),$$

so  $\delta(\cdot, m_1) \in (0, 1/2)$ . Similarly, derive:

$$(a9) \quad \delta(\cdot, m_2) =$$

$$\left[ \int_{Y(A)} [1-t(x|A)] dF(x|c) + \int_{Y(A)} [1+t(x|A)] dF(x|c) + \int_{Z(A) \cap X^+} dF(x|c) \right] / 2[1-p(A)],$$

so  $\delta(\cdot, m_2) \in (1/2, 1)$ . Now define the mapping  $h$  on  $[0, 1/2] \times [1/2, 1]$  by:

$$(a10) \quad \forall A = (a, a') \in [0, 1/2] \times [1/2, 1], \quad h(a, a') = (\delta_1, \delta_2);$$

where  $\delta_1$  and  $\delta_2$  are defined by (a8) and (a9), respectively. Then  $h$  is a continuous mapping from  $[0, 1/2] \times [1/2, 1]$  into itself, and so has a fixed point; say,  $h(\delta_1^*, \delta_2^*) = (\delta_1^*, \delta_2^*)$ . By construction  $(\lambda^*, \delta^*)$  such that  $\lambda^*(\cdot) \equiv \lambda(\cdot | (\delta_1^*, \delta_2^*))$  and  $\delta^* = (\delta_1^*, \delta_2^*)$  is an equilibrium to the lobbying subgame.  $(\lambda^*, \delta^*)$  is influential if  $\delta_1^* < 1/2$ . To check this, suppose not. Then for  $A = (\delta_1^*, \delta_2^*)$ ,

$$(a11) \quad \delta_1^* = \left[ \left( \int_{Y(A)} t(x|A) dF(x|c) \right)^2 + \int_{Z(A) \cap X^-} dF(x|c) \right] / 2p(A) = 1/2$$

$$\Leftrightarrow \left[ \left( \int_{Y(A)} t(x|A) dF(x|c) \right)^2 + \int_{Z(A) \cap X^-} dF(x|c) \right] = p(A)$$

$$\Leftrightarrow \int_{Y(A)} t(x|A) dF(x|c) \in \{0, 1\}.$$

By definition,  $x \in Y(A)$  iff  $t(x|A) \notin \{0, 1\}$ . Therefore, if  $\int_{Y(A)} t(x|A) dF(x|c) = 0$

then  $\int_{Y(A)} dF(x|c) = 0$ . Hence,  $\int_{Z(A)} dF(x|c) = 1$ , so  $Z(A) = X(c)$ . By (a4) and

(a6):

$$(a12) \quad \forall x \in Z(A), t(x|A) = \text{median}\{0, [\delta_1^* + \delta_2^*]/2 - x, 1\} \in \{0,1\}.$$

Hence  $\delta_1^* = 1/2$  implies,

$$(a13) \quad \forall x \in X^+, 1/4 - x + \delta_2^*/2 \leq 0;$$

$$\forall x \in X^-, 1 \leq 1/4 - x + \delta_2^*/2.$$

In turn, (a13) and  $\delta_2^* \geq 1/2$  imply  $1/4 - |x| < 0 \forall x \in X(c)$ . But by (\*),  $\exists Y \subseteq X(c)$  such that  $\int_Y (1/4 - |x|) dF(x|c) > 0$ : contradiction. Therefore, (a11) can only hold if  $\int_{Y(A)} t(x|A) dF(x|c) = 1$ , in which case  $t(x|A) = 1/4 - x + \delta_2^*/2 \in (0,1) \forall x \in Y(A)$ . But this contradicts  $\int_{X(c)} dF(x|c) = 1$ .  $\square$

**Proof of Proposition 2:** That (i) and (ii) are (individually) necessary and (jointly) sufficient for an equilibrium in which  $\gamma^*(x) = c > 0 \forall x \in X$  follows directly from (7) and (8). (And a necessary condition for either to occur is (\*) of Proposition 1.) The final statement of the result follows from  $k'(c) \leq 0 \forall c \geq 0$ , (7) and (8).  $\square$

**Proof of Proposition 3:** Suppose not; then  $\gamma^*$  is separating on some  $Y \subseteq \hat{X} \cap (0, \bar{x})$ . For any  $x \in Y$ , let  $\Lambda^*(x) \equiv (\lambda^*(x, \cdot), \delta^*(\cdot))$  denote a lobbying equilibrium, conditional on  $x$  being common knowledge, in which the associated partition satisfying Lemma 1.1 is of size  $N(x)$ . By (e1),  $\forall x, x' \in X$ :

$$(a14) \quad qV^*(\gamma^*(x), x) - \gamma^*(x) \geq qV^*(\gamma^*(x'), x) - \gamma^*(x')$$

$$(a15) \quad qV^*(\gamma^*(x'), x') - \gamma^*(x') \geq qV^*(\gamma^*(x), x') - \gamma^*(x)$$

(where  $V^*(\gamma^*(x), x) \equiv E[v(\delta^*(\gamma^*(x), \lambda^*(x, \gamma^*(x), t)), t, x] | \cdot]$  and  $V^*(\gamma^*(x), x') \equiv E[v(\delta^*(\gamma^*(x), \lambda^*(x', \gamma^*(x), t)), t, x') | \cdot]$ , etc.). By (8),  $\gamma^*(x) \neq 0$  only if  $\Lambda^*(x)$  is influential; i.e.  $N(x) \geq 2$ . Hence  $\gamma^*$  separating on  $Y$  implies  $\gamma^*(x) > 0$  a.a.  $x \in Y$ . Since  $\hat{X}$  is an open interval and  $V^*(\cdot)$  is differentiable, a necessary condition for (a14) and (a15) to hold on  $Y$  is the following local incentive compatibility condition:

$$(a16) \quad \forall x \in Y, d[qV^*(\gamma^*(x'),x) - \gamma^*(x')]/dx'|_{x'=x} = 0.$$

Therefore, for any  $x < x'$ ,  $x, x' \in Y$ :

$$(a17) \quad q \int_x^{x'} [dV^*(\gamma^*(y),y)/dy] dy = \int_x^{x'} \gamma^{*'}(y) dy \\ \Rightarrow q[V^*(\gamma^*(x'),x') - V^*(\gamma^*(x),x)] = [\gamma^*(x') - \gamma^*(x)].$$

With (a14) and (a15), therefore, (a17) implies  $\forall x, y \in Y$ :

$$(a18) \quad [V^*(\gamma^*(x),x) - V^*(\gamma^*(x),y)] \geq 0.$$

Consider any  $x, y \in Y$  with  $x > y$ . Let  $\hat{V}(\gamma^*(x),y)$  denote the expected payoff to the group with ideal point  $y$  from playing exactly the equilibrium strategies for the group with ideal point  $x$ ; i.e.  $\hat{V}(\gamma^*(x),y) \equiv E[v(\delta^*(\gamma^*(x),\lambda^*(x,\gamma^*(x),t)),t,y) | \cdot]$ . For all  $i = 1, \dots, N(x)$ , let  $\hat{t}_i(x) \equiv [t_i(x) + t_{i-1}(x)]/2$  and  $\delta_i^* \equiv \delta^*(\gamma^*(x),m_i)$  where,  $\forall t \in (t_{i-1}(x), t_i(x))$ ,  $m_i = \lambda^*(x, \gamma^*(x), t)$ . Then Lemma 1 and (2) yield,

$$(a19) \quad [\hat{V}(\gamma^*(x),y) - V^*(\gamma^*(x),x)] = \sum_{i=1}^{i=N(x)} \hat{t}_i(x) [(x + \hat{t}_i(x) - \delta_i^*)^2 - (y + \hat{t}_i(x) - \delta_i^*)^2] \\ = (x^2 - y^2) + 2(x-y) \sum_{i=1}^{i=N(x)} \hat{t}_i(x) [\hat{t}_i(x) - \delta_i^*].$$

Since  $\gamma^*$  is separating by supposition, Lemma 1 implies  $\delta^*(\gamma^*(x),m_i) = \hat{t}_i(x)$ , all  $i = 1, \dots, N(x)$ . Therefore,  $[\hat{V}(\gamma^*(x),y) - V^*(\gamma^*(x),x)] = (x^2 - y^2) > 0$ . But then, since  $\hat{V}(\gamma^*(x),y) - V^*(\gamma^*(x),y) \leq 0$  by definition of  $V^*(\cdot, y)$ ,  $[V^*(\gamma^*(x),x) - V^*(\gamma^*(x),y)] < 0$ : contradiction of (a18).  $\square$

**Proof of Proposition 4:** Let  $X^+ \equiv [0, \bar{x})$  and  $X^- \equiv X \setminus X^+$ . Assume  $\gamma^*$  is semi-pooling; then  $\exists x, y$  such that  $\gamma^*(x) \neq \gamma^*(y)$ . For each equilibrium contribution  $c_i$ , let  $A_i = \{a_{1(i)}, \dots, a_{N(i)}\}$  denote the set of actions elicited in the lobbying subgame equilibrium induced by  $\gamma^*(\cdot) = c_i$ ; label  $A_i$  such that  $a_{j(i)} > a_{(j-1)(i)} \forall j \geq 1$ . By Lemma 1.2,  $a_{N(i)} \in [1/2, 1) \forall i = 0, \dots, L$ . So by Lemma 1.1,  $\forall y \geq 1$  such that  $\gamma^*(y) = c_i$ ,  $i = 0, \dots, L$ ,  $t_{N(i)-1}(y) = \max\{0, [a_{N(i)} + a_{N(i)-1}]/2 - y\} = 0$ . Let

$a_{N(i^*)} \equiv \max_i a_{N(i)}$  and consider any  $j \neq i^*$ . Then  $\forall y \geq 1$ :

$$(a20) \quad [V^*(c_{i^*}, y) - V^*(c_j, y)] = (y + (1/2) - a_{N(j)})^2 - (y + (1/2) - a_{N(i^*)})^2 \\ = (a_{N(i^*)} - a_{N(j)})(2y + 1 - a_{N(j)} - a_{N(i^*)}).$$

Hence,  $\forall j \neq i^*$ ,  $[V^*(c_{i^*}, y) - V^*(c_j, y)]$  is strictly positive and increasing in  $y$ . It follows that  $\exists y_2 > 0$  such that

$$qV^*(\gamma^*(y), y) - \gamma^*(y) < (=) qV^*(c_{i^*}, y) - c_{i^*}$$

as  $y > (=) y_2$ . Therefore,  $X(c_{i^*}) \supseteq [y_2, \infty)$ . If  $Z_{i^*}^+ \equiv X(c_{i^*}) \cap X^+ = X^+$  then, by symmetry of expected payoffs between  $x$  and  $-x$ ,  $Z_{i^*}^- \equiv X(c_{i^*}) \cap X^- = X^-$ ; but this contradicts  $\gamma^*$  semi-pooling. Hence,  $Z_{i^*}^+ \subset X^+$  and, by Proposition 1, if  $a_1(i^*) < a_{N(i^*)}$  then  $X(c_{i^*}) \cap [0, 1/4] \neq \emptyset$ . Let  $Z_{i^*}^+ = [y_0, y_1) \cup [y_2, \infty)$ . Suppose  $y_1 = y_2$  and  $y_0 > 0$ . If  $\alpha^*(\gamma^*(0)) = 1$ , Lemma 1,  $\text{supp.} F \supset [0, y_0)$  and  $(\lambda^*(\cdot), \delta^*(\cdot))$  most influential imply  $a_{N(0)} > a_{N(i^*)}$ : contradiction of  $a_{N(i^*)} \equiv \max_i a_{N(i)}$ . If  $\alpha^*(\gamma^*(0)) = 0$  then  $\gamma^*(0) = 0$  and  $\delta^*(0, \emptyset) = 1/2$ . Given  $|A_{i^*}| \geq 2$ , Lemma 1 and (2) imply (with, *mutatis mutandis*, the notation used in the proof to Proposition 3),

$$[\hat{V}(c_{i^*}, 0) - V^*(c_{i^*}, y_0)] = y_0^2 + 2y_0 \sum_{i=1}^{i=N(i^*)} t_i(y_0)[t_i(y_0) - \delta_i^*].$$

By supposition,  $Z_{i^*}^+ = [y_0, \bar{x})$ . By Lemma 1 and (2), therefore,  $t_i(y_0) \geq \delta_i^*$ , all  $i$ . Therefore,  $[\hat{V}(c_{i^*}, 0) - V^*(c_{i^*}, y_0)] \geq y_0^2$ . Similarly,  $V^*(0, 0) - V^*(0, y_0) = y_0^2 > 0$ . Hence, since  $qV^*(c_{i^*}, y_0) - c_{i^*} \geq qV^*(0, y_0)$  by (e1),  $qV^*(0, 0) < qV^*(c_{i^*}, 0) - c_{i^*}$ : contradiction of  $\gamma^*(0) = 0$  being a best response. Therefore,  $y_1 = y_2$  and  $y_0 > 0$  is impossible. And clearly,  $y_1 = y_2$  and  $y_0 = 0$  is impossible since  $Z_{i^*}^+ \neq X^+$ . Hence,  $y_1 < y_2$ . Now suppose  $y_0 > 0$ . Then  $\gamma^*(0) \neq \gamma^*(x) \forall x \in (y_1, y_2)$ . To see this, suppose not; then  $\gamma^*(0) = c_0$  and (e1) imply,

$$(a21) \quad q[V^*(c_0, y_i) - V^*(c_{i^*}, y_i)] = [c_0 - c_{i^*}], \quad i = 0, 1, 2.$$

But for any set of actions  $a_1 < \dots < a_N$ , direct computation yields that there exists a unique value of  $x \geq 0$  at which  $V^*(\cdot, x)$  is a local minimum; so (a21) can hold for at most two values of  $y \geq 0$ . Hence,  $\gamma^*(0) \neq \gamma^*(x) \forall x \in (y_1, y_2)$ , in which case,

arguing as above, we again have either that  $a_{N(0)} > a_{N(i^*)}$  or that  $\gamma^*(0)$  is not a best response: contradiction. Therefore,  $Z_{i^*}^+ = [0, y_1) \cup [y_2, \infty)$ , and  $i^* = 0$ . An entirely symmetric argument establishes  $a_{1(i^*)} \equiv \min_i a_{N(i)}$  and  $Z_{i^*}^- \equiv Z_0^- = (-\infty, w_2] \cup (w_1, 0]$ . Let  $\gamma^*(y_1) = c_i$ . Proceeding as above, we conclude  $X(c_i) = [y_1, y_3) \cup [y_4, y_2)$ , with  $y_3 = y_4$  iff  $L = 1$  (and similarly for  $Z_1^-$ ). Since  $L$  is finite, iterating the argument then yields the proposition if  $c_i > c_{i+1} \forall i = 0, \dots, L-1$ . I now show this. Definition of  $y_1$  and (e1) imply,

$$(a22) \quad V^*(c_0, y_1) - V^*(c_i, y_1) = [c_0 - c_i]/q.$$

By Lemma 1 and  $(\lambda^*(\cdot), \delta^*(\cdot))$  most influential,  $F$  single-peaked and (from above)  $a_{N(0)} > a_{N(i)} \geq 1/2 \geq a_{1(i)} > a_{1(0)}$  imply  $N(i) \leq N(0)$ . Since  $t \sim U[0,1]$  and the group's preferences are quadratic, Crawford and Sobel (1982: Thm.5), *mutatis mutandis*, yields  $\text{LHS}(a22) > 0$ ; so  $c_0 > c_i$ . A similar argument gives  $c_1 > c_i \forall i > 1$ ; etc.. The result follows.  $\square$

**Definition:** Let  $\sigma^\circ \equiv (\xi^\circ, \delta^\circ)$  denote an equilibrium in which access is never granted and let  $\sigma^* \equiv (\xi^*, \alpha^*, \lambda^*, \delta^*)$  be an equilibrium in which access is sometimes granted. Then say  $\sigma^\circ$  is  $\epsilon$ -equivalent to  $\sigma^*$  if and only if  $\exists \bar{\epsilon} > 0$  such that  $\forall \epsilon < \bar{\epsilon}$ : (1) the number of actions elicited by  $\xi^\circ$  is identical to the number of actions elicited by  $(\xi^*, \lambda^*)$ ; and (2) for each action  $\delta^\circ(\xi^\circ(x, t), \emptyset)$ , there exists a distinct action  $\delta^*(\xi^*(x', t'), \lambda^*(x', t'))$  such that  $|\delta^\circ(\xi^\circ(x, t), \emptyset) - \delta^*(\xi^*(x', t'), \lambda^*(x', t'))| < \epsilon$ .

**Proof of Proposition 5:** First note that there can be no equilibrium in which  $t \neq t'$  implies  $\xi^*(\cdot, t) \neq \xi^*(\cdot, t')$ . To see this suppose not. By sequential rationality,  $\delta^*(\cdot)$  depends exclusively on the legislator's beliefs regarding the true value of  $t$ . So if  $\xi^*(\cdot)$  separates wrt  $t$  on  $[0,1]$ , Lemma 1.2 gives  $\delta^*(\xi^*(\cdot, t), \cdot) = t$ . But  $\forall (x, t') \neq (0, t)$  such that  $x+t' = t$ ,  $v(t, x, t') > v(t', x, t')$ ; and since  $\{(x, t') \mid v(t, x, t') = 0\}$

has strictly positive measure wrt  $F$ ,  $\delta^*(\xi^*(\cdot, t), \cdot) = t$  cannot be a best response. Hence  $\xi^*(\cdot)$  separating on  $t$  cannot be equilibrium behaviour. And, by Proposition 2,  $\xi^*$  cannot separate wrt  $x$ . Now let  $\sigma^*$  be an equilibrium in which  $\alpha^*(\xi^*(x, t)) = 1$  for at least some  $(x, t) \in X \times [0, 1]$ . Let  $A_i$  denote the set of actions elicited by  $\xi^*(x, t) = c_i$ , and let  $A = \cup_i A_i$ . Label actions  $a_j \in A$  so that  $a_1 < a_2 < \dots < a_K$ . By Lemma 1,  $0 < a_1$  and  $a_K < 1$ . By definition of equilibrium behaviour,  $\forall (x, t), (x', t') \in X \times [0, 1]$ :

$$(a23) \quad -q(x+t-\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)))^2 - \xi^*(x, t) \geq \\ -q(x+t-\delta^*(\xi^*(x', t'), \lambda^*(x', \xi^*(x', t'), t')))^2 - \xi^*(x', t').$$

$$(a24) \quad -q(x'+t'-\delta^*(\xi^*(x', t'), \lambda^*(x', \xi^*(x', t'), t')))^2 - \xi^*(x', t') \geq \\ -q(x'+t'-\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)))^2 - \xi^*(x, t).$$

Let  $\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)) = a_{j+1}^*$ ;  $\delta^*(\xi^*(x', t'), \lambda^*(x', \xi^*(x', t'), t')) = a_j^*$ ;  $\xi^*(x, t) = c$ ; and  $\xi^*(x', t') = c'$ . Then (a23) and (a24) imply,

$$(a25) \quad x+t \geq (c-c')/2q(a_{j+1}^* - a_j^*) + (a_{j+1}^* + a_j^*)/2 \geq x'+t'.$$

It follows directly from (a25) that  $A_i$  is "connected"; i.e. if  $a_j \in A_i$  and  $a_{j+m} \in A_i$ , then  $a_{j+l} \in A_i \forall l = 1, \dots, m-1$ . Hence,  $\{A_i\}_i$  is a partition of  $A$  and  $\{(x, t) | \xi^*(x, t) = c_i\}_i$  is a partition of  $X \times [0, 1]$ . Now construct  $\sigma^\circ$   $\epsilon$ -equivalent to  $\sigma^*$  as follows. For all  $a_j \in A$  and for any  $(x, t) \in X \times [0, 1]$  such that  $\lambda^*(x, \xi^*(x, t), t) \neq \emptyset$  and  $\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)) = a_j$ , set  $\xi^\circ(x, t) = \xi^*(x, t) + \mu\nu_j$ ; where  $\mu > 0$  is small,  $|\nu_j| \neq 0$  is arbitrarily small, and  $\nu_j$  is chosen so that,  $\forall (x, t), (x', t') \in X \times [0, 1]$ ,  $\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)) \neq \delta^*(\xi^*(x', t'), \lambda^*(x', \xi^*(x', t'), t'))$  implies  $\xi^\circ(x, t) \neq \xi^\circ(x', t')$ . For any  $(x, t)$  such that  $\lambda^*(x, \xi^*(x, t), t) = \emptyset$ , set  $\xi^\circ(x, t) = \xi^*(x, t)$ . Now, by Lemma 1.2,  $\delta^*(\xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)) = E[t | \xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)]$ . Therefore, since  $X$  is an interval and  $F$  smooth, the partition structure induced on  $A$  and  $X \times [0, 1]$  by  $\sigma^*$  implies that  $\forall (x, t)$ ,

$$\lim_{\mu \rightarrow 0} E[t | \xi^\circ(x, t), \emptyset] = E[t | \xi^*(x, t), \lambda^*(x, \xi^*(x, t), t)].$$

Hence, by continuity, (a25) and  $0 < a_j < a_{j+1} < 1 \forall j$ ,  $\sigma^*$  is an  $\epsilon$ -equivalent equilibrium to  $\sigma^*$  for  $\mu$  sufficiently small. And since no restrictions on the sign of  $\nu_j$  have been imposed, the second claim of the proposition follows.  $\square$

**Computational details for Example 1:** Let  $F(x) = p + x^I/\pi$ ,  $x \in [0, \bar{x}]$  and assume the equilibrium is such that:

$$\gamma^*(x) = c > 0 \forall x \in \{0\} \cup [y, \bar{x}] \text{ and } \gamma^*(x) = 0 \text{ otherwise;}$$

$$\alpha^*(c) = 1 \text{ and } \alpha^*(0) = 0;$$

$$\lambda^*(0, c, s) = m_1 \forall s < \hat{t}; \lambda^*(0, c, s) = m_2 \forall s \geq \hat{t}; \lambda^*(x, c, s) = m_2 \forall s \in [0, 1];$$

$$\delta^*(c, m) = E[t|c, m] \text{ and } \delta^*(0, \emptyset) = E[t|0, \emptyset] = 1/2.$$

Given  $\lambda^*$  and the prior on  $t$  being uniform,

$$(a26) \quad \delta^*(c, m_1) = \hat{t}/2$$

since only a group with preferences identical to the legislator's would send such a message. However, both this type of group and the extreme types (i.e.  $x \in [y, \bar{x}]$ ) might send  $m_2$ . By Bayes rule,

$$(a27) \quad \begin{aligned} \delta^*(c, m_2) &= \Pr[x=0|c, m_2](1+\hat{t})/2 + \Pr[x \geq y|c, m_2]/2 \\ &= p(1+\hat{t})/[1-y^I/\pi]^2 + [1-p-y^I/\pi]/[1-y^I/\pi]^2 \\ &= [\pi(1+p\hat{t})-y^I]/(\pi-y^I)^2. \end{aligned}$$

By Lemma 1,  $\lambda^*(0, c, s)$  is a best response strategy if

$$(a28) \quad \hat{t} = [\delta^*(c, m_1) + \delta^*(c, m_2)]/2.$$

Similarly,  $\lambda^*(x, c, s) = m_2$  is a best response for any  $x \in [y, \bar{x}]$  if  $y \geq [\delta^*(c, m_1) + \delta^*(c, m_2)]/2$ . By (9),  $\gamma^*(x) = c$  is a best response if  $q[V^*(\lambda^*, \delta^*; c, x) - V^*(\emptyset, \delta^*; x, 0)] - c \geq 0$ . Using (2) and substituting yields  $x = 0$  just indifferent between contributing  $c$  and contributing nothing if

$$(a29) \quad \begin{aligned} &(1/2 - \delta^*(0, \emptyset))^2 + 1/12 - \\ &\left\{ \hat{t}[(\hat{t}/2 - \delta^*(c, m_1))^2 + \hat{t}^2/12] + (1-\hat{t})\left[\left((1+\hat{t})/2 - \delta^*(c, m_2)\right)^2 + (1-\hat{t})^2/12\right] \right\} = c/q \\ \Leftrightarrow &1-\hat{t}^3 - (1-\hat{t})^3 - 12(1-\hat{t})\left((1+\hat{t})/2 - \delta^*(c, m_2)\right)^2 - 12(c/q) = 0. \end{aligned}$$

And a group of type  $y$  will be indifferent between contributing  $c$  and not contributing if,

$$(a30) \quad y^2 + 1/12 - (y + 1/2 - \delta^*(c, m_2))^2 - 1/12 - c/q = 0$$

$$\Leftrightarrow y = [c/q + (\delta^*(c, m_2) - 1/2)^2] / ((\delta^*(c, m_2) - 1/2)2).$$

Given parameters,  $p, \pi, r$  and  $q$ , equations (a26)–(a30) can be solved numerically to yield equilibrium values for  $t$ ,  $\delta^*(c, m_1)$ ,  $\delta^*(c, m_2)$ ,  $y$  and  $c$ . Finally, given  $c$ , the cost function  $k(\cdot)$  is chosen according to (8) to make  $\alpha^*(\cdot)$  a best response strategy.  $\square$

**Computational details for Example 2:** Let  $F(x) = x$  with  $x \in [0, 1]$ . Assume  $\xi^*(x, t) = \epsilon \forall (x, t) \in [0, 1]^2$  such that  $x+t < b \in (0, 2)$ , and  $\xi^*(x, t) = 0 \forall (x, t) \in [0, 1]^2$  such that  $x+t \geq b$ . Assume also that  $\alpha^*(\cdot) \equiv 0$ . Then,

$$(a31) \quad \delta^*(\epsilon, \emptyset) = E[t | \xi^*(x, t) = \epsilon] \\ = \frac{b}{2} \left[ \int_0^b (b-x)f(x)dx \right] / 2F(b) = b/4.$$

$$(a32) \quad \delta^*(0, \emptyset) = E[t | \xi^*(x, t) = 0] \\ = [1 - F(b) + \int_{\max\{b-1, 0\}}^b (1+b-x)f(x)dx] / 2(1 - F(\max\{b-1, 0\})) \\ = [1 + b^2/2] / 2 \text{ if } \max\{b-1, 0\} = 0.$$

Given  $\delta^*$ ,  $\xi^*$  is a best response if (a33) and (a34) hold:

$$(a33) \quad -q(x+t-\delta^*(\epsilon, \emptyset))^2 - \epsilon \geq -q(x+t-\delta^*(0, \emptyset))^2, \forall (x, t) \text{ such that } x+t < b;$$

$$(a34) \quad -q(x+t-\delta^*(0, \emptyset))^2 \geq -q(x+t-\delta^*(\epsilon, \emptyset))^2 - \epsilon, \forall (x, t) \text{ such that } x+t \geq b.$$

Together, (a33) and (a34) yield

$$(a35) \quad b = \epsilon/2q(\delta^*(\epsilon, \cdot) - \delta^*(0, \cdot)) + (\delta^*(\epsilon, \cdot) + \delta^*(0, \cdot))/2.$$

Assume  $\max\{b-1, 0\} = 0$  and take  $\epsilon > 0$  arbitrarily small. Then given  $q$ , (a31), (a32) and (a35) can be solved numerically for  $b$ ,  $\delta^*(\epsilon, \cdot)$  and  $\delta^*(0, \cdot)$ .  $\square$

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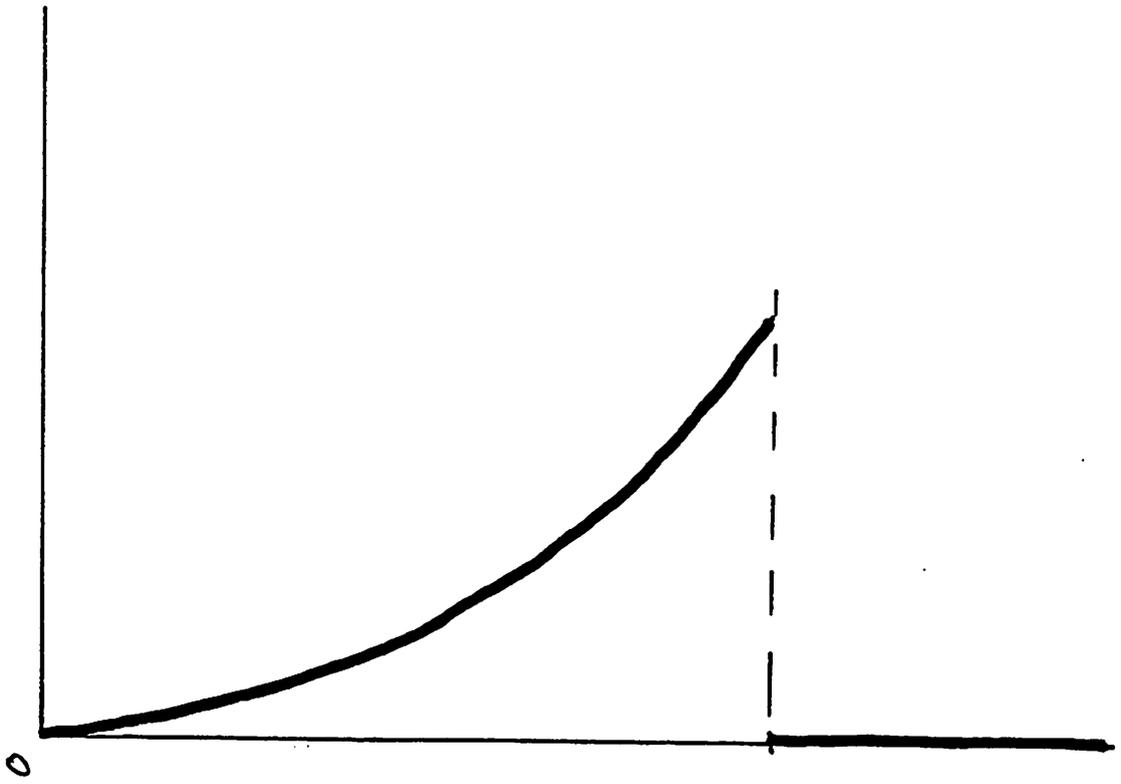
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FIGURE 1

PREDICTION OF CANONIC MODEL

contribution



Legislator  
and Group  
have identical  
preferences

Preference disparity  
increasing →

FIGURE 2  
TIME-LINE

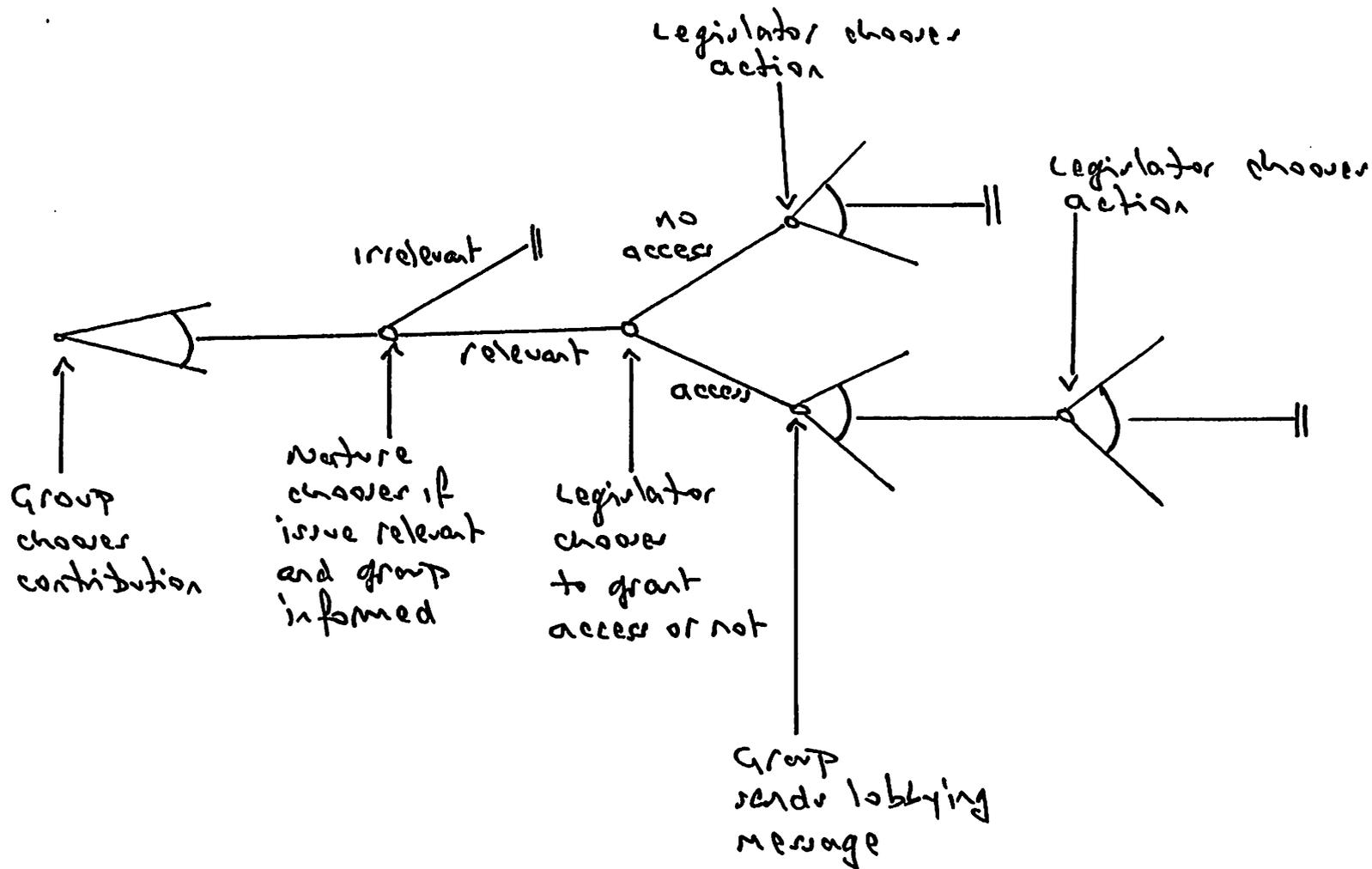


FIGURE 3  
ILLUSTRATION OF SEMI-POOLING  
CONTRIBUTION STRATEGY ON  $X = (-\bar{x}, \bar{x})$

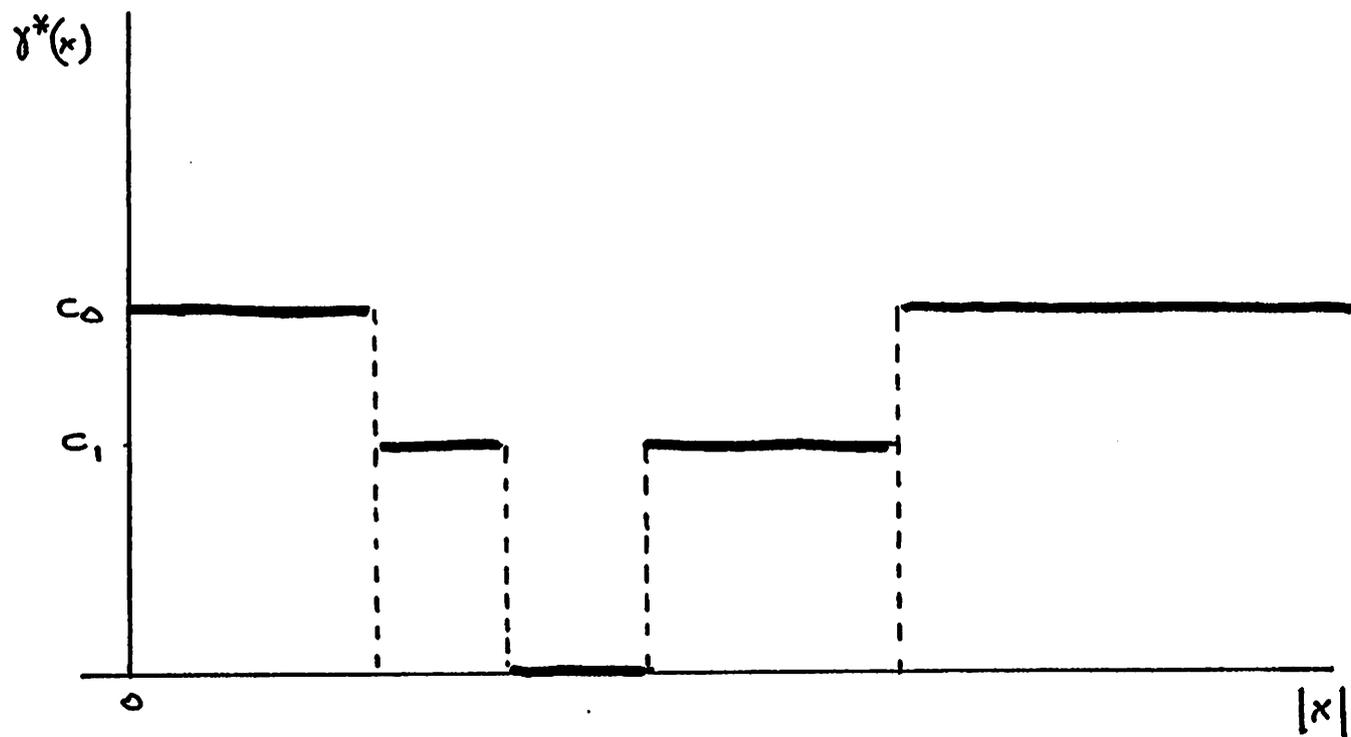
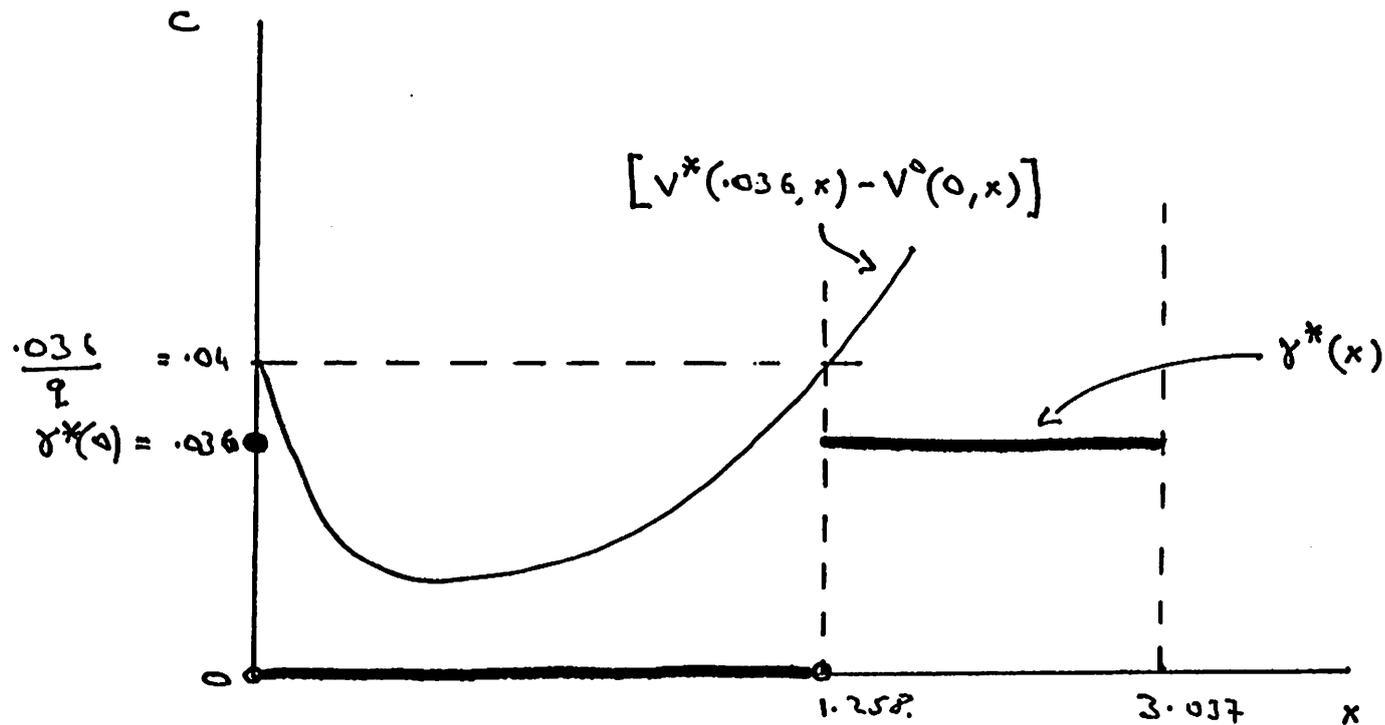


FIGURE 4a  
SEMI-POOLING EQUILIBRIUM  
IN NUMERICAL EXAMPLE 1



$$F(x) = 0.02 + \frac{x^{1/4}}{1.347}, \quad x \in [0, 3.037]$$

$$X(0.036) = \{0\} \cup [1.258, 3.037]$$

$$X(0) = (0, 1.258)$$

FIGURE 4b  
 LOBBYING IN GAME  
 IN NUMERICAL EXAMPLE 1

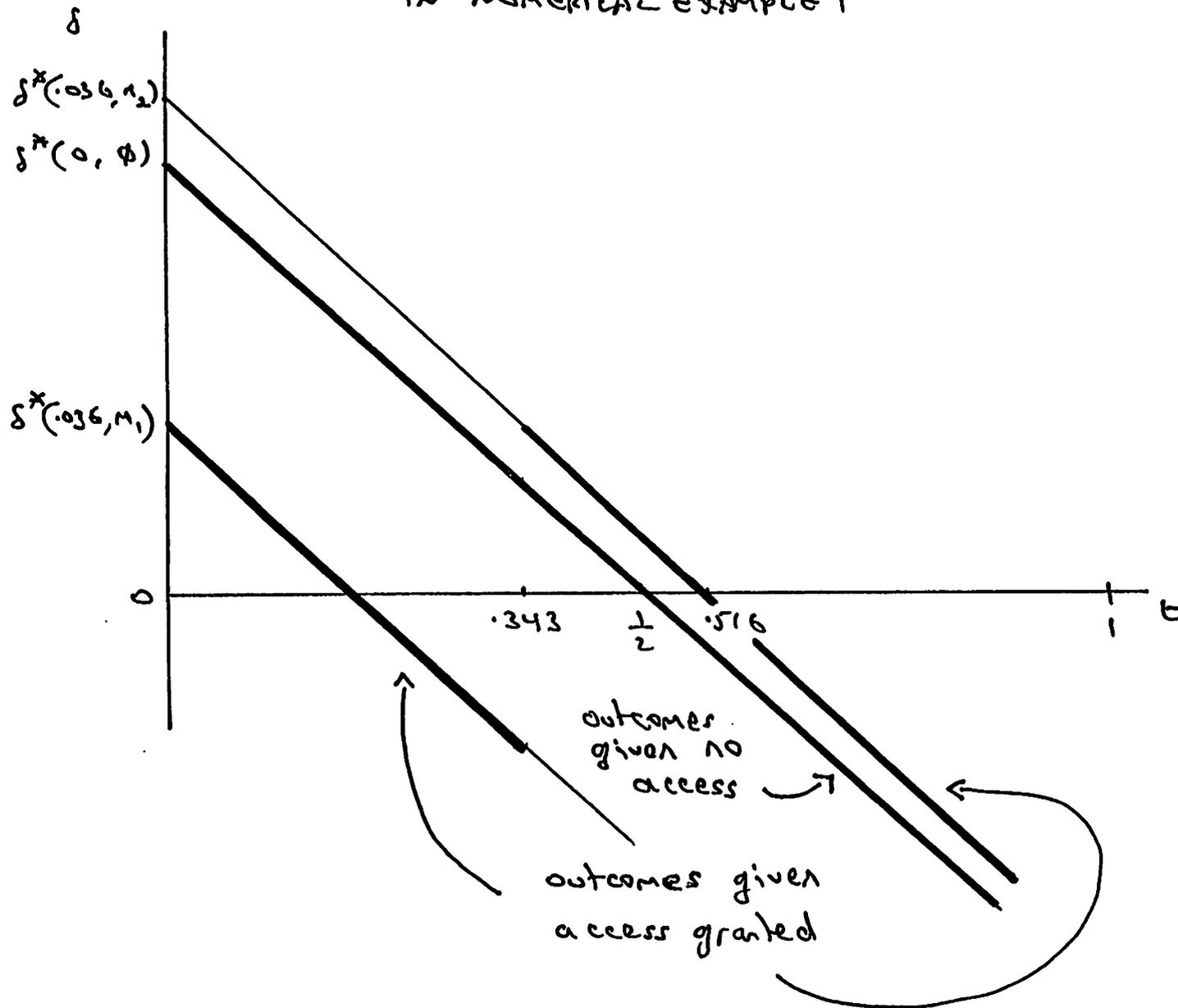


FIGURE 5  
 NUMERICAL EXAMPLE 2

