Endogenous Informational Lobbying

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SUMMARY

The focus of this paper is on individuals' decisions to seek access to influence a legislator's policy choice from a given binary agenda under uncertainty. In the model, influence is exclusively through the provision of information regarding the true state of the world, and money is used exclusively to seek access to the legislator to exert such influence. However, bias can occur through differences in individuals' willingness to contribute to seek access and through choice of argument at the lobbying stage, conditional on access being granted. Among the results are that the decision of moderates (i.e. those with state-dependent induced preferences over the agenda) to seek access is independent of others' decisions, but this is not true of extremists (those who unequivocally favour one or other of the two alternatives); that although the policy preferences of the legislator coincide with those of the moderates, the legislator often sets the required contribution from moderates higher than that from extremists and, moreover, this is so despite the fact that extremists seeking access offer an argument to the legislator which, although informative, gives negligible payoff gains to the legislator; and, finally, that (expected) "bias" in decision making typically exists and persists even when the size of extremist groups is negligible relative to that of the moderate group.

Key words: Informational lobbying, Collective action, Campaign contributions, Legislative access.

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NON TECHNICAL SUMMARY

Relatively little is known about how interest groups influence policy outcomes. One story is that groups give money in exchange for policy decisions. But while there is some evidence that money "buys" at least the attention of legislators, the evidence connecting money and policy decisions *per se* is mixed. An alternative (and by no means mutually exclusive) story is predicated on the observation that legislators make decisions under uncertainty and so value information regarding the political and technical consequences of legislation. As such, they have an incentive to solicit information from more informed agents among whom are special interest groups. Recognising this, groups give money to legislators who share their general preferences over policy outcomes because it is precisely such legislators who will solicit their informational expertise when necessary. Thus the effect of contributions is indirect, through access to the legislator and subsequent informational lobbying. An intuition derived from this story is that policy bias relative to, say, the full information majoritarian decision may be induced through both the selective acquisition of information by groups and the selective decision on which groups are granted access to the legislator. So even though legislators might receive information truthfully from those granted access, the information itself might be inherently biased and the preferences of those granted access may not span the set of all interested parties' preferences. This paper makes a first effort at formalising this intuition. The paper presents a formal model of legislative decision making in which individuals or groups seek policy influence exclusively through the provision of information and money is used exclusively to seek access to the legislator.

After motivating the problem, the paper develops a formal model in which a legislator has to choose one of two alternatives under uncertainty; that is, the choice the legislator wishes to make depends upon some aspect of the world about which he or she is uncertain (for example, the issue may be whether to raise or reduce price supports for milk, and the best choice here depends on whether the market for milk is strong or weak). At the start of the process, the legislator determines necessary levels of contribution for any individual to be granted access; individuals then choose whether or not to seek access by contributing. Because contributing does not guarantee access and there are many individuals, any individual's decision depends on what others are doing. Once contributions are made, the legislator chooses to whom to

grant access and the successful lobbyist makes an argument for his or her favoured decision. An "argument" in the paper is characterised in terms of presenting policy-relevant information to the legislator, and it is not presumed that every argument is necessarily persuasive. Having heard the argument the legislator makes the decision.

Among the results are that the decision to seek access by individuals whose policy preferences over the two alternatives are, like those of the legislator, sensitive to how the uncertainty is resolved, is independent of others' decisions, but this is not true of those who unequivocally favour one or other of the two alternatives; that the legislator often sets the required contribution from those who share his or her policy preferences higher than that from those who do not have the same preferences and, moreover, this is so despite the fact that the latter type of individual offers an argument to the legislator which, although informative, is of negligible value to the legislator; and, finally, that there is an expected and robust "bias" in decision making, consistent with the intuition motivating the analysis.

CONTENTS

1. Introduction

Relatively little is known about how interest groups influence policy outcomes. One story is that groups give money in exchange for policy decisions. But while there is some evidence that money "buys" at least the attention of legislators, the evidence connecting money and policy decisions *per se* is mixed (eg Sorauf, 1992; Wright, 1995). An alternative (and by no means mutually exclusive) story is predicated on the observation that legislators make decisions under uncertainty and so value information regarding the political and technical consequences of legislation. As such, they have an incentive to solicit information from more informed agents among whom are special interest groups. Recognizing this, groups give money to legislators who share their general preferences over policy outcomes because it is precisely such legislators who will solicit their informational expertise when necessary. Thus the effect of contributions is indirect, through access to the legislator and subsequent informational lobbying.

An intuition derived from the preceding story is that policy bias relative to, say, the full information majoritarian decision may be induced through both the selective acquisition of information by groups and the selective decision on which groups are granted access to the legislator. So even though legislators might receive information truthfully from those granted access, the information itself might be inherently biased and the preferences of those granted access may not span the set of all interested parties' preferences. This paper makes a first effort at formalising this intuition. In the model presented below, policy influence is exerted exclusively through the provision of information and money is used exclusively to seek access to the legislator.

More specifically, I consider a model in which a legislator must choose one of two actions under uncertainty; the legislator has state-dependent preferences and prior information on which he or she prefers a given alternative *ex ante*. Individuals' (who may be interpreted as interest groups) induced preferences over the legislator's actions may be constant in the state or state-dependent; call the latter "moderates" and the former "extremists". The (price discriminating) legislator first chooses contribution levels, or access "prices", following which individuals simultaneously decide whether or not to make the appropriate contribution and seek access. For any individual, this decision depends on the relative value he or she places on access and, because lobbying is costly and the legislative decision is a public good, on the extent to which there exist collective action problems within the group to which the individual belongs.

Once contribution decisions are realized, the legislator grants access to at most one agent; this captures the idea that legislators face an opportunity cost of giving time to lobbyists and can only see a fixed number of them. Thus paying the contribution does not guarantee access is granted but it is necessary to have any opportunity to influence the legislative decision. Conditional on access being granted, a lobbyist makes an "argument" for choosing one alternative over another. The form of the argument is that the lobbyist chooses a (possibly) biased experiment that generates a signal correlated with the true state of the world. On observing the experiment and signal, the legislator chooses a policy and payoffs are realized. The idea here is that even when there is no strategic transmission of information at the lobbying stage, we cannot expect lobbyists necessarily to select experiments or make arguments that are most likely to reveal the true state. For example, we do not expect Philip Morris to run and report experiments designed to show nicotine causes cancer, even if this is the case.

Finally, the legislator is assumed to have separable preferences across contributions and policy; consequently, imposing subgame perfection on equilibrium strategies precludes individuals from "buying" policy with money directly. So, as remarked above, policy influence is exerted only through information provision although who gets to provide the information and the nature of this information are endogenous and can be sources of bias in policy–making.

It is worth remarking here that assuming access is granted to only one agent is conservative. As indicated in the concluding section, granting access to multiple lobbyists essentially leads to more information being provided to the legislator. Consequently, allowing access only to a single lobbyist identifies the maximal level of bias that might occur in the model; with multiple lobbyists making arguments, the likelihood of bias declines.

The principal results under the preceding setup are as follows. Suppose the agenda is $\{A,B\}$ and A is the policy decision conditional on the legislator's prior information alone. Then at most moderates and extremists favouring B seek access and, at the lobbying stage, both types offer informative arguments. However, only the moderates give any significant *ex ante* payoff improvements to the legislator. Those favouring B extract all such informational gains through the choice of bias in their argument and, in equilibrium, leave the legislator virtually indifferent between listening to and ignoring their argument. At the contribution giving stage, the likelihood a moderate seeks access is independent of extremists' decisions, but any extremist's decision is sensitive to what others are doing. In equilibrium, however, the legislator chooses the costs of access to moderates and extremists in such a way that the probability any extremist seeks access depends only on the number of extremists in the population, but the probability any moderate seeks access depends on the number of extremists, on the number of moderates and on their respective valuations of the legislative decision. And although the policy preferences of the legislator coincide with those of the moderates, the legislator often sets the required contribution from moderates higher than that from extremists; indeed, the legislator often chooses the costs of access to exclude moderates. Given the bias in argument, therefore, the rationing aspect of access typically induces a bias in favour of those seeking to change the legislator's mind in favour of B (although they are certainly not always successful).

The germane literature on informational lobbying is small but growing (eg Ainsworth, 1993; Austen–Smith, 1993b; Austen–Smith and Wright, 1992; Potters and van Winden, 1992). Most of these papers, however, ignore any interaction between information and contributions, and they take the fact that groups lobby as given. Two exceptions are Austen–Smith (1995) who examines a signaling model of contributions with one group seeking access for (strategic) informational lobbying, and Lohmann (1993) who has multiple groups choosing contributions to signal private information germane to the legislator's binary decision. In Austen–Smith (1995), access is substantive and the contribution is a signal of the likely informational value of access to the legislator, and the focus is on the contribution schedule. In Lohmann (1993), however, contributions are a "yes/no" decision and all of the policy–relevant information is contained in this decision *per se*. The current paper therefore fits between these two earlier contributions. Complementing the literature concerned with influence at the legislative stage is a literature that focuses on the electoral stage of the process. Early work here looked mainly at *quid pro quo* models in which money is given for private goods and services, with the focus on the pattern of contributions; Baron (1989) and Snyder (1990,1991) are the standards here. Electoral models in which money influences candidates campaign platforms and, by implication, their subsequent legislative decisions conditional on being elected, are considered, *inter alia*, by Austen–Smith (1987), Baron (1994), McCarty and Rothenberg (1994), Grossman and Helpman (1996), and Lohmann (1995). Only McCarty and Rothenberg (1994) offer a model that distinguishes between giving money to secure access and giving money to promote electoral success. Moreover, they provide some empirical tests that support these two motivations behind PAC giving in the USA, although they do not explicitly consider any informational issues with respect to access.

2. Model

There are two given alternative policies, A and B. There are two states of the world, also labelled A and B. A legislator has to choose which alternative to adopt and has state contingent payoff $v(x,y)$ for choosing x in state y. Assume for all (policy,state)–pairs (x,y), $v(x,x) > v(x,y)$. The identity of the true state is unknown, however. Without loss of generality, assume the prior belief that the true state is A, $\pi \in (0,1)$, is such that the legislator prefers A over B. In addition to the legislator there are three nonempty groups of individuals, $\mathcal{A}$, $\mathcal{B}$ and $\mathcal{M}$; let the number of agents within each group be, respectively, a, b and m. Individuals in group $\mathcal{M}$ (moderates) have identical policy preferences to those of the legislator: for all $i \in \mathcal{M}$, for all (policy,state)–pairs (x,y), $v_i(x,y) = v(x,y)$. The assumption of identical preferences here is to save on notation; qualitatively, all that matters is that $\mathcal{M}$–types have state–dependent preferences such that alternative x is preferred in state x. Individuals in the remaining two groups have state–independent preferences given by:

$$\forall i \in \mathcal{A},\ \forall y \in \{A,B\}:\quad u_i(x,y) = u(x) \text{ with } u(A) > u(B),$$
$$\forall i \in \mathcal{B},\ \forall y \in \{A,B\}:\quad w_i(x,y) = w(x) \text{ with } w(B) > w(A).$$

All individuals share the prior belief, π; moreover, the legislator's preferences and the allocation of individuals to groups are common knowledge.

The sequence of decisions is as follows. At the first stage, the legislator commits to a list of access "prices", or required contribution levels, $c = (c_{\mathcal{A}},c_{\mathcal{B}},c_{\mathcal{M}})$, with $c_t \geq 0$ all $t = \mathcal{A},\mathcal{B},\mathcal{M}$. Given c, individuals simultaneously choose whether or not to make the necessary contribution to the legislator. From the set of individuals making the required contributions, the legislator chooses one individual to whom to grant access. Conditional on being granted access, an individual presents an argument to the legislator about which policy should be chosen. Finally, having heard the argument the legislator chooses policy A or B and policy payoffs are realized. Assume all agents' preferences are separable and linear in contributions.

The assumed decision sequence precludes the possibility of individuals offering various levels of contribution voluntarily to induce access (since the legislator chooses fixed prices for access), and precludes the possibility of a debate about the appropriate decision for the legislator to make (since the cost of granting access to more than one agent is assumed prohibitive). Discussion of these issues is deferred to a later section of the paper. For now, it suffices to remark that the setup captures the intuition mentioned in the Introduction that access is limited and, consequently, that the information on which a legislator (at least in part) bases a decision is likely to be biased.

The model of an "argument" used in the paper is particularly simple. Assume there is a large, finite and one-parameter set of experiments, or information structures:

$$K = \{k_1, k_2, \ldots, k_{|K|}\} \subset [0,1].$$

In particular, assume $k_1 \equiv 0$, $k_{|K|} \equiv 1$ and, for all $j > 1$, $0 < k_j - k_{j-1} \leq \epsilon$ and ϵ is a very small number.[1] Each experiment $k \in K$ is capable of generating a signal $s \in \{0,1\}$. Given an experiment $k \in K$ and state $x \in \{A,B\}$, let $p(k;x)$ denote the probability the experiment generates a signal $s = 1$. Assume:

[1]An earlier draft of the paper had $K = [0,1]$. Assuming a continuum of experiments forced an indifference property on equilibrium behaviour which in turn supported messier symmetric equilibria to the game than those derived below. Such equilibria, however, are not robust to any finite approximation of K and so are nongeneric. (And it is worth noting, too, that equilibria with finite K exhibit essentially identical qualitative results as those with K a continuum.)

$\forall x \in \{A,B\}$, $p(0;x) = 1-p(1;x) = 0$

$\forall j \notin \{1,|K|\}$, $0 < p(k_j;A) < p(k_j;B) < 1$

$\forall j > 1$, $\forall x \in \{A,B\}$, $p(k_j;x) > p(k_{j-1};x)$

$\forall j > 1$, $p(k_j;A)/p(k_j;B)$ strictly increasing in j.

For purposes of this paper, then, an "argument" is defined to be a choice of an experiment k, the outcome of which is observed by both the legislator and the individual making the argument (the lobbyist). Given that preferences are common knowledge and individuals choose their arguments only after access is granted, it is immaterial whether or not the choice of experiment is observed. (And assuming that only the lobbyist observes the outcome of an experiment and report this strategically adds nothing here but notation; see below.)

The idea of the model here is, first, that individuals can never have complete information about the true state but can make arguments yielding information correlated with the true state; and second, individuals can exercise some control over the likelihood that their argument will generate information favourable to their position. Of course, the more skewed is an argument in favour of an agent's position, the less credible will any such favourable information be to the listener. There is therefore a tradeoff between choosing an experiment that almost surely generates a favourable signal and choosing an experiment that is relatively persuasive given it does yield such a signal. The first three properties assumed of the function $p(\cdot;\cdot)$ reflect these intuitions, while the fourth is a technical assumption insuring a well-defined solution to any individual's decision problem with respect to choice of experiment. To save on notation later, it is convenient to define $P(k) = p(k;A)\pi + p(k;B)(1-\pi)$, the probability of experiment k generating a signal of "1".

For any list of contribution levels $c = (c_{\mathcal{A}},c_{\mathcal{B}},c_{\mathcal{M}})$ and any type $t \in \{\mathcal{A},\mathcal{B},\mathcal{M}\}$, let $N(c_t) \subseteq t$ denote the set of individuals from group t making contributions c_t to the legislator, and let $N(c) = N(c_{\mathcal{A}}) \cup N(c_{\mathcal{B}}) \cup N(c_{\mathcal{M}})$. Then a strategy for the legislator is a triple (c,γ,δ) where:

$$c \in \mathbb{R}^3_+$$
$$\gamma \in \{\text{Probability distributions on } N(c)\}$$
$$\delta\colon K \times \{0,1\} \to \{A,B\}.$$

The choice of c is the list of contributions necessary to be considered for access; γ is a probability distribution on N(c), describing the legislator's selection of who gets access from among those who have paid the necessary "price"; and δ describes the final policy decision conditional on the argument made by the lobbyist (if access is granted to no individual take the argument of δ to be (0,0)). As will be shown later, restricting δ to be a pure strategy is without loss of generality, and restricting the support of γ to N(c) is necessary to generate positive contributions in equilibrium.

For any individual $i \in \mathcal{A} \cup \mathcal{B} \cup \mathcal{M}$, i's strategy is a pair (σ_i, k^i) where:

$$\sigma_i\colon \mathbb{R}^3_+ \to [0,1]$$
$$k^i \in K.$$

The map σ_i describes i's decision on whether to pay the contribution required of i's type, say c_t, and seek access: for any $i \in t$, $c_t \geq 0$, $\sigma_i(c) = \Pr[i \text{ contributes } c_t]$. The decision k^i is i's choice of experiment conditional on being granted access. In what follows, the focus is exclusively on *symmetric subgame perfect Nash equilibria* in which all members of a given group use the same strategy. This is no restriction for the choice of experiment but is a restriction for the access–seeking component of the strategy. Given this, for all individuals $i \in \mathcal{A} \cup \mathcal{B} \cup \mathcal{M}$ write:

$$(\sigma_i,k^i) = \begin{cases} (\alpha,k^{\mathcal{A}}) \text{ if } i \in \mathcal{A} \\ (\beta,k^{\mathcal{B}}) \text{ if } i \in \mathcal{B} \\ (\mu,k^{\mathcal{M}}) \text{ if } i \in \mathcal{M} \end{cases}.$$

3. Policy decision, choice of argument and access

As usual the game is solved via backward induction. The patterns of behaviour at each stage of the sequence are of independent interest, so results for each stage are developed in turn.

It is convenient to introduce some notation. Let $f \in \{u_i,v_i,w_i\}$ and for any experiment $k \in K$, signal $s \in \{0,1\}$ and policy decision $x \in \{A,B\}$, define:

$$(1)\quad \bar{f}(x;k,s) = \Pr[\text{state is } A|k,s]f(x,A) + \Pr[\text{state is } B|k,s]f(x,B)$$
$$= \frac{\pi\Pr[s|k,A]}{\Pr[s|k]} f(x,A) + \frac{(1-\pi)\Pr[s|k,B]}{\Pr[s|k]} f(x,B).$$

For any $x \in \{A,B\}$, let $\Delta f(x) \equiv f(x,x)-f(y,x)$. Then,

$$(2)\quad \bar{f}(A;k,s)-\bar{f}(B;k,s) = \left[\pi\Pr[s|k,A]\Delta f(A)-(1-\pi)\Pr[s|k,B]\Delta f(B)\right]/\Pr[s|k]$$

describes the expected payoff difference relative to f from A being chosen over B. Now consider the various decision stages of the game, beginning with the legislator's final policy choice.

3.1. Legislator's Policy Decision.
The legislator chooses the policy that yields his or her highest expected payoff conditional on the information available. Specifically, for any experiment/signal pair (k,s),

$$\delta(k,s) = A \; [B] \text{ if } \bar{v}(A;k,s) - \bar{v}(B;k,s) > [<] \; 0.$$

The only circumstances under which this rule is equivocal is when the legislator hears an argument that leaves him or her indifferent. However, given the finiteness of K and $\pi \in (0,1)$, such indifference is a probability zero event and can be safely ignored hereafter.[2]

3.2. Individuals' choice of experiment. By assumption, the legislator is supposed to favour A over B on the basis of the prior information alone. So,

$$(3) \quad \bar{v}(A;0,0) - \bar{v}(B;0,0) = \pi \Delta v(A) - (1-\pi)\Delta v(B) > 0.$$

Now, recalling the assumptions on the probabilities $p(\cdot;\cdot)$, say that an experiment $k \in K$ is *influential* (relative to π) if and only if a signal of 1 [respectively, 0] induces the legislator to prefer choosing B over A [respectively, A over B]; that is, given (3), k is influential if

$$\bar{v}(A;k,0) - \bar{v}(B;k,0) > 0 > \bar{v}(A;k,1) - \bar{v}(B;k,1).$$

Thus k_1 and $k_{|K|}$ are by definition not influential. However, by the assumptions on $p(\cdot;\cdot)$ and $v(\cdot,\cdot)$, for each (v,π) satisfying (3), there exist some $j_1 > 1$ and $j_2 < |K|$ such that $K(\pi) = \{k_{j_1},\ldots,k_{j_2}\} \subset K$ is a nonempty set of influential experiments.

It is immediate from (3) that should some $i \in \mathcal{A}$ be granted access, i's best choice of experiment is not influential since this insures A will be chosen. Hence

[2]This is of course not so when K is assumed a continuum, and it turns out in this case that legislative indifference is exactly what will occur in equilibrium. However, as indicated in the previous note, the behaviour supported by such indifference is not robust.

any experiment $k^{\mathcal{A}} \notin K(\pi)$ is a best choice of experiment for any $i \in \mathcal{A}$. In effect, if $\mathcal{A}$-types seek access they do so purely to block any possibility of the legislator being persuaded to change his or her mind and choose B over A. (As discussed later, this extreme property is an artifact of only one agent being granted access and the binary agenda.) More interesting are the choices of the remaining types of individual.

Proposition 1: Conditional on being granted access and on alternative A being the legislator's best choice in the absence of any additional information, the optimal choice of experiment for any $\mathcal{A}$-type individual is not influential; the unique best choice for any $\mathcal{B}$-type is the minimally influential experiment, $k^{\mathcal{B}} = k_{j_2}$; and (given ϵ sufficiently small) any best choice of experiment for an $\mathcal{M}$-type individual, $k^{\mathcal{M}}$, satisfies $k_{j_1} \leq k^{\mathcal{M}} < k_{j_2}$.

Proof: For any objective function $f \in \{v_i, w_i\}$, let $E[f|k]$ denote the expected policy payoff relative to f from access being granted to an individual with argument k. Then for any influential experiment $k \in K(\pi)$,

$$
\begin{aligned}
(4)\quad E[f|k] &= [1-P(k)]\bar{f}(A;k,0) + P(k)\bar{f}(B;k,1) \\
&= \pi\Big[(1-p(k;A))f(A,A)+p(k;A)f(B,A)\Big]+(1-\pi)\Big[(1-p(k;B))f(A,B)+p(k;B)f(B,B)\Big] \\
&= \pi f(A,A)+(1-\pi)f(A,B) + (1-\pi)p(k;B)\Delta f(B) - \pi p(k;A)\Delta f(A) \\
&= \bar{f}(A;0,0) + (1-\pi)p(k;B)\Delta f(B) - \pi p(k;A)\Delta f(A).
\end{aligned}
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Let i be a $\mathcal{B}$-type individual. Such an individual wishes to make the best case for the legislator choosing B, and any best choice of experiment for i must maximize $E[w_i|k] \equiv E[w|k]$ over $K(\pi)$. Equivalently, in view of (3) and assumptions on $p(\cdot;\cdot)$, $k^{\mathcal{B}}$ solves the following programme:

(5) $\max_{k \in K} P(k)$

s.t. $\bar{v}(B;k,1)-\bar{v}(A;k,1) = \Big[(1-\pi)p(k;B)\Delta v(B)-\pi p(k;A)\Delta v(A)\Big]/P(k) \geq 0.$

Generically, K finite implies that the inequality constraint will not bind at the solution. By (3) and the technical assumption that $p(k;A)/p(k;B)$ is strictly increasing in k, therefore, the unique solution to the programme is $k^i \equiv k^{\mathcal{B}} = k_{j_2}$, the marginal influential experiment.[3]

Let i be an $\mathcal{U}$-type individual. Since i has state-dependent preferences, any maximizer of $E[v_i|k] \equiv E[v|k]$ must be influential. So let $k^i \equiv k^{\mathcal{U}}$ maximize $E[v|k]$ over $K(\pi)$. For ϵ sufficiently small, (3) insures there exist experiments k_j in $K(\pi)$ such that $k_{j_1} < k_j < k_{j_2}$. Likewise, ϵ sufficiently small implies

$$(6) \quad \bar{v}(B;k^{\mathcal{B}},1)-\bar{v}(A;k^{\mathcal{B}},1) = \bar{v}(B;k_{j_2},1)-\bar{v}(A;k_{j_2},1) \approx 0.$$

Hence, $E[v|k^{\mathcal{B}}] \approx \bar{v}(A;0,0)$. By assumption, $p(k_j;A)/p(k_j;B)$ is strictly increasing in j. Therefore, (3) and (6) imply

$$\bar{v}(B;k_{j_2-1},1)-\bar{v}(A;k_{j_2-1},1) > \bar{v}(B;k_{j_2},1)-\bar{v}(A;k_{j_2},1).$$

So (2) and (4) yield $E[v|k_{j_2-1}] > E[v|k^{\mathcal{B}}]$, in which case $k^{\mathcal{U}} < k_{j_2}$.[4] Since $k^{\mathcal{U}} \in$

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[3]When the set of experiments is a continuum, the constraint will bind and (in equilibrium) the legislator will choose B surely conditional on a signal of 1. Moreover, the chosen experiment $k^{\mathcal{B}}$ is implicitly defined by:

$$p(k^{\mathcal{B}};A)/p(k^{\mathcal{B}};B) = (1-\pi)\Delta v(B)/\pi\Delta v(A).$$

[4]When K is a continuum, $k^{\mathcal{U}}$ is defined implicitly by:

$$p'(k^{\mathcal{U}};A)/p'(k^{\mathcal{U}};B) = (1-\pi)\Delta v(B)/\pi\Delta v(A),$$

$K(\pi)$ and the argument for $k^{\mathcal{A}} \notin K(\pi)$ has been made above, this proves the proposition.□

Define the legislator's *informational value* from granting access to agent i as the difference between the legislator's expected payoff from hearing the argument k^i, $E[v|k^i]$, and from hearing no argument, $\bar{v}(A;0,0)$. Then in view of expression (6), an immediate implication of Proposition 1 is

Corollary 1: In equilibrium, the legislator's informational value from granting access to an $\mathcal{A}$–type is zero; from granting access to a $\mathcal{B}$–type is strictly positive but goes to zero with ϵ; and from granting access to an $\mathcal{M}$–type is strictly positive and bounded away from zero for all ϵ.

It is worth emphasising that in the limit as ϵ goes to zero (ie as the set of experiments becomes a continuum), the legislator is ex ante indifferent between listening to an $\mathcal{A}$–type lobbyist and listening to a $\mathcal{B}$–type lobbyist; they both offer no gains relative to giving access to no agent. And this is so despite the $\mathcal{B}$–type choosing an informative, if only marginally influential, experiment. The intuition here is simply that a $\mathcal{B}$–type lobbyist appropriates all of the available informational gains to the legislator by choosing the influential argument most likely to generate information supporting a decision for B and credible to the legislator; in the finite case this is the minimally influential experiment k_{j_2}. More formally, a high signal (ie $s = 1$) is evidence for the true state being B. If, however, and experiment is sufficiently biased in favour of generating a high signal irrespective of the true state

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so by the assumption that $p(k_j;A)/p(k_j;B)$ is increasing in j and the characterization of $k^{\mathcal{B}}$ in fn.3, this immediately gives $k^{\mathcal{M}} < k^{\mathcal{B}}$.

(ie P(k) sufficiently high), then the high signal is sufficiently discounted by the legislator to yield no influential change in beliefs. As the experiment becomes less biased (ie lower values of k) the informative content of a high signal increases and for some k the change in beliefs is sufficient to induce change in action. By continuity in the limit ($\epsilon = 0$), therefore, there exists an experiment k' at which seeing a high signal just leaves the legislator indifferent between choosing B and choosing A. In equilibrium with a continuum of experiments, k_{j_2} is precisely this experiment. When $\epsilon > 0$, as assumed here, any $\mathcal{B}$–type agent chooses $k^{\mathcal{B}}$ as close to k' as possible given ϵ and given $k^{\mathcal{B}}$ influential. Consequently, a $\mathcal{B}$–type's argument is influential but only marginally so and it is this fact that underlies Corollary 1.

3.3. **The decision to grant access.** Corollary 1 implies that for N(c) to be nonempty with $c_t > 0$ some $t \in \{\mathcal{A},\mathcal{B},\mathcal{M}\}$, the support of the access granting strategy, γ, must be N(c) rather than $\mathcal{A}\cup\mathcal{B}\cup\mathcal{M}$. To see this suppose to the contrary that for some t, $c_t > 0$, $N(c) \neq \emptyset$ and the legislator is willing (in equilibrium) to grant access to individuals $i \notin N(c)$. Then surely $\mathcal{M}$–types would never pay any contribution $c_{\mathcal{M}} > 0$ but would always be assured access. But then it cannot be a best response for extreme types, $t = \mathcal{A},\mathcal{B}$, to contribute $c_t > 0$, implying $N(c) = \emptyset$: contradiction. Similarly, credible price discrimination requires the legislator to refuse access to any $\mathcal{B}$–type contributing less than $c_{\mathcal{B}}$, irrespective of the existence or not of any $\mathcal{M}$–types seeking access. Therefore, in any subgame perfect equilibrium, if $c_t > 0$ for some t, $N(c) \neq \emptyset$ and $i \in N$ is granted access, then $i \in N(c)$. Given an access–granting strategy γ, let $\gamma(i|N(c))$ denote the probability the legislator grants access to individual $i \in N(c)$. Let m(c) [resp. b(c), a(c)] denote the number of $\mathcal{M}$–type [resp. $\mathcal{B}$–type, $\mathcal{A}$–type] individuals who seek access given $c = (c_{\mathcal{A}},c_{\mathcal{B}},c_{\mathcal{M}})$. Then Corollary 1 implies that the following access–granting strategy is the unique symmetric best response to $\{k^{\mathcal{A}},k^{\mathcal{B}},k^{\mathcal{M}}\}$ conditional on N(c) being nonempty:

$$(7)\quad \gamma^*(i|N(c)) = \begin{cases} 1/m(c) & \text{if } i \in \mathcal{M} \\ 0 & \text{if } i \notin \mathcal{M} \text{ and } m(c) \neq 0, \text{ or if } i \in \mathcal{A} \text{ and } b(c) \neq 0 \\ 1/b(c) & \text{if } i \in \mathcal{B} \text{ and } m(c) = 0 \\ 1/a(c) & \text{if } i \in \mathcal{A} \text{ and } m(c) = b(c) = 0 \end{cases}$$

4. Individuals' decisions to seek access

Throughout this section, fix γ^*, δ^* and k^t, $t = \mathcal{A},\mathcal{B},\mathcal{M}$, as defined above. Clearly, any t–type individual's contribution decision depends at least in part on whether he or she is the only individual of that type. Seeking access is costly when $c_t > 0$ and having access granted to a group member is a public good for the group, so there is a collective action problem for groups with more than one member. A focus of what follows is the influence of collective action problems on the distribution of types seeking access at any given price of access.

By virtue of (6) and the discussion following Corollary 1, for sufficiently small $\epsilon > 0$, the difference $\bar{v}(B;k^{\mathcal{B}},1)-\bar{v}(A;k^{\mathcal{B}},1)$ is arbitrarily well approximated by zero; so assume hereafter that the difference is indeed so approximated.

Proposition 2: Fix $\{k^t\}_{t=\mathcal{A},\mathcal{B},\mathcal{M}}$, γ^*, δ^*. Then for almost all c there is a unique symmetric subgame perfect equilibrium set of strategies $\{\alpha(c),\beta(c),\mu(c)\}$ described by:

(*i*) $\alpha(c) \equiv 0$;

(*ii*)
$$\beta(c) = \begin{cases} 1-\left[\frac{r}{c_{\mathcal{M}}}\right]^{\frac{m}{(m-1)(b-1)}} \cdot \left[\frac{c_{\mathcal{B}}}{R}\right]^{\frac{1}{(b-1)}} & \text{if } c_{\mathcal{B}} \leq R.\left[\frac{c_{\mathcal{M}}}{r}\right]^{\frac{m}{(m-1)}} \\ 0 & \text{otherwise} \end{cases};$$

(*iii*)
$$\mu(c) = \begin{cases} 1-\left[\frac{c_{\mathcal{M}}}{r}\right]^{\frac{1}{(m-1)}} & \text{if } c_{\mathcal{M}} \leq r \\ 0 & \text{otherwise} \end{cases};$$

where $r \equiv E[v|k^{\mathcal{M}}]-\bar{v}(A;0,0)$ and $R \equiv E[w|k^{\mathcal{B}}]-\bar{w}(A;0,0)$.

Proof: (*i*) follows immediately from $k^{\mathcal{A}}$ not influential and $\gamma^*(\cdot)$. To check (*ii*), fix $\alpha(c)$ and $\mu(c)$ as defined. Then for any $i \in \mathcal{B}$, i's expected payoff from seeking access is given by,

$$[1-(1-\mu)^m]E[w|k^{\mathcal{M}}] + (1-\mu)^m E[w|k^{\mathcal{B}}] - c_{\mathcal{B}}.$$

On the other hand, if $i \in \mathcal{B}$ chooses not to contribute, his or her expected payoff is,

$$[1-(1-\mu)^m]E[w|k^{\mathcal{M}}] + (1-\mu)^m \left\{[1-(1-\beta)^{b-1}]E[w|k^{\mathcal{B}}] + (1-\beta)^{b-1}\bar{w}(A;0,0)\right\}.$$

Therefore $i \in \mathcal{B}$ is willing to contribute $c_{\mathcal{B}}$ only if,

$$(8) \quad c_{\mathcal{B}} \leq (1-\mu)^m(1-\beta)^{b-1}[E[w|k^{\mathcal{B}}]-\bar{w}(A;0,0)].$$

Substituting for $\mu = \mu(c)$ and doing the tedious algebra now yields (*ii*). Now fix $\alpha(c)$ and $\beta(c)$ and consider the decision of any $i \in \mathcal{M}$. Given $\{\gamma^*,\delta^*\}$, the payoff to i if i contributes $c_{\mathcal{M}}$ is:

$$E[v|k^{\mathcal{M}}] - c_{\mathcal{M}}.$$

If i does not, but some $j \in \mathcal{M}\backslash\{i\}$ does, seek access, i's payoff is $E[v|k^{\mathcal{M}}]$; if no $j \in \mathcal{M}$ seeks access but $\mathcal{B}$-types seek access according to β, i's payoff is given by

$$\left\{[1-(1-\beta)^b]E[v|k^{\mathcal{B}}] + (1-\beta)^b\bar{v}(A;0,0)\right\} \approx \bar{v}(A;0,0)$$

by the approximation; and if no individual seeks access, then i's payoff is again $\bar{v}(A;0,0)$. Therefore, if i does not contribute, i's expected payoff is

$$[1-(1-\mu)^{m-1}]E[v|k^{\mathcal{M}}] + (1-\mu)^{m-1}\bar{v}(A;0,0).$$

Hence $i \in \mathcal{M}$ is willing to contribute $c_{\mathcal{M}}$ only if:

$$(9) \quad c_{\mathcal{M}} \leq (1-\mu)^{m-1}[E[v|k^{\mathcal{M}}]-\bar{v}(A;0,0)],$$

which, on suitable manipulation, yields (*iii*).□

Proposition 2 immediately yields two features of individuals' decisions to seek access. First, a necessary condition for a $\mathcal{B}$-type to seek access at any cost $c_{\mathcal{B}}$ is that the probability any moderate seeks access is sufficiently low — in particular, given $c_{\mathcal{B}} > 0$, the probability any $\mathcal{B}$-type contributes is zero for $c_{\mathcal{M}}$ in the interval $[0,r[c_{\mathcal{B}}/R]^{(m-1)/m})$ and strictly increasing in $c_{\mathcal{M}}$ on $[r[c_{\mathcal{B}}/R]^{(m-1)/m},r]$.[5] And second, given ϵ sufficiently small, moderates' decisions are independent of the extremists' behaviour, but the converse is false.[6] These properties of the equilibrium contribution strategies are perhaps most transparent when the legislator cannot price

[5]In the limit when ϵ is zero, the approximation $E[v|k^{\mathcal{M}}] = \bar{v}(A;0,0)$ is exact and there exists a symmetric equilibrium in which $\mathcal{A}$-types seek access with positive probability for some c. In particular in this instance, a necessary condition for $\mathcal{A}$-types to seek access is that the $\mathcal{B}$-types are seeking access with sufficiently high probability; $\mathcal{A}$-types, that is, engage exclusively in "counteractive lobbying" (Austen-Smith and Wright, 1994).

[6]When ϵ is bounded away from zero so the approximation $E[v|k^{\mathcal{B}}] \approx \bar{v}(A;0,0)$ is not so good, the moderates' strategy $\mu(\cdot)$ depends on the extremists' behaviour $\beta(\cdot)$ when c is such that $\mu(c)$ and $\beta(c)$ are positive. In particular, it is clear from the proof to Proposition 2 that μ is decreasing in β on this interval and this effect is the more pronounced the larger is the difference $E[v|k^{\mathcal{B}}]-\bar{v}(A;0,0)$.

discriminate; ie $c_{\mathcal{A}} \equiv c_{\mathcal{B}} \equiv c_{\mathcal{M}} = c$. Proposition 2 implies that under no price discrimination, the contribution strategies are as illustrated in Figure 1.

[Figure 1 here]

The comparative statics for the $\mathcal{B}$– and $\mathcal{M}$–types' contribution strategies on this cost and in the size of the groups are routine: increasing the ratio of cost–to–value for, and the size of, a group lowers the likelihood of any member of that group seeking access. More interesting properties derive from the earlier observation that (for ϵ small), changes in the cost of access to, or in the size of, the $\mathcal{B}$–group leave the moderates' contribution behaviour unaffected, but the same is not true in the other direction.

Straightforward computation yields that when the costs of access are such that both $\mathcal{M}$– and $\mathcal{B}$–types seek access, the $\mathcal{B}$–types do so more often as the size of the moderate group (m) increases and as the cost to the moderates of seeking access ($c_{\mathcal{M}}$) increases. The intuition for the latter result is transparent: increasing the cost of access to moderates directly lowers the probability that any moderate contributes and thus increases the likelihood of a $\mathcal{B}$–type being granted access. The intuition for the first of the two comparative statics is a little more subtle. On the one hand, for any probability μ, the likelihood that *some* moderate contributes, $[1-(1-\mu)^m]$, is increasing in m but, on the other hand, the probability that any given moderate seeks access at c, $\mu(c)$, is decreasing in m. And it turns out that first effect is more than offset by the second. Therefore the expected payoff to any $\mathcal{B}$–type from contributing to gain access increases with an increase in m. Moreover, an increase in the number of moderates induces $\mathcal{B}$–types to seek access with positive probability at lower contribution levels. (It is worth pointing out here that all of these comparative static results go through under no price discrimination: Austen–Smith, 1996.)

5. The price of access

Given equilibrium strategies $\{(\sigma_i(c),k^i)_i,\gamma^*,\delta^*\}$, the legislator is presumed to choose the costs of access to maximize the sum of his or her expected total contributions from lobbyists plus the expected informational value of granting access (conditional on the equilibrium strategies). In view of Proposition 2*(i)*, it suffices to consider only the contributions, c_B and c_M. Similarly, given ϵ sufficiently small, the legislator's ex ante informational value from granting access to a $\mathcal{B}$–type is well–approximated by zero (Corollary 1). Hence, recalling $r \equiv E[V|k^{\mathcal{M}}]-\bar{v}(A;0,0) > 0$ is the legislator's (and any $\mathcal{M}$–type's) informational value of access to a moderate lobbyist and given γ^* and δ^* as previously defined, the legislator's effective problem is:

$$\begin{aligned}(10)\quad & \max. W(c_{\mathcal{B}},c_{\mathcal{M}}) = m\mu(c_{\mathcal{M}})c_{\mathcal{M}} + b\beta(c_{\mathcal{B}},c_{\mathcal{M}})c_{\mathcal{B}} + [1-(1-\mu(c_{\mathcal{M}}))^m]r \\ & \text{subject to:} \quad c_{\mathcal{M}} \in [0,r] \\ & \qquad\qquad\qquad c_{\mathcal{B}} \in [0,R(c_{\mathcal{M}}/r)^{m/(m-1)}]\end{aligned}$$

Note that additive separability and the requirement of subgame perfection imply that policies cannot be "bought" in the model since contributions have to be given before the legislator chooses to whom to listen or makes the final policy choice.

The following lemma shows that, in equilibrium, moderates never seek access surely and extremist $\mathcal{B}$–types always seek access with positive probability.

Lemma 1: Assume $b > 1$ and $m > 1$. Let $(c^*_{\mathcal{B}},c^*_{\mathcal{M}})$ be a solution to (10). Then $c^*_{\mathcal{M}} > 0$ and, for all $c_{\mathcal{M}} > 0$, $c^*_{\mathcal{B}} \in (0,R[c_{\mathcal{M}}/r]^{m/(m-1)})$.

Proof: Fix $c_{\mathcal{B}} \geq 0$ and let $c_{\mathcal{M}} < r$. Then $W(c_{\mathcal{B}},c_{\mathcal{M}})$ is differentiable in $c_{\mathcal{M}}$ and, using Proposition 2, some algebra gives

$$(11)\quad \partial W(c_B,c_M)/\partial c_M = m\left[1 - \frac{m+1}{m-1}\left[\frac{c_M}{r}\right]^{1/(m-1)}\right] + \kappa\left[bc_B\frac{m}{c_M(m-1)(b-1)}(1+\beta)\right],$$

where $\kappa = 1$ if $c_B \in [0, R[c_M/r]^{m/(m-1)})$ and $\kappa = 0$ otherwise. Therefore, $\lim_{c_M \to 0} \partial W(c_B,c_M)/\partial c_M > 0$, in which case $c_M^* > 0$.

Given $m > 1$ and $c_M > 0$, Proposition 2 implies that for all pairs (δ,x) such that $0 < \delta < R[c_M/r]^{m/(m-1)} \leq x$:

$$\begin{aligned} W(\delta,c_M) &= m\mu(c_M)c_M + b\beta(\delta,c_M)\delta + [1-(1-\mu(c_M))^m]r \\ &> m\mu(c_M)c_M + [1-(1-\mu(c_M))^m]r \\ &= W(x,c_M). \end{aligned}$$

Hence $\beta(c_B^*,c_M) > 0$, implying $c_B^* < R[c_M/r]^{m/(m-1)}$. Finally, given $c_M > 0$, $m > 1$ and $b > 1$, Proposition 2(*ii*) yields $\lim_{c_B \to 0} \partial W(c_B,c_M)/\partial c_B > 0$. So $c_B^* > 0$ as required.□

Proposition 3: Assume $b > 1$ and $m > 1$. Then (10) has a unique solution (c_B^*,c_M^*). In particular, if and only if $2r > R(\frac{b-1}{b})^{b-1}$,

$$(12)\quad c_B^* = R\left(\frac{b-1}{b}\right)^{b-1}\left[\frac{(m-1)r}{(m+1)r - R[(b-1)/b]^{b-1}}\right]^m,$$

and

$$(13)\quad c_M^* = r\left[\frac{(m-1)r}{(m+1)r - R[(b-1)/b]^{b-1}}\right]^{m-1}.$$

Otherwise $c_B^* = R(\frac{b-1}{b})^{b-1}$ and $c_M^* = r$.

Proof: By Lemma 1, there is no loss of generality in assuming $c_{\mathcal{M}} > 0$. Further, Lemma 1 also implies that for any $c_{\mathcal{M}} > 0$, $c^*_{\mathcal{B}} = c_{\mathcal{B}}(c_{\mathcal{M}})$ solves the first order condition, $\partial W(c,c_{\mathcal{M}})/\partial c = 0$ at $c = c^*_{\mathcal{B}}$. That is:

$$(14)\quad b[c.\partial\beta(c,c_{\mathcal{M}})/\partial c + \beta(c,c_{\mathcal{M}})]|_{c=c^*_{\mathcal{B}},c_{\mathcal{M}}} = 0.$$

Using Proposition 2*(ii)* and collecting terms, (14) has a unique solution:

$$(15)\quad c_{\mathcal{B}}(c_{\mathcal{M}}) = R[\tfrac{b-1}{b}]^{b-1}\left[\frac{c_{\mathcal{M}}}{r}\right]^{m/(m-1)}.$$

Hence, (10) is equivalent to the problem,

$$(16)\quad \max_{c_{\mathcal{M}}\leq r} \hat{W}(c_{\mathcal{M}}) = m\mu(c_{\mathcal{M}})c_{\mathcal{M}} + b\beta(c_{\mathcal{B}}(c_{\mathcal{M}}),c_{\mathcal{M}})c_{\mathcal{B}}(c_{\mathcal{M}}) + [1-(1-\mu(c_{\mathcal{M}}))^m]r.$$

Substituting for $c_{\mathcal{B}}(c_{\mathcal{M}})$ from (15) and doing the calculus gives

$$(17)\quad \partial\hat{W}(c_{\mathcal{M}})/\partial c_{\mathcal{M}} = m + \frac{m}{m-1}\cdot\left[\frac{c_{\mathcal{M}}}{r}\right]^{1/(m-1)}\left[\frac{R}{r}(\tfrac{b-1}{b})^{b-1} - (m+1)\right].$$

It follows that the equation $\partial\hat{W}(c_{\mathcal{M}})/\partial c_{\mathcal{M}} = 0$ has a solution in $(0,r)$ if and only if $2r > R(\frac{b-1}{b})^{b-1}$. Moreover, if such a stationary point exists then it is unique and is a maximum. On the other hand, if $2r \leq R(\frac{b-1}{b})^{b-1}$ then $\partial\hat{W}(c_{\mathcal{M}})/\partial c_{\mathcal{M}} > 0$ on $(0,r]$. Thus, $\hat{W}(\cdot)$ is strictly quasi–concave and this proves uniqueness.

Given $2r > R(\frac{b-1}{b})^{b-1}$, we can solve for $c^*_{\mathcal{M}}$ from $\partial\hat{W}(c_{\mathcal{M}})/\partial c_{\mathcal{M}} = 0$ to obtain expression (13). And substituting for $c^*_{\mathcal{M}}$ into (15) then yields (12). Finally, when $2r \leq R(\frac{b-1}{b})^{b-1}$, (17) implies $c^*_{\mathcal{M}} = r$ and, therefore, (15) implies $c^*_{\mathcal{B}} = R(\frac{b-1}{b})^{b-1}$.□

The proposition says that $\mathcal{B}$–types will invariably seek access with some positive probability, but the same is not true of $\mathcal{M}$–types: when the value of access to moderates is sufficiently low relative to that of $\mathcal{B}$–types, the legislator sets the price of access for $\mathcal{M}$–types sufficiently high to deter any effort at legislative influence. In particular, if $r > R/2$ then, irrespective of group sizes, required contributions are always set to induce positive lobbying by both moderates and extremists, but if $r \leq R/2e$ then moderates are always priced out of the access "market".[7]

Propositions 2 and 3 yield a variety of properties of equilibrium behaviour. These are collected in the following three corollaries.

Corollary 2: Let $b > 1$ and $m > 1$. Then the equilibrium probability that any $\mathcal{B}$–type seeks access depends only on the number of $\mathcal{B}$–types: $\beta(c^*_{\mathcal{B}}, c^*_{\mathcal{M}}) = b^{-1}$. On the other hand, given $2r > R(\frac{b-1}{b})^{b-1}$ so $c^*_{\mathcal{M}} < r$, the equilibrium probability that any $\mathcal{M}$–type seeks access depends on the size of both groups and their respective values from access: $\mu(c^*_{\mathcal{M}}) = 1-\left[\frac{(m-1)r}{(m+1)r - R[(b-1)/b]^{b-1}}\right]$.

Proof: Apply Propositions 2 and 3.□

This implication is fairly striking. Although $\mathcal{B}$–types' behaviour depends on the behaviour of moderates while the converse is not true, the legislator nevertheless sets

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[7]It is worth noting here that when there is no price discrimination, the uniqueness property is no longer guaranteed: the legislator's induced maximand in this case, although continuous in the price of access on [0,R], is not quasi–concave on the interval. However, it can be shown that there exist at most two local maxima under any circumstances (Austen–Smith, 1996).

contribution levels for access in such a way that the likelihood any $\mathcal{B}$–type contributes is independent (in equilibrium) on either the values of access or the size of the moderate group. The same, however, does not hold for the likelihood any moderate contributes; such a decision is (in equilibrium) dependent on the sizes of both groups and on both groups' valuations of access.

Corollary 3: Assume $m > 1$, $b > 1$ and $2r > R(\frac{b-1}{b})^{b-1}$. Then:

(*i*) $c^*_{\mathcal{B}}$ is strictly increasing in R, and strictly decreasing in r, m and b;

(*ii*) $c^*_{\mathcal{M}}$ is strictly increasing in R, and strictly decreasing in m and b; and $c^*_{\mathcal{M}}$ is strictly increasing [decreasing] in r as $r(\frac{m+1}{m}) > [<] \; R(\frac{b-1}{b})^{b-1}$;

(*iii*) $W(c^*_{\mathcal{B}},c^*_{\mathcal{M}})$ is strictly increasing in r and R, and strictly decreasing in m and b.

Proof: (*i*) and (*ii*) follow from routine differentiation of (12) and (13), respectively (making the technically convenient assumption that m and b are continuous variables, where necessary). To check (*iii*), recall from Corollary 2 that $\beta(c^*_{\mathcal{B}},c^*_{\mathcal{M}}) = b^{-1}$; hence

$$(18)\quad W(c^*_{\mathcal{B}},c^*_{\mathcal{M}}) = m\mu(c^*_{\mathcal{M}})c^*_{\mathcal{M}} + c_{\mathcal{B}}(c^*_{\mathcal{M}}) + r[1-(1-\mu(c^*_{\mathcal{M}}))^m].$$

Substituting for $c^*_{\mathcal{M}}$ appropriately and collecting terms yields:

$$(19)\quad W(c^*_{\mathcal{B}},c^*{}_{\mathcal{M}}) = r + r\left[\frac{(m-1)r}{(m+1)r - R[(b-1)/b]^{b-1}}\right]^{m-1}$$
$$= r + c^*_{\mathcal{M}}.$$

That $W(c^*_{\mathcal{B}},c^*_{\mathcal{M}})$ is increasing in R and decreasing in m and b now follows directly from parts (*i*) and (*ii*) of the corollary. To see that $W(c^*_{\mathcal{B}},c^*_{\mathcal{M}})$ is strictly increasing in r (given the maintained hypotheses), let $Z \equiv \left[\frac{(m-1)r}{(m+1)r - R[(b-1)/b]^{b-1}}\right]$ and differentiate RHS(19) with respect to r to give:

$$(19)\quad \partial W(\cdot)/\partial r = 1 + Z^{m-1}\{1 - (\frac{Z}{r})R(\frac{b-1}{b})^{b-1}\}.$$

Hence, $\partial W(\cdot)/\partial r > (<) 0$ as $r[Z^{m-1} + 1] > (<) ZR(\frac{b-1}{b})^{b-1}$. But by (12) and (13), this condition is equivalent to $c^*_{\mathcal{M}} + r > (<) Z^{m-2}c^*_{\mathcal{B}}$. Therefore, by $Z < 1$ (since $c^*_{\mathcal{M}} < r$ by hypothesis) and (18) and (19), $\partial W(c^*_{\mathcal{B}},c^*_{\mathcal{M}})/\partial r > 0$.□

Under the hypotheses of Corollary 3, both moderates and extremists seek access with positive probability. With this in mind, the intuition behind the reported comparative statics derives from the legislator's incentive to grant access to moderates rather than to extremists: any parametric change inducing, say, moderates to contribute more frequently dampens the incentive for any extremist to contribute; the legislator's response to such changes, therefore, will adjust for these countervailing effects on her payoff. So, for example, as the value of access to moderates relative to extremists, r/R — and hence the legislator's informational value of granting access to a moderate — increases, the more likely it is that the legislator raises the price of access to moderates at the margin and lowers that to extremists. Similarly, an increase in the size of the moderate group, m, accentuates the free-rider problem so reducing the likelihood any moderate seeks access; to compensate optimally at the margin, the legislator lowers the required contribution both to moderates and extremists — in the first case to offset the free-riding problem among $\mathcal{M}$-types, and in the second case to offset the consequent disincentive effect on $\mathcal{B}$-types' contribution strategies.

Corollary 3 identifies the principal comparative static properties on the required contributions for access. The next result, Corollary 4, is of some interest in view of the empirical regularity that donors tend to give more to legislators who share similar policy views than to those who do not. If access is granted for informational lobbying, then it is not immediately apparent why the relationship should obtain. In principle, rational legislators can be expected to grant access to those having higher informational value whatever the history of donations. Consequently, we might expect to see extremists contributing more for access to offset the informational value of moderates. And, indeed, when there is complete information and contribution levels *per se* are determined by the donors, this expectation holds (Lohmann 1993, Austen–Smith 1995). Corollary 4 indicates that predicted relationship can be reversed when legislators are price setters with respect to access, rather than price takers.

Corollary 4: Assume $m > 1$, $b > 1$ and $2r > R(\frac{b-1}{b})^{b-1}$. Then:

(*i*) $c^*_{\mathcal{M}} > [<] \ c^*_{\mathcal{B}}$ as $r(\frac{m+1}{m}) > [<] \ R(\frac{b-1}{b})^{b-1}$;

(*ii*) Total expected contributions from $\mathcal{M}$–types is greater [less] than those from $\mathcal{B}$–types as $r(\frac{2m}{2m-1}) > [<] \ R(\frac{b-1}{b})^{b-1}$.

Proof: *(i)* follows from direct calculation using (12) and (13). *(ii)* is shown by noting that the expected contribution from $\mathcal{M}$–types is simply $m\mu(c^*_{\mathcal{M}})c^*_{\mathcal{M}}$ and that from $\mathcal{B}$–types is (from (18), above) $c^*_{\mathcal{B}}$. Substituting and doing the algebra gives the result.□

Corollary 4*(i)* says that the legislator charges a higher required contribution level to moderates than to extremists in exactly same circumstances under which the equilibrium price to moderates, $c^*_{\mathcal{M}}$, is increasing in r, the legislator's informational value of granting access to moderates. In effect, when this value is sufficiently high, the incentive for moderates to seek access is likewise high relative to extremists, in which case the legislator is free to charge a higher price to moderates than to extremists. And it is worth noting here that "the value being sufficiently high" does not imply it exceeds the value placed on access by extremists; for instance, if both $\mathcal{B}$– and $\mathcal{M}$–groups are large, the condition is essentially that $r > R/e \approx 2R/5$.

From part *(ii)* of the result, a necessary condition for aggregate expected revenue from moderates to exceed that from extremists is that $c^*_{\mathcal{M}}$ exceeds $c^*_{\mathcal{B}}$, but the converse is not true for small m. However, if $c^*_{\mathcal{M}}$ exceeds $c^*_{\mathcal{B}}$ for m large then (almost surely) the expected revenue from moderates likewise exceeds that from extremists.

6. Bias and efficiency

In settings where policy decisions are not the result of some implicit contract between campaign contributors and legislators, "bias" in decision making might still obtain through those granted access having preferences that do not reflect those of, say, the median members of the electorate, and through the provision of biased information at the lobbying stage. To say something about the issue requires a benchmark for what constitutes an "unbiased" decision. In the model here, a natural benchmark for the appropriate information structure, or argument, upon which the legislator's decision "should" be predicated is the experiment $k^{\mathcal{M}}$; this is the optimal experiment those in the polity with state–dependent preferences $v(\cdot;\cdot)$ (including the legislator) choose to determine their most preferred alternative.[8] Thus $k^{\mathcal{B}}-k^{\mathcal{M}}$ is a

[8]An alternative candidate for a benchmark is a solution to the programme:

$$\max_{k\in K} . aE[u|k] + bE[w|k] + mE[v|k].$$

Given a, b and m are positive, the assumptions on K insure a solution $k^\circ \in K(\pi)$ with $k^\circ < k^{\mathcal{B}}$. If $k^\circ \neq k^{\mathcal{M}}$, however, the legislative process modelled here invariably leads to decisions made on the basis of "biased" information. With respect to the measure of the bias introduced when a $\mathcal{B}$–type is granted access, and the probability that the legislator acts on the basis of biased information relative to the benchmark is precisely the probability that a $\mathcal{B}$–type gets access given by,

$$\Pi(b,m,r,R) = (1-\mu(c^*_{\mathcal{M}}))^m[1-(1-\beta(c^*_{\mathcal{B}},c^*_{\mathcal{M}}))^b].$$

Assuming there are at least two members of each group, $\mathcal{M}$ and $\mathcal{B}$, we can use Propositions 2 and 3 to compute:

$$(20)\quad \Pi(\cdot) = \begin{cases} \left[\dfrac{(m-1)r}{(m+1)r-R\,[\,(b-1)/b]^{b-1}}\right]^m [1 - (\frac{b-1}{b})^b] & \text{if } 2r > R(\frac{b-1}{b})^{b-1} \\ [1 - (\frac{b-1}{b})^b] & \text{otherwise} \end{cases}$$

It is straightforward to check that when both moderates and extremists seek access, $\Pi(\cdot)$ is strictly increasing in m and R, and strictly decreasing in b and r.

The empirically interesting case is often where $\mathcal{M}$ is large relative to $\mathcal{B}$. And in the limit we find that when $2r > R(\frac{b-1}{b})^{b-1}$, so $c^*_{\mathcal{M}} < r$:

$$\lim_{m\to\infty} \Pi(\cdot) = e^{-[2r-R(\frac{b-1}{b})^{b-1}]}[1 - (\frac{b-1}{b})^b].$$

That is, there is strictly positive probability of bias even when the size of the moderate group swamps that of the extremist group and moderates' value of access is high relative to that of extremists. At the same time, collective action problems among extremists lead to lower likelihoods of bias in equilibrium.

When $2r \le R(\frac{b-1}{b})^{b-1}$, so $c^*_M = r$, the probability of bias is independent of m and of the relative values of access, r and R (and obviously, the likelihood of bias is strictly higher here than when moderates seek access). If the value of granting

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equilibrium set of arguments, therefore, $k^{\mathcal{M}}$ is the appropriate benchmark.

access to moderates is too low, the legislator maximizes her payoff by attracting contributions from extremists alone and, in equilibrium, the probability of an extremist seeking access depends only the size of the group $\mathcal{B}$ (Corollary 2).[9]

From a normative perspective, it is evident that if only the payoffs to individuals other than the legislator are deemed germane, then efficiency gains can be realized by setting all contribution levels to zero and implementing the equilibrium lottery, $\{\gamma^*(\cdot\,|\,N(c^*))\}$. However, there is no guarantee that such an institutional change results in an efficient allocation; in general, the efficiency properties of any level of "bias" as defined here depend on the relative size of the various groups as well as their respective valuations of the available alternatives. However, the identified properties of the likelihood of bias, $\Pi(\cdot)$, show that even when $\mathcal{M}$ is very large relative to other groups and when any moderate's valuation of the issues exceeds that of any extremist's then, in expectation, there remains bias in the legislative decision. Ignoring the legislator's payoffs from contributions, therefore, forcing the price of access to moderates to zero yields an efficient allocation: with zero cost of access to moderates, some moderate seeks access with probability one and no extremist enters the market. On the other hand, Proposition 2(*ii*) implies that if moderates are priced out of the market altogether by the legislator (ie when $2r \leq R(\frac{b-1}{b})^{b-1}$), capping the cost of access to extremists at levels $c_{\mathcal{B}} \in [r, c^*_{\mathcal{B}})$ increases the probability of bias and thus leads to an increase in inefficiency.

[9]When price discrimination is impossible the probability of bias is a nonmonotonic function of the cost of access, c. In particular, when extremists do not seek access, the probability is zero; it is increasing in c on the interval over which both moderates and extremists seek access; and it is decreasing in c when only extremists seek access (ie on $(r,R]$). But without an explicit characterization of the legislator's best choice of c (see earlier footnote), the equilibrium probability of bias cannot be pinned down precisely.

7. Discussion

The model here addresses the lobbying decisions and behaviours of individuals interested in a legislator's policy choice. The key features of the model are that the legislator sets the contribution levels necessary for any individual to be granted access and there is no possibility of a *quid pro quo* with respect to legislative decisions and contributions; that the number of lobbyists he or she is able to receive is limited; that lobbyists are free to choose arguments weighted in favour of their preferred legislative outcome; and that interested individuals face collective action problems with respect to the decision to seek access. Within this setting, results on the pattern of lobbying and the extent to which legislative decisions might be biased are derived. Several issues are sidestepped. Some of these add little; for example, allowing for any individual with access to observe the outcome of any experiment privately and then report this outcome strategically at the lobbying stage, lowers all of the *ex ante* expected payoffs from seeking access but changes none of the qualitative results (the relevant subgame here is an entirely standard signaling game). On the other hand, some issues are important.

In the model the legislator chooses the contribution levels at the first stage and a given quantity constraint on the number of individuals he or she can see at the lobbying stage rations access among those contributing. While this feature has some empirical appeal, it precludes the model generating a contribution schedule and it precludes asking what happens when several lobbyists have the opportunity to make an argument. Contribution schedules can be introduced by altering the order of moves in the model. Suppose at the first stage potential lobbyists make a contribution to the legislator, following which the legislator decides to whom to grant access. Given single-peaked preferences, this model amounts to an all-pay auction with multiple "prizes" (where a "prize" is access to the legislator) in which individual contributors are distinguished both by intensity and direction of preference (ie two individuals may have the same willingness to contribute but prefer distinct alternatives). As yet, all–pay auctions with multiple prizes, endogenous values and multidimensional types are not well understood (but see Baye, Kovenock and de Vries, 1993, who consider a complete information model of an all–pay auction with multiple prizes).

Increasing the number of lobbyists who can be granted access raises some additional issues. At least with the binary policy agenda, there appears to be no simultaneous move pure strategy equilibrium in choice of experiment, k, when both A– and B–types are granted access (it can be checked that in any such equilibrium, the legislator must be indifferent between alternatives conditional on hearing mixed signals; but with ϵ sufficiently small, such indifference can always be upset advantageously by a variation in the choice of experiment by at least one type of lobbyist). Consequently in any mixed strategy equilibrium to the lobbying subgame, both extreme types of lobbyist will offer influential arguments with positive probability. Likewise, given a sequential choice process in which the legislator listens first to one agent and then to another, etc., A–types — those supporting the decision the legislator favours on the basis of the prior — offer informative arguments under some circumstances and the order in which lobbyists speak can matter (as, for example, in Austen–Smith, 1993a). Consequently, under either institutional environment there exist equilibria in which A–types seek access at some positive contribution levels.

Finally, the assumption of a binary agenda introduces an asymmetry in the model since one of these alternatives must (generically) be what is chosen surely in the absence of any additional information. Insofar as there is a status quo policy, such an asymmetry is a fact of life. However, if the legislator is free to choose an action from a continuum, lobbyists face an additional tradeoff in selecting arguments, k. For example, let A be the policy chosen on the basis of prior information only;

then higher values of k both improve the probability of a signal favouring actions greater than A and lead to smaller upward (larger downward) changes from A conditional on a high (low) signal.

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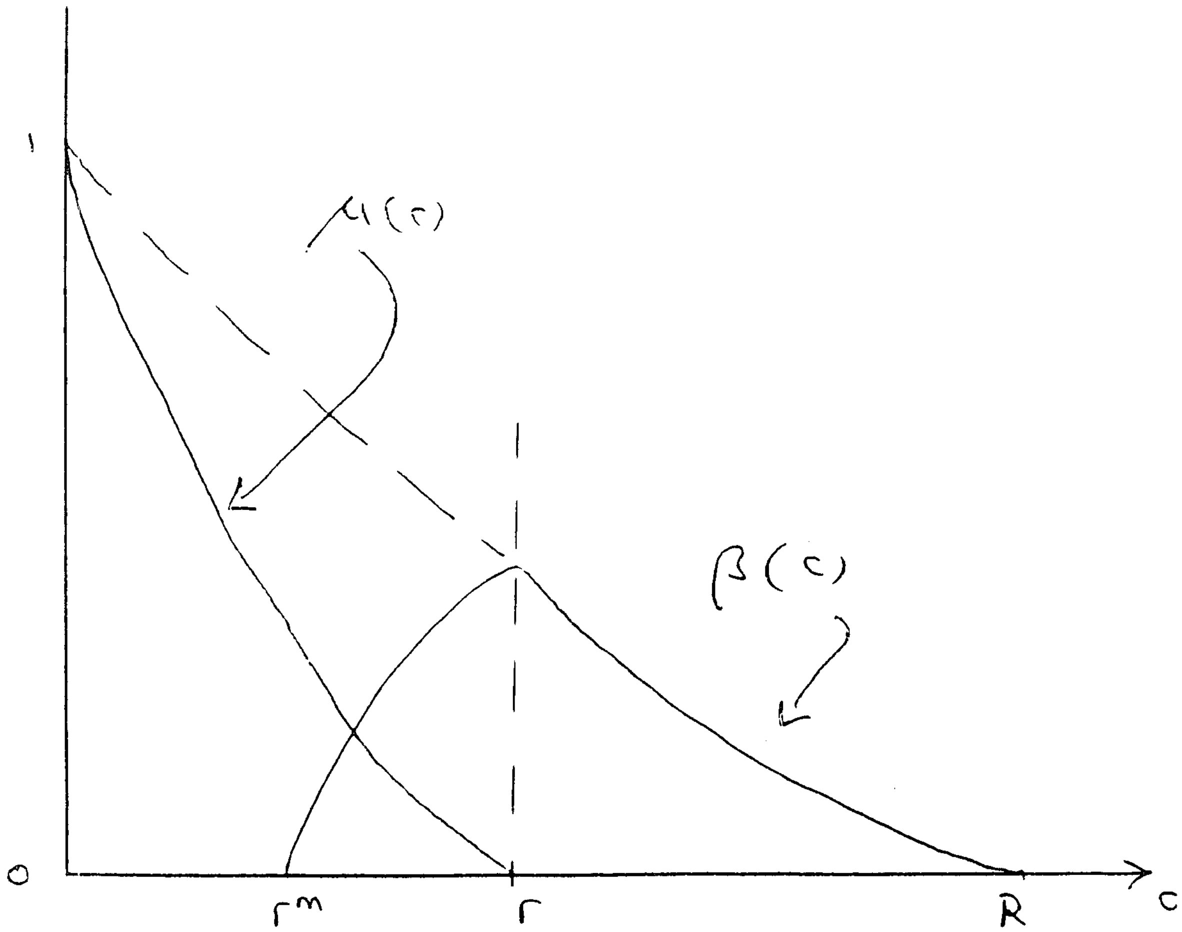
FIGURE 1

Equilibrium contribution strategies with m > 1 and b > 1 when there is no price discrimination.



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