Legislative Context, Legislator Quality and Campaign Contributions

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Abstract

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We introduce a simple theoretical model of the relationship between the campaign contributions a legislator receives from a PAC and the amount of "service" the legislator provides to the PAC, a key assumption being that the marginal cost of service decreases as the quality of the legislator increases. Optimal solution of the constrained optimization problem that each PAC faces in allocating its campaign contributions among legislators implies a conditional two-limit tobit model for the relationship between contributions and aspects of the quality of each legislator. The constraints arise because PAC contributions must be positive but no greater than a legally limiting value and because each PAC's budget for contributions is finite. We extend the tobit model to support pooling data from several similar PACs. We estimate the empirical model using data from the U.S. House of Representatives. The fact that optimal PAC behavior implies censoring suggests that it is usually inappropriate to aggregate contributions from different PACs; but pooling can work well.

We introduce a model of PACs' portfolio choices that explains how PACs allocate their campaign finance resources among House members. The key formal innovation in our approach is that we derive an empirical model of PAC campaign contributions directly from an explicit model of optimizing behavior subject to price and budget constraints, given each PAC's judgment of the quality of each legislator. The result is a particular form of a two-limit tobit model. We propose a method by which data from different PACs that are assumed to be similar in their appraisals of legislators' quality may be pooled to estimate the effects that observed attributes of quality have on contributions. The pooling method is compatible with our model of optimizing behavior by each PAC, in a way that a method based on aggregating contributions data from the PACs would not be. We use our pooling method to analyze contributions to House incumbents during the 1991–92 House campaign period by a collection of telecommunications company PACs.

In representing contributions as conditional on institutional attributes of each legislator (such as committee memberships) and on selected aspects of the election in each legislator's district, our approach to measuring each legislator's quality is similar to models used in numerous other studies (e.g., Gopoian, Smith and Smith 1984; Grier and Munger 1991, 1993; McCarty and Rothenberg 1996, 2000; Milyo 1997; Poole and Romer 1985; Stratmann 1998). An innovation in our data specifications is that we use information about legislators' subcommittee memberships and chairmanships in a systematic way to augment the usual collection of simple dummy variables that represent committee memberships.

Our model is based on the idea that each PAC uses its campaign contributions to purchase some amount of what we call "service" from each legislator. The PAC maximizes the total amount of service it receives from all legislators, subject to a budget constraint and to a legally determined upper bound on the size of each contribution (necessarily nonnegative) given to each legislator. The PAC may pay nothing to a legislator and hence receive no service. We intend the concept of service that we have in mind to be at once comprehensive and elemental. It is intended to be a composite of expectations a PAC has for actions a legislator may take to do such things as vote in a way the PAC would like, provide access, perform district service, intervene with an executive agency or state-level government or political actors, and so forth. We do not intend to suggest that the relationship between PACs and legislators is based on a strict—or even a weak—quid pro quo. A contribution increases the PAC's expectation that something good for the PAC will be forthcoming from the legislator who receives the contribution. The increased expectation may reflect an increase in the probability with which the PAC believes a favorable discrete action will occur, an increase in the value of some event the probability of which does not change, or a continuous increase in the value or amount of some continuous process. We do not distinguish among these or other possible interpretations of the service the PAC's contribution is buying.[1]

We do not model strategic interaction between PACs and legislators, nor among PACs. We treat each PAC as acting independently of every other PAC, while legislators are reduced to reaction functions. We recognize that such an approach may be subject to numerous and serious limitations. Our justification is the thought that the very general optimizing model we use may apply as a kind of final constraint on a PAC's contributions in a wide array of strategic contexts. We do not know yet whether that idea will ultimately be supportable. We also say nothing about the timing of a PAC's contributions. All of a PAC's contributions to House members are considered to be decided simultaneously and paid at once.

With service being conceived in such a broad way, we do not expect it to be observable. But one of our primary goals is to obtain an empirical model that it is feasible to estimate and test.

[1]This implies that we are implicitly assuming risk neutrality for all interpretations that involve a PAC's buying bundles of uncertain events.

A constraint on our model is therefore that the model must imply relationships that are defined directly between contributions and the quality that each PAC attributes to each legislator. According to a definition of quality that we stipulate, we can observe attributes of quality sufficient to support useful statistical analysis.

Quality and Optimal Contributing

Members of Congress do not have equal abilities to secure service on behalf of PACs. For example, the legislator most able to influence a regulatory agency may be the chairman of the committee that oversees that agency. An arbitrary member of Congress may attempt to provide such service, but the expected probability of a successful outcome would be lower—perhaps vastly lower. Institutional positions that affect or signal a legislator's ability include committee assignments, seniority, leadership positions and membership in the majority party. Electoral conditions or constituency constraints, legislator ideology, the political environment or other considerations may also be pertinent.

Some legislators are not able to provide certain kinds of service at all. We may think of such limitations as defining an upper bound on the amount of service each member is able to supply any particular PAC. The bound for each legislator with respect to each PAC is jointly determined by the legislator's resources and the specific bundle of service demanded by the PAC.

Among legislators who are able to supply a given amount of service, some are able to do so at lower cost (Denzau and Munger 1986). If the marginal cost of providing service determines the price of a contribution from a PAC, then for any amount of service the PAC would prefer to purchase the service from the low-cost legislator.

We define the concept of a legislator's quality to encompass both the upper bound on the total amount of service the legislator can supply to a PAC and the cost at which the legislator can supply any amount of service up to that maximum. To say that one legislator has higher quality than another is to say both that the former legislator can supply more service than the latter can do and that the former can supply any positive amount of service at a lower cost than the latter can do.

Given a legislature composed of members of heterogenous quality, a PAC that has a limited budget for service has to decide how to allocate its resources among them. Should the PAC buy only from high quality legislators, perhaps only the highest one? Or would the PAC do better to buy from several legislators of low quality? Using standard methods for constrained nonlinear optimization, we show that a PAC that allocates its budget optimally in order to maximize the amount of service it obtains makes purchases from all legislators who have quality above a certain threshold value. The PAC buys service from each legislator in amounts that equate the marginal costs of service from the legislators. The exceptions to the equal-marginals rule are legislators for whom the price implied by that rule is greater than the maximum contribution allowed by law. To such legislators the PAC pays that maximum amount.

General Form of the Theoretical Model

Let p_i denote the price (i.e., contribution) paid by a PAC to legislator i, $i = 1, \ldots, m$, for service s_i, where $s_i \geq 0$ and $0 \leq p_i \leq h_i\overline{p}$, with $\overline{p} > 0$ being the upper bound on any PAC's total contributions to any one legislator in a single election and h_i being the number of elections for i.[2] Each legislator

[2]Notice that our "price" p_i corresponds to the total amount paid for service s_i, not the amount paid for a unit of service. Below we derive the marginal cost of service given optimal behavior by the PAC (for unconstrained contributions the marginal cost of service from legislator i is $\tilde{\lambda}_i$). Regarding the construction $h_i\overline{p}$, U.S. federal election law has for many years allowed most PACs to contribute up to \$5000 per election to each candidate. The primary, general election and any runoff each counts as a separate election.

has a quality value $q_i > 0$ such that $s_i < q_i$.

We assume the relationship according to which each legislator supplies service as a function of the legislator's quality and of the price the PAC pays to have the following properties.

Assumption 1 (A1) Bijective Mapping: For each $q_i > 0$, every price $p_i \geq 0$ buys a unique amount of service $s_i = s(p_i, q_i)$, and every service value, $0 \leq s_i < q_i$, may be bought for a unique price $p_i = p(s_i, q_i)$.

Assumption 2 (A2) Increasingness: s_i is strictly increasing in p_i.

Together with the stipulation that p_i and s_i have lower bounds at zero, assumptions 1 and 2 imply that $p_i = 0$ if and only if $s_i = 0$: there is no service without a contribution, and no contribution without some service. The assumption that service is a strictly increasing function of price means that for every positive increment in price there is a positive increment in service. The combination of increasingness with bijectivity implies that the mapping between service and price is continuous. Because we require $s_i < q_i$, service asymptotically approaches the upper bound q_i as price increases. To ensure concavity we further assume

Assumption 3 (A3) Diminishing Returns: For every $\delta > 0$, $s(p_i + \delta, q_i) - s(p_i, q_i) < s(p_i, q_i) - s(p_i - \delta, q_i)$.

For convenience we assume first-order smoothness:[3]

Assumption 4 (A4) Differentiability: For every $q_i > 0$, $s(p_i, q_i)$ has continuous first partial derivatives in p_i for all $p_i \geq 0$.

Finally, we assume that quality q_i separates legislators at every price:

Assumption 5 (A5) Quality Separation: For every pair of legislators i_1 and i_2, if $p_{i_1} = p_{i_2} > 0$ then $q_{i_1} > q_{i_2}$ implies $s_{i_1} > s_{i_2}$, and $q_{i_1} = q_{i_2}$ implies $s_{i_1} = s_{i_2}$.

The assumption states that at every positive price, the PAC obtains more service from a legislator of higher quality than from a legislator of lower quality. And at the same price two legislators who have the same quality provide exactly the same amount of service.

We assume that the PAC acts to maximize the amount of service it obtains, summing the service obtained from the m legislators, subject to a budget constraint and to the upper and lower bounds on the price it can pay to each legislator. The PAC's budget is $B \geq 0$ and the budget constraint is $B \geq \sum_{i=1}^{m} p_i$. The PAC's constrained maximization problem is

$$\max_p \sum_{i=1}^{m} s(p_i, q_i), \quad \text{s.t.} \quad B \geq \sum_{i=1}^{m} p_i, \quad h_i \overline{p} \geq p_i \geq 0 \,. \tag{1}$$

The vector $\tilde{p}$ of prices that solves problem (1) has the following characteristics ($s_1(\tilde{p}_i, q_i)$ denotes the partial derivative of $s(\tilde{p}_i, q_i)$ with respect to its first argument).[4]

[3] Proving the existence of a globally optimal solution to the PAC's maximization problem (1) requires only concavity, but producing testable results requires differentiability.

[4] Proofs for theorems and corollaries appear in Appendix A.

Theorem 1 *(Optimal Allocation of Campaign Contributions Among Legislators)*
I. *The PAC makes no contributions if and only if it has a budget of zero.*
II. *If the PAC can pay the maximum amount $h_i\overline{p}$ to all legislators, then it does so.*
III. *If the PAC pays any legislator less than $h_i\overline{p}$, then the PAC fully expends its budget.*
IV. *If the PAC cannot pay $h_i\overline{p}$ to all legislators, then the PAC fully expends its budget.*
V. *All prices greater than zero and less than $h_i\overline{p}$ equate the marginal costs of service across all legislators who receive such prices; that marginal cost value is $\tilde{\lambda}_1 = s_1(\tilde{p}_i, q_i)$.*
VI. *Every legislator with $s_1(p_i, q_i)|_{p_i=0} \leq \tilde{\lambda}_1$ has $\tilde{p}_i = 0$, i.e., receives no contribution.*
VII. *Every legislator with $s_1(p_i, q_i)|_{p_i=h_i\overline{p}} \geq \tilde{\lambda}_1$ has $\tilde{p}_i = h_i\overline{p}$, i.e., receives the maximum legal contribution.*

The most important aspects of Theorem 1 are the equal-marginals condition (part V), the existence of a positive threshold in quality below which a legislator does not receive a contribution (part VI) and the existence of a positive threshold in quality above which a legislator receives the maximum legal contribution (part VII). The thresholds depend on the distribution of quality values across legislators and on the PAC's budget. In general, a larger budget implies smaller thresholds:

Theorem 2 *(Budget Size and the Threshold for Contributions)*
For a fixed set of quality values q_i and election numbers h_i, $i = 1, \ldots, m$, let budget B imply marginal cost $\tilde{\lambda}_1$ for all prices $\tilde{p}_i$, $0 < \tilde{p}_i < h_i\overline{p}$, and let budget B^* imply marginal cost $\tilde{\lambda}_1^*$ for all prices $\tilde{p}_i^*$, $0 < \tilde{p}_i^* < h_i\overline{p}$. If $0 < B < B^* < \sum_{i=1}^m h_i\overline{p}$ and the sets $\{\tilde{p}_i : 0 < \tilde{p}_i < h_i\overline{p}\}$ and $\{\tilde{p}_i^* : 0 < \tilde{p}_i^* < h_i\overline{p}\}$ are not empty, then $\tilde{\lambda}_1^* < \tilde{\lambda}_1$.

Parametric Form of the Theoretical Model

To obtain a solution to the PAC's optimization problem that is sufficiently explicit to support empirical analysis, we stipulate a particular functional form for the mapping between price and service. For the price function we define

$$p(s_i, q_i) = \begin{cases} as_i/(q_i - s_i), & 0 \leq s_i < q_i \\ +\infty, & q_i \leq s_i\ , \end{cases} \tag{2}$$

where $a > 0$ is a scaling parameter.[5] The inverse function, giving service as a function of price and quality, is

$$s(p_i, q_i) = p_i q_i/(a + p_i)\ . \tag{3}$$

The PAC's constrained maximization problem becomes

$$\max_p \sum_{i=1}^m p_i q_i/(a + p_i), \quad \text{s.t.} \quad B \geq \sum_{i=1}^m p_i, \quad h_i\overline{p} \geq p_i \geq 0\ . \tag{4}$$

Theorem 1 characterizes the prices $\tilde{p}_i$ that solve problem (4). It is worthwhile to highlight the precise forms that the equal-marginals and threshold results given in parts V, VI and VII of Theorem 1 specify, given (3)'s definition of the service function:

[5]The function $p(s_i, q_i) = as_i/(q_i - s_i)^b$ for $0 \leq s_i < q_i$, with $b > 0$, is more flexible than the definition of (2), in that it allows the shape of the price curves to vary, as well as their scale. For our empirical purposes the extra flexibility is not useful. Except for a few discrete values of b, the more flexible definition of $p(s_i, q_i)$ lacks a closed-form inverse function. More importantly, for only a few values of b is it possible to factor $\partial s/\partial p$ to eliminate s_i, which we cannot observe.

Corollary 1 *(Optimal Allocation of Campaign Contributions Among Legislators)*
v. *All prices greater than zero and less than $h_i\overline{p}$ equate the marginal costs of service across all legislators who receive such prices; that marginal cost value is $\tilde{\lambda}_1 = q_i a/(a+\tilde{p}_i)^2$.*
vi. *Every legislator with $q_i \leq \tilde{\lambda}_1 a$ has $\tilde{p}_i = 0$, i.e., receives no contribution.*
vii. *Every legislator with $q_i \geq \tilde{\lambda}_1(a+h_i\overline{p})^2/a$ has $\tilde{p}_i = h_i\overline{p}$, i.e., receives the maximum legal contribution.*

The solution to (4) implies that the prices and qualities of the legislators who receive no contribution, who receive a contribution less than the maximum and who receive a maximum contribution have a characteristic relationship. Consider three disjoint sets of indexes for legislators who have prices in one of three ranges of values:

$$J \equiv \{i : \tilde{p}_i = 0\} \tag{5a}$$
$$K \equiv \{i : 0 < \tilde{p}_i < h_i\overline{p}\} \tag{5b}$$
$$H \equiv \{i : \tilde{p}_i = h_i\overline{p}\}\ . \tag{5c}$$

Any (but not all) of the three sets J, K or H may be empty. The prices and qualities of the legislators in the respective sets are related as follows.

Theorem 3 *(Ordering of Marginal Costs)*
For all $i_J \in J$, $i_K \in K$ and $i_H \in H$, $q_{i_J}/a \leq q_{i_K}a/(a+\tilde{p}_{i_K})^2 \leq q_{i_H}a/(a+h_{i_H}\overline{p})^2$.

This result states that the marginal cost of service is greatest for legislators to whom the PAC gives a maximum contribution and least for those to whom the PAC gives no contribution.

For legislators who receive contributions less than the maximum, there is a unique one-to-one mapping between the size of each contribution and each legislator's quality. For any two legislators $i_1, i_2 \in K$, equal marginals (Corollary 1 part v) implies $q_{i_1}a/(a+\tilde{p}_{i_1})^2 = q_{i_2}a/(a+\tilde{p}_{i_2})^2$, hence

$$q_{i_1}/q_{i_2} = (a+\tilde{p}_{i_1})^2/(a+\tilde{p}_{i_2})^2\ .$$

This implies that a legislator who has higher quality receives a larger contribution, and a legislator who receives a larger contribution has higher quality.

An intuitively helpful corollary of Theorem 3 characterizes relationships between the qualities of legislators in the three sets J, K and H:

Corollary 2 *(Legislator Quality Ordering)*
Every legislator who receives no contribution has quality lower than every legislator who receives a contribution. If one legislator receives the maximum possible contribution and another legislator has the same possible maximum but receives a contribution smaller than that, then the legislator who receives the maximum has higher quality.

A Conditional Likelihood

We equate $\tilde{p}_i$ with the observed total contribution from the PAC to legislator i; $h_i\overline{p}$ corresponds to the maximum legal contribution. We do not observe q_i but assume q_i to be a function of a fixed scalar β_0, vector x_i, vector β and a random variable $e_i \sim N(0,\sigma^2)$ (i.i.d. normal), with $\sigma^2 > 0$:

$$q_i = \exp(\beta_0 + x_i'\beta + e_i)\ . \tag{6}$$

We observe x_i.

We consider only the case where there is at least one positive contribution that is less than $h_i\overline{p}$. Let $i_{\max}$ index the legislator who has the largest positive contribution less than $h_i\overline{p}$; if several legislators have the same such largest value, let $i_{\max}$ index one of them (which one makes no difference). From the equal-marginals condition of part v of Corollary 1, $0 < \tilde{p}_i < h_i\overline{p}$ implies $q_i a/(a+\tilde{p}_i)^2 = q_{i_{\max}} a/(a+\tilde{p}_{i_{\max}})^2$, from which we obtain

$$2\log[(a+\tilde{p}_i)/(a+\tilde{p}_{i_{\max}})] = \log(q_i/q_{i_{\max}}) . \tag{7}$$

Substituting from (6) into (7) and rearranging gives

$$e_i = 2\log[(a+\tilde{p}_i)/(a+\tilde{p}_{i_{\max}})] - [(x_i - x_{i_{\max}})'\beta - e_{i_{\max}}] . \tag{8}$$

The solution to (4) determines ranges for the quality values of legislators who receive either no contributions or the maximum legal amount of contributions. Using (6), those ranges then imply ranges for the random variables e_i of such legislators. From Theorem 3 we have that $\tilde{p}_i = 0$ implies $q_i/a \le q_{i_{\max}} a/(a+\tilde{p}_{i_{\max}})^2$, from which we obtain $\log(q_i/q_{i_{\max}}) \le 2\log[a/(a+\tilde{p}_{i_{\max}})]$ and hence, using (6),

$$e_i \le 2\log[a/(a+\tilde{p}_{i_{\max}})] - [(x_i - x_{i_{\max}})'\beta - e_{i_{\max}}] . \tag{9}$$

Also from Theorem 3 we have that $\tilde{p}_i = h_i\overline{p}$ implies $q_i a/(a+h_i\overline{p})^2 \ge q_{i_{\max}} a/(a+\tilde{p}_{i_{\max}})^2$, from which we obtain $\log(q_i/q_{i_{\max}}) \ge 2\log[(a+h_i\overline{p})/(a+\tilde{p}_{i_{\max}})]$ and hence, using (6),

$$e_i \ge 2\log[(a+h_i\overline{p})/(a+\tilde{p}_{i_{\max}})] - [(x_i - x_{i_{\max}})'\beta - e_{i_{\max}}] . \tag{10}$$

Putting together (8), (9) and (10), using $e_i \sim N(0,\sigma^2)$ and conditioning on $e_{i_{\max}}$ gives a two-limit tobit conditional likelihood for the observed data $\tilde{p}_i$ and x_i, $i = 1,\ldots,m$, from a single PAC. The scaling parameter a is not identifiable in the absence of observations of service s_i. We set $a = 1$. Using

$$\begin{aligned}
w_{0i} &\equiv 2\log[1/(1+\tilde{p}_{i_{\max}})] + e_{i_{\max}} + (x_{i_{\max}} - x_i)'\beta \ ,\\
w_{1i} &\equiv 2\log[(1+\tilde{p}_i)/(1+\tilde{p}_{i_{\max}})] + e_{i_{\max}} + (x_{i_{\max}} - x_i)'\beta \ ,\\
w_{2i} &\equiv 2\log[(1+h_i\overline{p})/(1+\tilde{p}_{i_{\max}})] + e_{i_{\max}} + (x_{i_{\max}} - x_i)'\beta \ ,
\end{aligned}$$

the likelihood is

$$L(\cdot \mid e_{i_{\max}},\beta,\sigma^2) = \prod_{i:\tilde{p}_i=0} \Phi(w_{0i}/\sigma) \prod_{\substack{i:0<\tilde{p}_i<h_i\overline{p}\\ i\ne i_{\max}}} \sigma^{-1}\phi(w_{1i}/\sigma) \prod_{i:\tilde{p}_i=h_i\overline{p}} [1-\Phi(w_{2i}/\sigma)] \ , \tag{11}$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ respectively denote the standard normal density and cumulative distribution functions (cf. Maddala 1983, 160). Unknown parameters in (11) are $e_{i_{\max}}$, β and σ^2. The likelihood is defined for the case where there is at least one positive contribution that is not equal to $h_i\overline{p}$.

Pooling Multiple PACs

To discuss how our model may be used to analyze campaign contributions from multiple PACs, we augment the notation to index quantities associated with each of several PACs. For $j = 1,\ldots,n$ and $i = 1,\ldots,m$, let $\tilde{p}_{ji}$ denote the contribution made by PAC j to legislator i, $0 \le \tilde{p}_{ji} \le h_i\overline{p}$. For each PAC j, each legislator has a quality value $q_{ji} > 0$. We assume q_{ji} is a function of a fixed scalar β_{j0}, vector x_{ji}, vector β_j and a random variable $e_{ji} \sim N(0,\sigma_j^2)$, $\sigma_j^2 > 0$:

$$q_{ji} = \exp(\beta_{j0} + x'_{ji}\beta_j + e_{ji}) . \tag{12}$$

We observe $\tilde{p}_{ji}$ and x_{ji} for all $j = 1, \ldots, n$ and $i = 1, \ldots, m$.

In our model the strongest interpretation of the idea that two PACs have the same interests in what legislators do is that the PACs have identical evaluations of the quality of each legislator. For two PACS j_1 and j_2, that would mean $q_{j_1 i} = q_{j_2 i}$ for all i. We consider some weaker conceptions of similarity between PACs that have wider applicability. PACs are similar, we say, if they put the same weight on the attributes x_{ji}, that is, if they have the same vectors β_j. PACs that are similar may be said to have similar observed interests if, in addition, they assign to all legislators the same observed attributes; i.e., two PACS j_1 and j_2 have similar observed interests if $\beta_{j_1} = \beta_{j_2}$ and $x_{j_1 i} = x_{j_2 i}$ for all i.

PACs that are similar but lack similar observed interests may be thought of as at least sharing a conception of how the potential usefulness of legislators varies as a function of their attributes. What they lack is a common view of the values those attributes take for the various legislators.

There are two ways for PACs that have similar observed interests to have non-identical interests. Their interests may be said to have differing intensities if they do not have the same values for β_{j0}. A larger value of β_{j0} means greater intensity. According to our theoretical model, the intensity in this sense of a PAC's interests does not affect the PAC's contribution behavior. If two PACs have the same budgets and have interests that are identical except that one PAC's interests are more intense, then Corollary 1 implies that the PACs make identical contributions: in Corollary 1 it is easy to see that the prices that satisfy the equal-marginals condition and the sets of legislators who receive either no contribution or the maximum legal contribution are invariant to the value of β_{j0}.[6] Variations across PACs in the intensities of their interests are therefore, in this sense, irrelevant to an explanation of their contribution behavior.[7]

Another way for PACs that have similar interests to have non-identical interests is for them to have different values of e_{ji} for each i. The values of e_{ji} are by construction unobservable, but we may expect the values in general to vary across PACs for each i. For PACs that have similar observed interests, the question is whether the variation in e_{ji} is so large as to make the commonality represented by $x'_{ji}\beta_j$ unimportant. One way to measure whether the commonality is important is to compare σ_j^2 to what we may describe as the "mean squared commonality" defined by

$$C_j = m^{-1} \sum_{i=1}^{m} (x'_{ji}\beta_j)^2 \; .$$

If σ_j^2 is large relative to C_j for a set of PACs that have similar observed interests, then the commonality among them is not inducing them to have similar appraisals of legislators' qualities.

The likelihood of (11) may be expanded to support estimation of the β_j vector that is common to a set of similar PACs. Let the set R contain the indexes of the PACs being assumed similar. The assumption is that there is a vector β such that $\beta_j = \beta$ for all $j \in R$, while the PACs may have different values for $e_{ji_{\max}}$ (including the index $i_{\max}$) and σ_j^2. Referring to the likelihood of (11), we may write the likelihood that pools the presumed-similar PACs as

$$L_R(\cdot \mid \beta, e_{ji_{\max}}, \sigma_j^2, j \in R) = \prod_{j \in R} L(\cdot \mid e_{ji_{\max}}, \beta, \sigma_j^2) \; . \tag{13}$$

If the contributions values $\tilde{p}_{ji}$ are sufficiently various for each $j \in R$, the hypothesis of similarity may be tested by a likelihood ratio test of the pooled model L_R versus separate estimation of the basic model L for each PAC.

[6]This is assuming that the PACs have the same value for the scaling parameter a.

[7]The irrelevance of intensity—of β_{j0}—depends on our implicit assumption that PACs are risk-neutral in their appraisals of the expectations that comprise our conception of the service each is buying with its contributions.

Application: Telecommunications Company PACs in 1991–92

We apply our model to contributions made by the PACs of selected telecommunications companies ("telcos") during the 1991-92 House campaign period. In particular, we compare the contributions behavior of two kinds of telcos: the seven "Baby Bells"; and seven other companies not barred from providing long-distance service. For convenience we refer to the latter set of companies simply as long-distance companies, even though all were also extensively involved in other kinds of telecommunications business. The names of the companies we include in each classification appear in Table 1. Also included in the table are the FEC identification numbers of the PACs and of affiliated PACs from subsidiary corporations.

*** Table 1 about here ***

In Appendix B we review the legislative context in the 102nd Congress that motivates the key differences we expect to observe between the two sets of telcos. Because of the existence of vigorous legislative activity that would potentially affect their vital interests, we expect to see evidence of intricate and deep involvement in the legislative process by the Baby Bells. The long-distance companies were not facing any similar potential for immediate legislative action and so had no need to try to intervene in the legislative process in such a detailed manner. Both kinds of companies we expect to be sensitive to the existence of a Democratic majority in the House.

We expect both kinds of companies to be sensitive to the geographic scope of their primary productive activities. Because the Baby Bells have in total a geographically narrower scope than the long-distance companies do and are more comprehensively entrenched in local regulatory environments, we expect the Baby Bells to exhibit greater sensitivity to legislators' geographic locations. We use a dummy variable called BizState to measure whether a House member is from a state in which a telco has such primary operations. $\text{BizState}_{ji} = 1$ if legislator i is from a state in which the telco that sponsors PAC j operates local telephone exchanges, otherwise $\text{BizState}_{ji} = 0$.

Tables 2 and 3 list all the variables we use to measure attributes of legislators' quality (i.e., the components of x_i).[8] To measure institutional features of the House that are associated with different legislators and so may affect the PACs' evaluations of each legislator's quality, we use measurements of seniority and party affiliation, membership on House and party committees and subcommittees, and possession of leadership positions. Most of the variables have straightforward definitions that do not require comment. The subcommittees listed in Table 2 were selected because their apparent jurisdictions (in most cases reflected in their names) suggested they may be especially relevant for telcos' legislative interests.

*** Tables 2 and 3 about here ***

We use special definitions for the House committee membership variables, in an effort to bring in more information than simply whether a legislator is a member of the committee. Especially we wish to capture differences between the subcommittee memberships of different committee members. We also wish to distinguish chairs and ranking members of the whole committee and of subcommittees. To avoid an intractable explosion of dummy variables, we construct a score to summarize each committee member's subcommittee seats, based on a conjecture about an indirect way to measure the importance of each subcommittee. The conjecture is that House members of higher seniority choose to chair or be ranking members of the more important subcommittees. We use the chamber seniority of the chair of each subcommittee as a proxy for the importance of the subcommittee for Democrats, and we use the seniority of the ranking member as a proxy for the subcommittee's importance for Republicans. To facilitate the comparability of the proxy measures across committees, we reduce the seniority of each subcommittee chair to the rank of that seniority among the seniorities of the chairs all the subcommittees of the referent committee. Seniorities of

[8]See Appendix C for information about data sources.

equal value have the same rank value. To minimize differences across committees due to variation in the number of subcommittees, we transform the raw rank values so that the highest seniority value has a normalized rank value of one and the normalized rank of the smallest seniority value is a positive number less than one.[9] Each Democratic member of a committee is assigned a "committee subcommittee score" equal to the highest normalized rank value among the subcommittees on which the member sits. A committee member who is not a member of any subcommittee has a committee subcommittee score of zero. For Republicans we perform parallel operations using the seniority of subcommittee ranking members. To define the committee membership variables, we sum the following quantities to compute what we call an "augmented committee membership score": 1.0 simply for being on the committee; the committee subcommittee score; 1.0 if one is the committee chair or ranking member; and 1.0 if one is chair or ranking member of any subcommittee.

Parameter estimates for the pooled model with likelihood function L_R appear in Tables 4–7. Estimates for the seven long-distance companies are in Tables 4–5 and estimates for the seven Baby Bells are in Tables 6–7. We have transformed most of the variables that are not originally defined with distinct values for members of the two parties (counting Bernie Sanders as a Democrat) so that they have separate effects for Democrats and for Republicans. In the tables a prefix of "D:" denotes an effect that applies only to Democrats and a prefix of "R:" denotes an effect that applies only to Republicans.[10] The ordering of the PACs used to label the estimates for $e_{ji_{\max}}$ and σ_j^2 corresponds to the order in which they appear in Table 1. Hence for the long-distance companies σ_1^2 is the disturbance variance for GTE and σ_7^2 is the disturbance variance for Rochester Telephone, etc.[11]

*** Tables 4–7 about here ***

A succinct way to summarize the estimates for the long-distance companies is to say that they seem to be trying to buy the Democratic majority in a fairly undifferentiated way while "cherry picking" Republicans who are members of the committees widely considered to be the most powerful in the House. In Table 4 one can see a significant and substantially positive estimate for IsDem: being a Democrat means a substantial advantage in attracting long-distance company campaign funds. But none of the committee variables have significant positive effects for Democrats. For the Democrats the only significant committee effects are negative estimates for Banking and Education and Labor. For the Republicans there are significant positive effects estimated for Appropriations, Commerce, Rules, Ways and Means, and Government Operations. Three of the subcommittees that have jurisdictions apparently relevant for telco interests have significant effects for Democrats: two are negative (Judiciary, Intellectual Property, and Small Business, Regulation) and one is positive (Science, Technology). There are no significant effects for any of the leadership or party committee variables, except for the Democrat's Congressional Campaign Committee.

The contrast with the results for the Baby Bells is dramatic. For the Baby Bells there is not a significant estimate for IsDem. Instead there are significant estimates for Democrats for several of the committee membership variables: Rules, Ways and Means, Commerce, Judiciary, Science,

[9] To compute the unnormalized ranks, the highest seniority value is assigned a rank of one, the next highest a rank of two, and so on. Tied seniority values are assigned the same rank. Using r_k to denote the raw rank for the seniority value indexed by k and $r_{\max}$ to denote the highest raw rank value (which equals the number of distinct seniority values across the committee's subcommittees), the normalized rank is $1 - r_k/(r_{\max} + 1)$.

[10] Variables that have the "D:" prefix are multiplied by IsDem and variables that have the "R:" prefix are multiplied by $1 - \text{IsDem}$.

[11] The specification using the augmented committee membership scores seems to fit the data better than a specification that uses simple committee membership dummy variables. If the scores are replaced with simple membership dummies, the loglikelihoods are -3633.8 for the long-distance companies and -3355.9 for the Baby Bells. Both values are more negative than the corresponding values using the augmented scores, suggesting (at least informally) that the scores are better than the simple dummies.

House Administration, Merchant Marine, Small Business and District of Columbia all have significant positive effects; there are no significant negative effects. On the Republican side there is a significant positive effect for only one top-level ("Red") committee: Ways and Means. The other committees that have significant positive effects are Judiciary and Education and Labor, while District of Columbia has a significant negative effect. Instead of going after Republicans on entire committees, the Baby Bells seem to be focusing on important subcommittees. Subcommittees of Commerce (Telecommunications), Government Operations (Commerce), Small Business (Regulation) and Ways and Means (Select Revenue Measures) have large positive effects for Republicans. Other subcommittees have significant negative effects for Republicans: Trade on Ways and Means, Technology on Science, and Economic and Commercial Law on Judiciary. The reasons for all the negative effects are not clear, but in light of the lines of legislative conflict outlined in Appendix B, it is interesting to note that the chairman of the Economic and Commercial Law subcommittee of the Judiciary Committee was Jack Brooks, one of the primary proponents of the new regulatory measures that the Baby Bells vigorously opposed. The Baby Bells also exhibit sensitivity to leadership and party committee positions. There are significant positive effects for the Democratic leaders, the Democrat's Steering and Congressional Campaign committees, and the Republican Whips. Negative effects appear for the Republican's Committee on Committees and Policy committee. A negative effect for the Speaker effectively cancels the effect applying to him via the positive effect for Democratic leaders.

The Baby Bells seem to be more sensitive to local—or at least state level—business considerations than the long-distance companies are. The estimated effect of BizState is significant and positive for both sets of PACs, but the estimate for the Baby Bells is nearly three times that for the long-distance companies. The more concentrated geographic focus one would expect for the Baby Bells given the geographically limited nature of their primary business is apparent in the data.

Remarks

We derived a particular form of two-limit tobit model using the idea that PACs allocate their campaign finance budgets optimally among legislators based on a particular conception of legislator quality. Applying the model to contributions data from two sets of telecommunications companies produced estimates that seem to capture important aspects of their divergent involvements in the legislative politics of that time. The Baby Bells showed sensitivity to a wide range of specialized committee and subcommittee memberships, while the long-distance companies seemed to be acting broadly to buy the majority along with those Republicans sitting in generally powerful committee positions. Matching the main lines of the more narrative account of Appendix B, the analysis using the pooled model strongly suggests that the Baby Bells were in the middle of a complex legislative battle, while the long-distance companies were acting less reactively but perhaps more comprehensively to maintain a hold on the whole Congress.

Such results suggest the potential usefulness of the pooled model, $L_{R\cdot}$. If the hypothesis of similarity among the pooled PACs is correct, the pooled model is not subject to distortions because the PACs may have different budgets. In such a case, analysis based on data aggregated over the PACs generally fails.[12]

[12]See for instance the discussion in Farrell (1953–54). Where Farrell refers to individual income, substitute the budget of each PAC.

Appendix A: Proofs

In the proofs we use notation $C_0 \stackrel{*}{\Longrightarrow} C_1$ to state that C_0 implies C_1 according to equation or result $(*)$.

Proof of Theorem 1: The Lagrangean for the nonlinear program (Kuhn and Tucker, 1951) corresponding to (1) is

$$\mathfrak{L}(q,p,\lambda) = \sum_{i=1}^{m} s(p_i,q_i) + \lambda_1 \left(B - \sum_{i=1}^{m} p_i \right) + \sum_{i=1}^{m} \lambda_{1+i}(h_i\overline{p} - p_i)\ ,$$

where λ denotes the vector of Lagrange multipliers λ_i, $i = 1,\ldots,m+1$. The necessary conditions for a constrained maximum require that the solution vectors $\tilde{p}$ and $\tilde{\lambda}$ satisfy

$$\partial\mathfrak{L}/\partial p_i = s_1(p_i,q_i) - \lambda_1 - \lambda_{1+i} \leq 0, \quad i = 1,\ldots,m, \tag{14a}$$
$$p_i(\partial\mathfrak{L}/\partial p_i) = p_i[s_1(p_i,q_i) - \lambda_1 - \lambda_{1+i}] = 0, \quad i = 1,\ldots,m, \tag{14b}$$
$$\partial\mathfrak{L}/\partial\lambda_1 = B - \textstyle\sum_{i=1}^{m} p_i \geq 0, \tag{14c}$$
$$\lambda_1(\partial\mathfrak{L}/\partial\lambda_1) = \lambda_1(B - \textstyle\sum_{i=1}^{m} p_i) = 0, \tag{14d}$$
$$\partial\mathfrak{L}/\partial\lambda_{1+i} = h_i\overline{p} - p_i \geq 0, \quad i = 1,\ldots,m, \tag{14e}$$
$$\lambda_{1+i}(\partial\mathfrak{L}/\partial\lambda_{1+i}) = \lambda_{1+i}(h_i\overline{p} - p_i) = 0, \quad i = 1,\ldots,m, \tag{14f}$$
$$p_i \geq 0, \quad i = 1,\ldots,m, \tag{14g}$$
$$\lambda_j \geq 0, \quad j = 1,\ldots,m+1\ . \tag{14h}$$

Because $s(p_i,q_i)$ is concave in p_i, the constraints are linear (hence convex) and the feasible set of prices is bounded for finite B, satisfaction of the necessary conditions is sufficient for a global optimum (Lancaster 1987, 74–75).

Proof of I:

$$B = 0 \stackrel{14c}{\Longrightarrow} \textstyle\sum_{i=1}^{m} \tilde{p}_i = 0 \stackrel{14g}{\Longrightarrow} \forall i\ \tilde{p}_i = 0 \stackrel{14f}{\Longrightarrow} \forall i\ \tilde{\lambda}_{1+i} = 0 \stackrel{14a}{\Longrightarrow} \tilde{\lambda}_1 \geq \max_i s_1(p_i,q_i)|_{p_i=0}\ ;$$
$$\forall i\ \tilde{p}_i = 0 \stackrel{14f}{\Longrightarrow} \forall i\ \tilde{\lambda}_{1+i} = 0 \stackrel{14a}{\Longrightarrow} \tilde{\lambda}_1 \geq \max_i s_1(p_i,q_i)|_{p_i=0} > 0 \stackrel{14d}{\Longrightarrow} B = \textstyle\sum_{i=1}^{m} \tilde{p}_i = 0\ .$$

Proof of II: For a PAC with an excessive budget: $B > \sum_{i=1}^{m} h_i\overline{p} \stackrel{14d}{\Longrightarrow} \tilde{\lambda}_1 = 0 \stackrel{14a,A2}{\Longrightarrow} \forall i\ \tilde{\lambda}_{1+i} > 0 \stackrel{14f}{\Longrightarrow} \forall i\ \tilde{p}_i = h_i\overline{p} \stackrel{14b}{\Longrightarrow} \forall i\ \tilde{\lambda}_{1+i} = s_1(h_i\overline{p},q_i)$. For a PAC with an exactly sufficient budget: $(B = \sum_{i=1}^{m} h_i\overline{p}\ \ \&\ \ \exists i : 0 \leq \tilde{p}_i < h_i\overline{p}) \stackrel{14d}{\Longrightarrow} \tilde{\lambda}_1 = 0 \stackrel{14a}{\Longrightarrow} \tilde{\lambda}_{1+i} > 0$, but $\exists i : \tilde{p}_i < h_i\overline{p} \stackrel{14f}{\Longrightarrow} \tilde{\lambda}_{1+i} = 0$, a contradiction; therefore $B = \sum_{i=1}^{m} h_i\overline{p} \Longrightarrow \forall i\ \tilde{p}_i = h_i\overline{p} \stackrel{14b}{\Longrightarrow} \forall i\ \tilde{\lambda}_{1+i} = s_1(h_i\overline{p},q_i) - \tilde{\lambda}_1 \stackrel{14h}{\Longrightarrow} 0 \leq \tilde{\lambda}_1 \leq \min_i s_1(h_i\overline{p},q_i)$.

Proof of III: $\exists i : 0 \leq \tilde{p}_i < h_i\overline{p} \stackrel{14f}{\Longrightarrow} \tilde{\lambda}_{1+i} = 0 \stackrel{14a}{\Longrightarrow} \tilde{\lambda}_1 > 0 \stackrel{14d}{\Longrightarrow} B = \sum_{i=1}^{m} \tilde{p}_i$.

Proof of IV: $B < \sum_{i=1}^{m} h_i\overline{p} \stackrel{14c}{\Longrightarrow} \sum_{i=1}^{m} \tilde{p}_i < \sum_{i=1}^{m} h_i\overline{p} \stackrel{14g}{\Longrightarrow} \exists i : 0 \leq \tilde{p}_i < h_i\overline{p}$.

Proof of V: $0 < \tilde{p}_i < h_i\overline{p} \stackrel{14f}{\Longrightarrow} \tilde{\lambda}_{1+i} = 0 \stackrel{14b}{\Longrightarrow} \tilde{\lambda}_1 = s_1(\tilde{p}_i,q_i)$.

Proof of VI: $s_1(p_i,q_i)|_{p_i=0} \leq \tilde{\lambda}_1 \stackrel{A3}{\Longrightarrow} s_1(p_i,q_i)|_{p_i>0} < \tilde{\lambda}_1 \stackrel{14b}{\Longrightarrow} (\tilde{p}_i = 0 \text{ or } \tilde{\lambda}_{1+i} < 0) \stackrel{14h}{\Longrightarrow} \tilde{p}_i = 0$.

Proof of VII: $s_1(p_i,q_i)|_{p_i=h_i\overline{p}} > \tilde{\lambda}_1 \stackrel{14a}{\Longrightarrow} \tilde{\lambda}_{1+i} > 0 \stackrel{14f}{\Longrightarrow} \tilde{p}_i = h_i\overline{p}$; $s_1(p_i,q_i)|_{p_i=h_i\overline{p}} = \tilde{\lambda}_1 \stackrel{A3}{\Longrightarrow} s_1(p_i,q_i)|_{p_i<h_i\overline{p}} > \tilde{\lambda}_1 \stackrel{14a}{\Longrightarrow} (\tilde{p}_i < h_i\overline{p} \Longrightarrow \tilde{\lambda}_{1+i} > 0) \stackrel{14f}{\Longrightarrow} \tilde{p}_i = h_i\overline{p}$. *Q.E.D.*

Proof of Theorem 2: Define a continuum of budgets by $B_\theta = \theta B + (1-\theta)B^*$, $\theta \in [0,1]$. Corresponding to each budget is a set of optimum prices $\tilde{p}_{\theta i}$, $i = 1,\ldots,m$. Because $B_\theta < \sum_{i=1}^{m} h_i\overline{p}$ for every $\theta \in [0,1]$, part IV of Theorem 1 implies that every such budget is fully expended. Hence an increase in B_θ implies an increase in price for at least one i. Consider a value of $\theta > 0$ sufficiently small that $B_\theta - B < \min_{0<\tilde{p}_i<h_i\overline{p}}(h_i\overline{p} - \tilde{p}_i)$. If $\tilde{p}_{\theta i} > \tilde{p}_i > 0$, then $s_1(\tilde{p}_{\theta i}, q_i) < s_1(\tilde{p}_i, q_i)$ because of diminishing returns (A3). But equal marginals (Theorem 1 part V) implies that $s_1(\tilde{p}_{\theta i}, q_i) = \tilde{\lambda}_{\theta 1}$ for some constant $\tilde{\lambda}_{\theta 1}$ for all i such that $0 < \tilde{p}_{\theta i} < h_i\overline{p}$. Therefore $\tilde{\lambda}_{\theta 1} < \tilde{\lambda}_1$. If $\tilde{p}_{\theta i} > \tilde{p}_i = 0$, then diminishing returns again implies $s_1(\tilde{p}_{\theta i}, q_i) < s_1(\tilde{p}_i, q_i)$ and hence $\tilde{\lambda}_{\theta 1} < \tilde{\lambda}_1$. Whether or not any price $\tilde{p}_i = 0$ becomes positive under the increased budget B_θ, $\tilde{p}_{\theta i} > \tilde{p}_i$ for all prices $0 < \tilde{p}_i < h_i\overline{p}$: by increasingness (A2) and diminishing returns, $s_1(\tilde{p}_{\theta i}, q_i) < s_1(\tilde{p}_i, q_i)$ implies $s(\tilde{p}_{\theta i}, q_i) > s(\tilde{p}_i, q_i)$, which by bijectivity (A1) and increasingness implies $\tilde{p}_{\theta i} > \tilde{p}_i$. For some $\theta > 0$ it is possible that $\tilde{p}_{\theta i} = h_i\overline{p}$ for at least one i for which $0 < \tilde{p}_i < h_i\overline{p}$. In that case the relationship $s_1(\tilde{p}_{\theta i}, q_i) < s_1(\tilde{p}_i, q_i)$ still holds for all i that have $0 < \tilde{p}_{\theta i} < h_i\overline{p}$. Hence $\tilde{\lambda}_1^* < \tilde{\lambda}_1$ if there is at least one i for which $0 < \tilde{p}_i^* < h_i\overline{p}$. *Q.E.D.*

Proof of Theorem 3: We use the result obtained from part V of Theorem 1 by setting $s_1(\tilde{p}_i, q_i) = q_i a/(a + \tilde{p}_i)^2$:

$$0 < \tilde{p}_i < h_i\overline{p} \implies \tilde{\lambda}_1 = q_i a/(a + \tilde{p}_i)^2 \; . \tag{15}$$

Proof of the first inequality:

$$i_J \in J,\; i_K \in K \overset{14f}{\implies} \tilde{\lambda}_{1+i_J} = 0 \overset{14a,15}{\implies} q_{i_J}/a \le q_{i_K} a/(a + \tilde{p}_{i_K})^2 \; . \tag{16}$$

Proof of the second inequality:

$$\begin{aligned} &i_H \in H,\; i_K \in K \overset{14b}{\implies} \tilde{\lambda}_{1+i_H} = q_{i_H} a/(a + h_{i_H}\overline{p})^2 - \tilde{\lambda}_1 \\ &\overset{14h,15}{\implies} q_{i_H} a/(a + h_{i_H}\overline{p})^2 \ge q_{i_K} a/(a + \tilde{p}_{i_K})^2 \; . \end{aligned} \tag{17}$$

The relationship $q_{i_J}/a \le q_{i_H} a/(a + h_{i_H}\overline{p})^2$ holds even if K is empty:

$$\begin{aligned} &i_J \in J \overset{14f}{\implies} \tilde{\lambda}_{1+i_J} = 0 \overset{14a}{\implies} \tilde{\lambda}_1 \ge q_{i_J}/a \; ; \\ &i_H \in H \overset{14b}{\implies} \tilde{\lambda}_{1+i_H} = q_{i_H} a/(a + h_{i_H}\overline{p})^2 - \tilde{\lambda}_1 \overset{14h}{\implies} q_{i_H} a/(a + h_{i_H}\overline{p})^2 \ge \tilde{\lambda}_1 \; ; \\ &i_J \in J,\; i_H \in H \implies q_{i_H} a/(a + h_{i_H}\overline{p})^2 \ge q_{i_J}/a \; . \end{aligned}$$

Q.E.D.

Proof of Corollary 2: First result: if $\tilde{p}_i > 0$ then $q_{i_J}/a \le q_i a/(a + \tilde{p}_i)^2$ implies $q_{i_J} < q_i$. Second result: if $h_{i_H}\overline{p} > \tilde{p}_{i_K}$ then $q_{i_H} a/(a + h_{i_H}\overline{p})^2 \ge q_{i_K} a/(a + \tilde{p}_{i_K})^2$ implies $q_{i_H} > q_{i_K}$. *Q.E.D.*

Appendix B: The 102nd Congress and Telecommunications

In the early nineties the United States telecommunication industry was shaped by the often contrasting forces of technology and politics. Technology had forced open a market that as recently as 1984 was dominated by one company, American Telephone and Telegraph (AT&T). The pieces created by the historic break-up engineered by U.S. Federal Judge Howard Greene were the long-distance company AT&T and the seven Regional Holding Companies (RHCs), or Baby Bells. The companies in the industry, heavily regulated by the FCC, state public utility commissions (PUCs) and the courts, turned to Congress to seek regulatory and legislative advantages over competitors.

AT&T had kept its monopoly throughout most of the twentieth century because of promises made to the government to secure "universal service" and geographic price averaging. In effect, AT&T used government sanctioned price discrimination to subsidize rural and residential phone service. Beginning with technological advances made by MCI in the late 1960s that penetrated the long distance market, new firms were able to price long distance service closer to costs, allowing them to undercut AT&T. Instead of using their monopolistic lock on their local service networks to subsidize the competition in long distance markets, the company voluntarily signed a consent decree with the Department of Justice that divided the company and created seven regional local telephone monopolies.

The Bell phone companies were not alone in providing American phone service. There were some 1,300 phone companies at the time of divestiture. However even into the 1990s, the Bells dominated the industry along with GTE, MCI and US Sprint. While MCI was solely a long distance service provider, GTE and Sprint had significant regulated (mostly by the state PUCs) local service divisions as well. They were unaffected by the restraints that Judge Greene's Modified Final Judgement (MFJ) placed on the Baby Bells, however, except in the way that the restraints allowed them to have competitive advantages over the former Ma Bell offspring.

The 102nd Congress was the battle ground for intense lobbying efforts by all of the telecommunications companies. The telcos were trying to grapple with the rapid transformations that their market was experiencing. So many looked to Congress to use legislative and political tools to change, or maintain, the environment in their favor. In addition, many members of Congress resented that an unelected federal judge controlled such a large industry and sought to return power back to themselves and the FCC.

The Baby Bells formed the most homogeneous segment of the industry, being near mirror images of each other, and operating in mutually exclusive regional territories. Thus their political goals were not conflicting. Their political goals were not completely parallel because each Baby Bell (as were other local service providers) was forced to deal with a different set of PUCs. The PUCs had nearly complete control over the amount of money that the phone companies made in intrastate business. This often led telcos to buy access to Members of Congress based on their ability to influence their originating state political systems. In the early 1990s, many states were switching from a specified rate of return type profit regulation to incentive based systems that could potentially offer the telco uncapped profits. Other issues surrounding state regulations were also critical as technology had developed to allow competing companies the ability to bypass the local Bell monopolies by creating their own fiber optic cable systems. Frequently these companies targeted the most profitable telephone customers, city residents and businesses. The combination of this threat and the spread of unregulated wireless telephone excited the political needs of the Bells.

On the federal level, the telcos sought to overturn the restrictions placed on them by the MFJ. The first restriction, which they did not hope to overturn in the short-run, was the prohibition from offering long distance service to customers. A court order early in the 102nd Congress, overturned the provision which kept the Baby Bells from offering electronic information services (an almost laughable precursor to the internet). However, forces in the House of Representatives sought to reduce the ability of the Baby Bells to leverage their monopolies in this new market. Aligned against them were a consortium of cable television, broadcaster, printed media and consumer groups, all with substantial lobbying and political clout.

A Senate Bill introduced by Commerce Chairman Ernest F. Hollings (D-SC) and eventually passed would have overturned the third restriction placed on the Baby Bells, a ban on manufacturing and R&D activities. A similar bill was introduced in the House, but went unpassed mostly due to the fact that Members of Congress were trying to solve all of the competitive and regulatory issues involved within the industry with a single bill. A jurisdictional battle between Commerce Chairman John Dingell (D-MI) and Judiciary Chairman Jack Brooks (D-TX) over which committee should control the industry delayed action further. The dispute was not a petty turf war, but grew out of conflicting visions of how the industry should be shaped. Brooks introduced a bill that died in 1992 that would have placed more restrictions on the Baby Bells from entering new businesses. Dingell and the chairman of the Commerce Committee's Telecommunications and Finance subcommittee, Edward Markey (D-MA), desired a more lenient market which would have regulatory restrictions to prevent consumer abuses. The lobbying efforts and PAC donations made by the Baby Bells reflected their political goals to maintain their current monopoly status while being able to enter new businesses as the dynamic nature of the industry unfolded. Their needs were concentrated in two competing committees, one which was being led by a chairman who was overtly hostile to their interests. The Baby Bells did manage to keep their ability to enter the information market intact while dodging the extra regulations of the Brooks sponsored bill.

AT&T and the other long distance companies had no need to get involved in specific legislative contests as they spent most of the Congress embroiled in a price war. The session ended with the FCC and other regulators considering an end to AT&Ts restricted status as the dominant industry member as they continued to lose market share to the cheaper long distance carriers. Congress seemingly could offer few political solutions to AT&T's current predicament as Congress had decided in 1989 to freeze the Subscriber Line Charge (SLC) at \$3.50 instead of the \$8 plus that each local customer would pay the local telephone provider. The difference was to be made up by the long distance providers as they continued to subsidize local service with the fees they paid the local telephone companies. However, it does not seem that the SLC was a great political loss to AT&T and the other long distance companies because any increase, and thereby any reduction in cost for them, would have been passed on to consumers due to the heavy price competition in the long distance segment of the industry. In addition AT&T did not oppose the removal of the manufacturing restriction because the Baby Bells did not seek to enter the segment of that industry where AT&T profited.

Much of the lobbying and PAC donations made to Congress could be seen as forward thinking. The recent and anticipated changes in the industry were so great that many telcos probably sought to put Members of Congress on "retainer" in the expected event of future political needs for access and other service. With the intense regulatory penetration into so much of the market, it is easy to understand the perceived need for political services that telcos had during the 102nd Congress. We can anticipate PAC campaign contributions to be focused around the committees central to their regulatory needs, but staying away from areas dominated by members who have aversions to their causes (i.e., Jack Brooks).

Appendix C: Data Sources

We obtained the AFL-CIO and BIPAC roll call vote rating scores from their respective annual reviews of Congress. For recent years the data can be found on their respective web pages (www.aflcio.org and www.bipac.org). Information from earlier years was mailed to us by the PACs.

Seniority, term of service and party affiliation data come from Inter-university Consortium for Political and Social Research and Carroll McKibbin 1997, with some corrections based on U.S. Congress (1991–92).

Information about the money raised by challengers comes from the 1992 FEC House and Senate Spread Data (Federal Election Commission 1995).

Data regarding PAC contributions to House members were compiled from itemized data, Committee Master and Candidate Master files (pas292.zip, cm92.zip and cn92.zip) downloaded from the Federal Election Commission Information Access Center FTP Server (ftp://ftp.fec.gov/FEC/).

The 1992 congressional vote percentages were downloaded from The Office of the Clerk On-line Information Center (www.clerkweb.house.gov), with the exception of the data for Louisiana which came from Scammon and McGillivray (1993). For Louisiana we used the vote totals from the decisive election. The state has an open primary with a second election between the two cadidates with the highest vote totals, in the event that no candidate received more than 50% of the vote in the primary.

The committee assignments data were created by Gregory J. Wawro.

Subcommittee assignments, leadership information, membership lists of party committees, chairs and ranking members of committees and subcommittees all come from U.S. Congress (1991–92).

The parties' whip structures came from *Congressional Quarterly Weekly Reporter* May 4, 1991, *Committee Supplement*, as did subcommittee asignments for the Committee on the Budget, which were not available as of the printing of the Congressional Directory.

BizState data come from *Moody's Public Utility Manual* 1992 vol. 1 and 2.

For further information on the Telecommunications industry consult Standard and Poor's *Industry Surveys Telecomunications Current Analysis* September 17, 1992, and the basic analysis dated January 23, 1992. For Details of telco political issues see *Congressional Quarterly Weekly Reporter* various issues 1991-1992.

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Table 1: Fourteen Telecommunications Companies

Company Name	PAC Numbers
Regional Holding Companies ("Baby Bells")	
BellSouth	C00174060, C00099655, C00095760, C00184390
Ameritech	C00174763, C00079731, C00080184, C00083436, C00090191, C00113134
NYNEX	C00179762, C00094763, C00101717
Bell Atlantic	C00186288, C00085332, C00093468, C00126110
Pacific Telesis Group	C00083865
Southwestern Bell	C00109017
U S West	C00184374
Long-Distance and Full Service Companies	
General Telephone and Electronics	C00025163, C00107490
American Telephone and Telegraph	C00185124, C00083774
United Telecommunications (Sprint)	C00089342
MCI Telecommunications	C00142836
ALLTEL	C00216556
Advanced Telecommunications	C00225763
Rochester Telephone	C00258210

Source: 1992 FEC Committee Master file.

Table 2: Descriptions of Legislator Quality Attribute Variables

Business Interest, Electoral and Party Variables:

BizState	One if legislator is from a state in which the telco operates local telephone exchanges, otherwise zero
AFL-CIO	AFL-CIO roll call vote rating scores
BIPAC	Business Industry Political Action Committee roll call vote rating scores
IncProp	Proportion of all 1992 general election votes for the legislator
IncClos	IncProp*(1-IncProp)
PMoney	Total campaign contributions ($1000) received by all 1992 primary election challengers
GMoney	Total campaign contributions ($1000) received by all 1992 general election challengers
IsDem	One for Democrats and Bernie Sanders (I-VT), zero for Republicans
Terms	Number of House terms served (counted from 1)

House Committee Variables:

AG	Agriculture	IN	Interior and Insular Affairs
AP	Appropriations	JU	Judiciary
AR	Armed Services	ME	Merchant Marine and Fisheries
BA	Banking, Finance and Urban Affairs	PO	Post Office and Civil Service
BU	Budget	PU	Public Works and Transportation
DC	District of Columbia	RU	Rules
ED	Education and Labor	SC	Science, Space, and Technology
EN	Energy and Commerce	SM	Small Business
FO	Foreign Affairs	ST	Standards of Official Conduct
GO	Government Operations	VE	Veterans' Affairs
HO	House Administration	WA	Ways and Means

Subcommittee Dummy Variables:

EN04	Telecomunications and Finance
EN06	Commerce, Consumer Protection, and Competitiveness
GO04	Commerce, Consumer, and Monetary Affairs
JU01	Economic and Commercial Law
JU04	Intellectual Property and Judicial Administration
SC05	Technology and Competitiveness
SC06	Science
SM03	Regulation, Business Opportunities, and Energy
SM04	Antitrust, Impact of Deregulation, and Ecology
WA01	Trade
WA03	Select Revenue Measures

Note: Where committee chairs or ranking members are indicated in U.S. Congress (1991–92) to be *ex officio* members of subcommittees, we count them as members thereof.

Table 3: Descriptions of Legislator Quality Attribute Variables

Committee and Subcommittee Chair Dummy Variables:

Chair1	Chair of exclusive committee (Dems)
Chair2	Chair of semi-exclusive committee (Dems)
Chair3	Chair of non-exclusive committee (Dems)
SChair1	Chair of subcommittee of exclusive committee (Dems)
SChair2	Chair of subcommittee of semi-exclusive committee (Dems)
SChair3	Chair of subcommittee of non-exclusive committee (Dems)
Rank1	Ranking member of "Red" committee (Reps)
Rank2	Ranking member of "White" committee (Reps)
Rank3	Ranking member of "Blue" committee (Reps)
SRank1	Ranking member of subcommittee of "Red" committee (Reps)
SRank2	Ranking member of subcommittee of "White" committee (Reps)
SRank3	Ranking member of subcommittee of "Blue" committee (Reps)

Party Committee Dummy Variables:

ComPol	Committee on Committees or Policy Committee (Republican)
Steering	Steering Committee (Democrat)
DCCC	Congressional Campaign Committee (Democrat)
RCCC	National Congressional Committee (Republican)
Whips	Whips

Special Position Dummy Variables:

Speaker	Speaker of the House
MajLead, MinLead	Majority and Minority Leaders
MajWhip, MinWhip	Majority and Minority Whips
Leader	Speaker; Majority and Minority Leaders; Whips; Chief Deputy Whips; Caucus Chair, Vice Chair and Secretary; Conference Chair and Vice Chair; Chairs of Steering and Policy Comm., Republican Policy Comm., Republican Research Comm., Democratic Study Group Democratic Campaign Comm., Republican National Congressional Comm.

Note: Exclusive committees are AP, RU, WA, semi-exclusive are AG, AR, BA, ED, EN, FO, JU, PU and non-exclusive are BU, DC, GO, HO, IN, ME, PO, SC, SM, VE, ST. "Red" committees are AP, RU, WA, EN, "White" committees are the semi-exclusive set less EN, and "Blue" is the same as non-exclusive.

Table 4: Parameter Estimates for Long-Distance Company PACs (part 1)

parameter	MLE	SE	parameter	MLE	SE
BizState	7.462	1.189	D:HO	.906	.906
IsDem	27.906	10.390	D:IN	.527	.909
R:AG	1.898	1.091	D:JU	2.845	1.527
R:AP	4.471	1.835	D:ME	−.006	.935
R:AR	1.335	1.404	D:PO	−.186	.974
R:BA	1.638	.982	D:PU	−1.325	.847
R:BU	1.022	.862	D:RU	.600	1.497
R:DC	−1.344	1.846	D:SC	.200	1.035
R:ED	−.052	1.000	D:SM	1.714	.991
R:EN	4.249	1.994	D:ST	.050	1.733
R:FO	1.932	1.275	D:VE	.079	.903
R:GO	2.602	1.207	D:WA	.235	1.504
R:HO	−.101	1.286	D:EN04	1.062	1.081
R:IN	1.439	1.089	D:EN06	−.327	1.014
R:JU	2.423	1.878	D:GO04	.866	.678
R:ME	.459	.971	D:JU01	−4.084	3.265
R:PO	−.496	.960	D:JU04	−7.674	2.494
R:PU	1.194	1.047	D:SC05	3.821	1.394
R:RU	6.232	2.355	D:SC06	−2.110	1.384
R:SC	1.710	1.157	D:SM03	−4.413	1.787
R:SM	2.036	1.393	D:SM04	−1.455	3.392
R:ST	−1.220	2.923	D:WA01	2.987	2.814
R:VE	.124	.974	D:WA03	1.089	2.188
R:WA	5.262	2.067	R:EN04	4.564	4.009
D:AG	−.828	.905	R:EN06	−1.735	2.793
D:AP	.483	1.410	R:GO04	−3.657	2.409
D:AR	−1.600	.888	R:JU01	3.335	4.726
D:BA	−3.052	.850	R:JU04	−1.769	3.996
D:BU	−1.357	.735	R:SC05	1.357	1.960
D:DC	.163	1.059	R:SC06	−1.893	1.961
D:ED	−1.770	.845	R:SM03	−2.370	3.370
D:EN	−.247	1.000	R:SM04	−3.808	3.448
D:FO	−.879	.874	R:WA01	−6.771	5.204
D:GO	1.147	1.022	R:WA03	4.542	3.631

Table 5: Parameter Estimates for Long-Distance Company PACs (part 2)

parameter	MLE	SE	parameter	MLE	SE
Chair1	−3.325	3.645	DCCC	2.208	.907
Chair2	3.951	3.548	Speaker	7.778	9.438
Chair3	−5.727	2.112	MajLead	10.493	6.591
Rank1	−3.851	5.592	MinLead	18.910	9.754
Rank2	−.732	4.523	MinWhip	10.537	8.994
Rank3	3.081	3.428	R:IncProp	10.346	4.091
SChair1	−4.637	2.310	R:IncClos	−1.575	10.690
SChair2	1.141	1.353	D:IncProp	−5.440	2.658
SChair3	.213	1.302	D:IncClos	−.176	7.098
SRank1	−4.305	2.778	R:PMoney	−.001	.002
SRank2	.581	2.200	R:GMoney	.001	.002
SRank3	.149	1.736	D:PMoney	−.008	.002
D:Leader	−.753	2.244	D:GMoney	−.001	.002
R:Leader	5.202	4.084	R:Terms	−.925	.297
ComPol	−1.492	1.362	D:Terms	−.061	.162
Steering	1.434	1.535	R:BIPAC	.060	.068
D:Whips	1.610	.836	R:AFL-CIO	.035	.054
R:Whips	.047	2.153	D:BIPAC	−.032	.032
RCCC	.320	1.392	D:AFL-CIO	−.109	.040
$e_{1i_{\max}}$	−.264	6.108	$e_{5i_{\max}}$	30.271	3.952
σ_1^2	79.080	12.655	σ_5^2	207.913	81.573
$e_{2i_{\max}}$	−1.191	8.139	$e_{6i_{\max}}$	37.665	17.228
σ_2^2	39.961	3.941	σ_6^2	353.489	366.905
$e_{3i_{\max}}$	24.861	5.237	$e_{7i_{\max}}$	61.270	34.484
σ_3^2	148.953	37.944	σ_7^2	617.777	863.263
$e_{4i_{\max}}$	24.152	3.357			
σ_4^2	220.279	86.967			

Note: Maximum likelihood estimates. $n = 7$ PACs and $m = 357$ House members ($N = 2,499$ observations). Log-likelihood: −3627.3.

Table 6: Parameter Estimates for Regional Holding Company ("Baby Bell") PACs (part 1)

parameter	MLE	SE	parameter	MLE	SE
BizState	22.432	.992	D:HO	2.471	1.021
IsDem	14.675	16.042	D:IN	1.482	.897
R:AG	.262	1.099	D:JU	8.340	1.254
R:AP	.002	1.986	D:ME	2.245	1.062
R:AR	−2.571	1.652	D:PO	1.974	1.121
R:BA	.096	.885	D:PU	−.172	1.082
R:BU	−.678	1.209	D:RU	4.743	1.554
R:DC	−3.731	1.491	D:SC	2.397	1.079
R:ED	2.795	.854	D:SM	2.552	1.145
R:EN	2.376	1.501	D:ST	−.654	2.470
R:FO	−.964	1.310	D:VE	1.718	1.031
R:GO	−.955	1.160	D:WA	6.925	1.701
R:HO	−.159	1.201	D:EN04	−.357	.968
R:IN	−.824	1.417	D:EN06	−.832	1.056
R:JU	4.748	1.522	D:GO04	2.240	.769
R:ME	.531	.982	D:JU01	−13.498	2.854
R:PO	−1.148	1.455	D:JU04	.010	1.966
R:PU	−1.709	1.201	D:SC05	3.265	1.686
R:RU	1.303	1.993	D:SC06	−2.476	1.662
R:SC	−.030	.985	D:SM03	−1.757	2.210
R:SM	−.612	1.409	D:SM04	−.293	4.651
R:ST	4.900	2.528	D:WA01	.537	1.911
R:VE	−.084	1.097	D:WA03	1.589	1.861
R:WA	6.920	2.020	R:EN04	8.711	3.049
D:AG	1.279	.880	R:EN06	2.804	1.982
D:AP	1.905	1.626	R:GO04	7.667	2.662
D:AR	−1.119	1.155	R:JU01	3.703	2.799
D:BA	−.820	1.094	R:JU04	−7.846	2.239
D:BU	−1.356	.765	R:SC05	−3.863	1.842
D:DC	3.013	1.018	R:SC06	2.934	1.740
D:ED	.492	.943	R:SM03	6.140	2.657
D:EN	7.206	1.050	R:SM04	1.601	4.517
D:FO	1.536	.966	R:WA01	−15.351	5.066
D:GO	−.615	1.161	R:WA03	3.445	3.237

Table 7: Parameter Estimates for Regional Holding Company ("Baby Bell") PACs (part 2)

parameter	MLE	SE	parameter	MLE	SE
Chair1	−4.022	3.829	DCCC	3.118	.993
Chair2	1.937	3.766	Speaker	−11.913	5.803
Chair3	−8.368	2.937	MajLead	10.097	12.371
Rank1	2.161	5.348	MinLead	13.156	8.431
Rank2	−4.208	4.116	MinWhip	8.071	6.147
Rank3	−2.728	4.247	R:IncProp	8.090	8.442
SChair1	−10.262	2.468	R:IncClos	22.468	21.403
SChair2	−3.108	1.716	D:IncProp	−7.116	2.999
SChair3	−4.640	1.469	D:IncClos	−25.409	8.544
SRank1	−2.266	2.774	R:PMoney	−.003	.003
SRank2	−.347	2.176	R:GMoney	.003	.003
SRank3	2.696	2.049	D:PMoney	−.010	.003
D:Leader	14.432	3.186	D:GMoney	.001	.002
R:Leader	5.066	3.041	R:Terms	.156	.370
ComPol	−3.581	1.662	D:Terms	.463	.215
Steering	3.529	1.472	R:BIPAC	−.028	.098
D:Whips	.933	.978	R:AFL-CIO	.035	.063
R:Whips	4.095	1.833	D:BIPAC	.003	.040
RCCC	−.493	1.485	D:AFL-CIO	−.048	.055
$e_{1i_{\max}}$	2.812	1.628	$e_{5i_{\max}}$	−4.433	2.035
σ_1^2	139.816	19.768	σ_5^2	47.885	7.770
$e_{2i_{\max}}$	19.848	2.564	$e_{6i_{\max}}$	−17.339	11.746
σ_2^2	111.307	18.978	σ_6^2	72.222	13.040
$e_{3i_{\max}}$	−2.810	3.113	$e_{7i_{\max}}$	7.357	3.381
σ_3^2	130.504	20.944	σ_7^2	96.173	16.608
$e_{4i_{\max}}$	−11.160	3.657			
σ_4^2	107.577	15.971			

Note: Maximum likelihood estimates. $n = 7$ PACs and $m = 357$ House members ($N = 2,499$ observations). Log-likelihood: −3352.4.