THE DETERMINANTS OF INDUSTRY POLITICAL ACTIVITY, 1978–1986

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While the allocation of interest group monies to specific politicians has been extensively studied, little is known about the factors that determine of the overall level of political activity across groups. We study total contributions by corporate political action committees at the industry level. We create a large data set on industry political activity, covering 124 industries across five election cycles from 1978 to 1986 and sketch out a simple benefit–cost model to predict total corporate PAC contributions in each industry. The few previous studies of this phenomenon use relatively small samples and employ statistical techniques that are either biased or impose untested restrictions. The selectivity-corrected regression technique used here solves these problems. We find that industries with greater potential benefits from government assistance contribute systematically more but that the ability to realize these benefits is constrained by collective action problems facing firms in each industry.

Campaign contributions made by corporate political action committees (PACs) are increasingly important—and controversial—in U.S. elections. "Influence purchasing" is often alleged by pundits, and campaign finance reform is continually debated in Congress. In the academy, social scientists have analyzed the allocation of interest group monies and have looked for possible impacts on legislation. Few, however, have tried to explain the total contributions of economic interest groups. We shall analyze variations in contributions across industries and over time with an empirical model based on organizationally constrained profit-maximizing behavior. We assume that corporate PAC contributions in an industry are raised to enhance industry profits subject to the constraints of organization costs and free-riding incentives. Our empirical work covers 124 industries over five election cycles from 1978 through 1986.

Both the costs and benefits of political activity vary across industries. We argue that the benefits of political action are determined by direct contact with the government as a regulator or purchaser of industry output, by government's ability to ameliorate adverse market conditions, and by the industry's ability to solve collective action problems without government assistance. The costs of industry political action arise mainly from collective action problems, because effective political activity often requires concerted action by the constituent firms in each industry.

We also make a methodological contribution. Previous studies use statistical techniques that suffer from sample selectivity bias or else force the probability of acting politically to be explained by the same set of coefficients as is the amount of action taken. We explain and employ a technique that accounts for both problems. The results are consistent with the theses that industries follow investment-oriented goals in deciding the amount of political action to undertake, and that collective action problems are important constraints on industry political activity. We can explain between 60% and 80% of the variation in contributions in our sample.

First, we review existing work on corporate political activity, particularly papers examining patterns of aggregate PAC spending by industry. Then we present an organization-cost-constrained industry-profit-maximizing model, based on a comparison between an idealized zero-organization-cost industry and the more realistic case where organizing collective action is difficult. The independent variables used in the analysis are also discussed and defined. Next, we discuss the dependent variable and total industry contributions and explain our statistical method. Then the results are presented, followed by a discussion of industry structure and political activity. To make clear how our results can explain different contribution patterns, we give examples using five actual industries.

PREVIOUS WORK ON CORPORATE POLITICAL ACTIVITY

Most work on PACs examines where contributions go and what they accomplish, not where the money comes from. Gopoian (1984), Poole and Romer (1985), Snyder (1990), and Stratmann (1992) all explicitly study the allocation patterns of PACs. Grier and Munger (1991, 1993) find that corporate, union, and trade association PACs target incumbents who win by moderate margins, have voted sympathetically, and (at least in the U.S. House) have seats on committees with jurisdiction over the PACs area of interest. Studies of the *effects* of contributions show more mixed results (e.g., Evans 1988; Grenzke 1989; Hall and Wayman 1990; Langbein 1986; Salamon and

Siegfried 1977; Stratmann 1991; Wright 1989, 1990). Research on specific policies finds some measurable effects. Work on broader measures of influence (e.g., general voting patterns and behavior) finds negligible impacts.[1]

Turning to the sources of money, Andres (1985), Masters and Keim (1985), Grier, Munger, and Roberts (1991), Humphries (1991), and McKeown (1994) all study a binary choice: Does a corporation have a PAC?[2] This question is important, but if we are really to understand the pattern of political action of industries we must focus on the amounts that industries contribute as a collection of firms. Unfortunately, the work on total contributions (our dependent variable of interest) has focused on industry structure (particularly concentration) rather than offering a general model.[3] Pittman (1976) argues that more contributions will be generated by concentrated industries (i.e., a few large firms). Esty and Caves (1982) and Zardkoohi (1985) find ambiguous effects for industry structure. None of these models has worked from an overarching conception of the goals of the firm and the industry and how these goals might be realized through political action.

The data that previous researchers use also vary widely. Pittman (1976) uses a Common Cause data set of large individual contributions to Nixon's reelection campaign, aggregated into industry-level observations. Esty and Caves (1982) aggregate 300 firms from the Fortune 1,000 into 35 industry-level observations. Their dependent variable is total PAC receipts plus estimated lobbying expenditures by industry, summed over the years 1976–78. Zardkoohi's sample is 412 firms with PACs that made contributions in 1980. Boies (1989) examines PAC contributions by the Fortune 500 firms in 1976 and 1980. He begins with 18 independent variables, then considers the 10 that are correlated with contributions in either year.

Though each of these papers makes a useful contribution, they each have problems in research design. The first kind of problem is the choice of a sample to analyze. Pittman, Zardkoohi, and Esty and Caves all consider only industries (in Zardkoohi's case, firms) that are politically active. Though this does allow the use of least squares estimation, using only active PACs is clearly a nonrandom criterion for inclusion in the sample. As Heckman (1976, 1979) shows, if variables, that determine the sample are correlated with variables used to test hypotheses in the sample, ordinary least squares coefficient estimates are biased and inconsistent. It is quite likely that variables influencing whether firms in an industry establish a PAC correlate with variables affecting how much money that PAC then spends. (We show later that this is exactly the case.) Boies's sample includes noncontributing firms, but he chooses his specification with ordinary least squares and then reestimates the "best" model using TOBIT.[4] TOBIT regressions force the model for predicting existence of PACs, and the model predicting the spending of PACs, to have the same set of coefficients (see Appendix A).

The second research design problem is the size of the samples used in these studies. Esty and Caves study 300 firms aggregated into just 35 industry-level observations. Zardkoohi and Boies consider 415 and 500 firms respectively. Pittman does not report the number of industries included in his sample. Further, each paper analyzes only one or two cross sections of contributions. In cases where more than one cross section is examined, regressions are run separately, with no attempt to exploit the time-series property of the data for increased efficiency of coefficient estimates.

We address these research design issues in our empirical work, aggregating thousands of firms into 124 different industries, over five election cycles. We test for, and then reject, the implicit restrictions built into the TOBIT model. The alternate technique first proposed by Heckman (1976) is shown to be a better means of accounting for sample selection.

INVESTMENT IN POLITICAL ACTION BY INDUSTRY

It will be useful to lay out the theoretical perspective that informs the subsequent empirical work.

Theoretical Perspective

The following model captures variations in the likely gains to political action and the costs in achieving those gains, across industries. The maintained hypothesis underlying our work is that in a world of no organization costs, industries would maximize total profits earned by all producers. But as Olson (1965) points out, groups that might form profitably may be prevented from doing so by the free-rider problem. Consequently, the explanatory variables we shall discuss are mostly controls for obstacles to collective action.

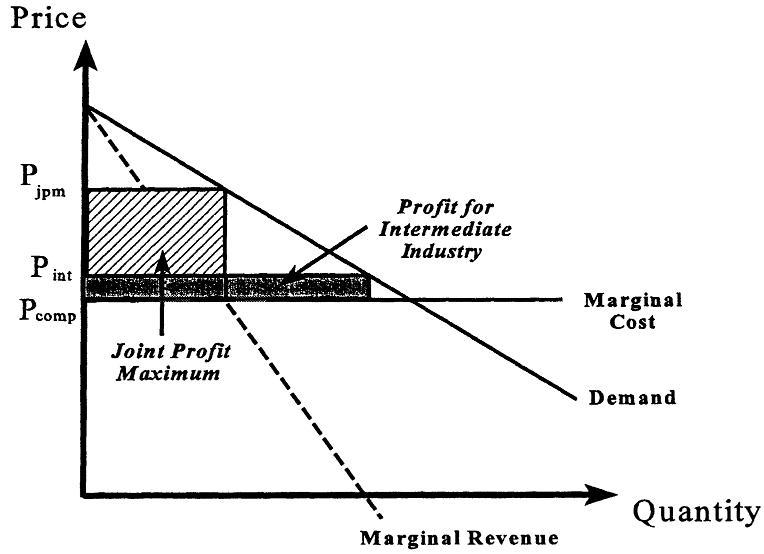
We shall analyze corporate PACs *as if* they were directly controlled by their sponsors in cooperation with other corporations in the industry, to see how much explanatory power this reductionist approach has. Under the assumption that there are no impediments to agreeing on or enforcing collective action, industries would achieve the joint profit maximum. In this idealized setting, we can write the following profit function for industry i:[5]

$$\Pi_i = P_i(Q_i, I_i)Q_i(L_i, K_i) - r_i(I_i, K_i)K_i - w_i(I_i, L_i)L_i - \phi I(\phi)_i, \quad \textbf{(1)}$$

where Π = joint industry profits; P = price of output for whole industry (no cheating), partly politically determined; Q = quantity of output produced, given production technology and amounts of K and L; I = political influence of the industry, an industry-specific function of ϕ;[6] L = quantity of labor used for

FIGURE 1

If Industries Cooperate, Political Action is of Little Value; If Industries Can't Cooperate, Political Action is Costly



production; K = quantity of capital used for production; r = price of capital (interest rate), partly politically determined; and w = price of labor (wages), partly politically determined. The firm invests in all activities with a rate of return greater than the risk-adjusted cost of borrowing. Political activity will become attractive if its net present value is greater than zero. It is worth noting, however, that unlike labor and somewhat like capital investments, political activity may be "lumpy." Though many firms have established PACs, many more have not. As Eismeier and Pollock note, the costs of establishing and running a PAC (including reporting and accounting requirements), are significant, so that the minimum investment required to make contributions is substantial (1988, 101). In the empirical work that follows, we estimate the activity decision first as a PROBIT. We assume that labor and capital markets are segmented and that the industry can affect P, r, and w through government influence.[7] For example, the auto industry can affect P by supporting protectionist legislation, w by gaining power over unions, and r through regulation of financial markets and monetary policy.

We must account for an important additional factor to make the model useful for application to actual corporate political activity. The industries with the lowest costs (in terms of acting collectively) of using political action are also the industries for which political action holds the lowest marginal benefits. Industries that can act as a unit are quite likely able to achieve most benefits of cartelization on their own. As Posner points out: "The demand for regulation . . . is greater among industries for which private cartelization is an unfeasible or very costly alternative—industries that lack high concentration and other characteristics favorable to cartelizing. They lack good substitutes for regulation" (1974, 345). Figure 1 illustrates this trade-off. If the industry can act perfectly collusively, privately, it can charge P_{JPM} and achieve the private, joint profit maximum. Political influence might increase profits further, by protecting the industry's output for competition, increasing government purchases, or making cheaper loans or labor contracts available. But these gains may be smaller than the potential gains of more competitive industries: the cost of increasing profits rises as the industry nears the joint profit maximum (Denzau and Munger 1986; Peltzman 1976).

A purely noncooperative industry, with no private collective agreement on price and output, charges price equal to marginal cost (the flat line in Figure 1) and makes zero economic profits. This industry serves a similar market to—and faces the same input costs as—the joint profit-maximizing industry discussed above, but $\Pi = 0$, because of collective action problems. The benefits to political action for a competitive industry are large, but the costs of overcoming the collective action problem if firms are atomistic are larger still. Finally, the "intermediate" industry charges P_{INT}. Political action is more costly for intermediate industries than for perfectly organized industries, but the benefits are far larger than for privately colluding groups because intermediate industries cannot reach P_{JPM} on their own.

To summarize, we claim that if the marginal costs and benefits of political activity are accounted for, the pattern of contributions can be explained. The null hypothesis against which our theory is tested is that corporate PAC contributions by an industry are explained by idiosyncratic internal imperatives, not external investment-oriented goals. This view is mostly associated with the interview results of Bauer, Pool, and Dexter (1963); Handler and Mulkern (1982);

and the work of Wright (1985) on trade associations. Rejection of the null will not imply that American business is a monolith and acts only on its collective interests, of course. Rather, if the null hypothesis is rejected, it simply means that corporations in industries in our sample respond systematically and predictably to political incentives in choosing their levels of political activity.

Finally, it is useful to distinguish PACs sponsored by corporations and the trade association PACs that represent the same industry. Previous work on trade association PACs (Grenzke 1989; Wright 1985) or work that has mixed trade association and corporate PACs (Wright 1989, 1990) is useful as research on interest groups generally but tells us little about the general pattern of corporate political action. Corporate PAC contributions at the industry level are important in their own right, for at least three reasons.

First, trade associations are subject to the statutory limit of $10,000 per election cycle (primary and general) per candidate, while PACs representing individual corporations in the same industry can make many contributions of up to $10,000. Consequently, trade associations often represent groups with many diffuse members. For example, in 1988, the National Association of Realtors spent $3 million, the American Medical Association $2.7 million, and the Association of Trial Lawyers $1.9 million. Trade associations are less important in industries with a few large firms, however: the "motor vehicles and equipment" industry gave more than $1.8 million, with just the Ford, Chrysler, and General Motors PACs spending $1.2 million. Second, collective action by corporations is a substantive and interesting problem in its own right. Umbrella organizations such as trade associations are one means by which collective action problems can be overcome, but only because the costs of organizing and raising funds are internalized. We address collective action directly, by explaining differences in industries' ability to overcome free-rider problems and induce corporations to act. Finally, government actions often affect the entire industry. The Environmental Protection Agency regulates use of chemicals by dry-cleaning firms, the National Highway Traffic Safety Administration requires all autos to meet safety standards, and an increase in the oil depletion allowance affects the net profits of all oil producers. Firms that can act as an industry will be much more effective at deflecting or diluting unfavorable regulation.[8] Since the pattern of contributions *observed just one firm at a time* could be consistent with either pure cooperation or purely atomistic behavior, we use the *industry* as the unit of analysis.

Definition of *Industry*

The intuitive definition of an industry is just "all firms that produce similar products." Of course, this requires a definition of *similar*. The Census of Manufactures has a range of industry definitions, or standard industrial classifications (SICs), from two-digit (very broad) to five-digit (extremely specific). For example, SIC 20 is "food and kindred products," SIC 202 is "dairy products," and SIC 2024 is "ice cream and frozen desserts." Similarly, SIC 50 is "durable goods–wholesale," 504 is "professional and commercial equipment supply–Wholesale," and 5045 is "computers and software–wholesale." We need to use a definition of industry that includes enough observations that the sample can be analyzed statistically yet ensures that the firms we will call an industry produce similar outputs. To strike a balance between these two concerns, we have chosen the three-digit SIC level as the definition of industry.

The variables we propose to use to explain industry political activity will be defined and discussed. These variables are designed to capture the determinants of variations in political activity across industries, that is, the marginal benefits of political action to the industry, the marginal costs of political action to the industry, and the collective action costs faced by the firms in the industry in organizing politically.

Empirical Model

To specify an empirical model embodying these ideas, we shall consider each of three sets of explanations in turn: direct political influences on demand for the industry's output, political influences on underlying market conditions, and the costs of collective action. A brief description of the variables we use to measure these concepts is given here. (For a complete description of the definitions and sources of the variables, see Appendix B.)

Direct Political Influence on Demand. The federal government can affect the demand for the industry's output directly by being a consumer and indirectly by being a regulator. The size of average sales to the government and whether the industry is subject to *regulation* (a dummy variable, equal to 1 for 17 industries in the sample subject to specific federal regulation) are the most important indicators of direct government impact. Our measure of regulated industry is taken from Pittman (1977). *Average government sales* is the mean (in millions of dollars) amount of sales by firms in each industry and is taken from Bureau of the Census (1985a–d). These variables represent the degree that prices are determined by a political process and may be sensitive to political influence. Consequently, both regulation and government sales should cause higher contributions.

Amelioration of Adverse Market Conditions. As noted, for an industry to profit from favorable regulation, both its input and output markets should be protected from unexpected shocks and from potential competitors. Government can also indirectly affect both the level and variability of demand for the industry's product and competition from imports. Our measure of variability of demand that the industry faces is *standard deviation of industry profits*, based on time-series data on real corporate profits (again, in 1988 dollars) provided by the Bureau of Economic

Analysis at the two-digit SIC level. The variable used is the standard deviation of profits over the four years preceding each election in the sample. We expect this variable, which measures variations in the riskiness of profits across industries, to be positively associated with political activity. The reason is that risky industries may try to get government either to underwrite their losses (as was the case in the bailout of Chrysler and the savings-and-loan industry) or to pursue policies that will support demand. Examples of the latter include price floors on commodities or the extension of "most favored" trade status to nations with many consumers and many large human rights violations. *Import share* is a measure of the industry's exposure to foreign competition, which might be moderated by government intervention. Ceteris paribus, industries with higher import shares will use the political process more heavily, at least up to some critical level of imports. The source for import share is Clark, Kaserman, and Mayo 1990.

If the industry uses specialized labor, political influence on Congress and the National Labor Relations Board can affect wages industry by industry. The federal government also influences the risk-adjusted price of borrowing funds through management of the money supply, but no good industry-specific measures of interest rates are available. Consequently, our measures of input prices are real wage rate and BAA bond rate. *Wage* is the annual inflation-adjusted wage rate for production workers in the industry; the data come from the CITIBASE economic data bank. This variable is available only at the two-digit SIC level and only for industries 20–49. *Bond rate* is available annually and is the average rate charged on BAA-rated bonds as reported by CITIBASE. All else equal, high-wage industries should be more politically active, and all industries should be more politically active in years when interest rates are high.

Collective-Action Problems. Although, for the sake of exposition, we assume that the industry faces no collective-action problems and can achieve the joint profit maximum of a pure cartel, differences in the costs of collective action are the key variables in the choice to seek political influence. There are two general categories of measures to be included: measures of the extent to which the industry has common interests, and measures of the industry's ability to overcome the free-rider problem.

We include two measures of the extent to which the industry has common interests: geographic concentration and diversity of the products that the industry produces and sells. *Geographic concentration* is a measure of whether an industry has good alternatives to contributions as means of gaining political influence (e.g., lobbying, direct appeals to voters). If an industry is located entirely in a single state, its employees are an important voting bloc for legislators in that state when compared to an industry with the same number of employees spread uniformly over all 50 states. We use a Herfindahl index to measure dispersion of industry sales across states; greater geographic concentration produces a higher index.[9] The expected sign for the coefficient on this variable is negative, since votes can substitute for contributions.[10] *Diverse industry* is a dummy variable selecting heterogeneous industries, in terms of number of different products. The variable equals 1.0 for the 30 industries that have more products than two standard deviations above the mean. To the extent that industries with greater product diversity have weaker common interests among firms, we expect contributions to be lower.[11] Both geographic concentration and diversity are adapted from COMPUSTAT.

We account for the ability of the industry to overcome the free-rider problem in three ways: firm size, industry structure, and government reaction to collusive arrangements. The first of these is the most obvious; in Olson's (1965) framework, the key element is the absolute size of benefits to the individual. Since in our analysis the "individual" is the firm, we use *average private sales* (measured in millions of 1988 dollars) as a measure of firm size. The relative cost of raising funds falls with larger firms, at least over a certain size range. Political action committee money has to be raised from employees in sufficient quantities to have some effect; larger firms have more employees and are better able to pay the fixed start-up and accounting costs for establishing a PAC. The data on mean firm size within industries is from COMPUSTAT. The industry structure variable is the four-firm concentration ratio (hereafter, *concentration*). *Concentration* is the proportion of total industry sales accounted for by the four largest firms (the data used here are from the Bureau of the Census 1985a). In more concentrated industries, the smaller number of similar-sized firms simplifies formation and enforcement of agreements over contribution strategies and raise total contributions, at least over some range. As industries become highly concentrated, firms presumably have sufficient market power to earn maximal profits with less and less political help. *Cumulative antitrust indictments* measures the ability of the industry to solve problems of collective action privately without attracting attention from the Justice Department and Federal Trade Commissions, which try to ensure private collective action problems stay unsolved. Other factors equal, antitrust actions make firms more sensitive to the political environment and raise contributions. Our measure comes from Miller 1989 and Miller, Shughart, and Tollison 1990.

The variables described above account for several different effects. Industry structure for example, proxies for both the costs and the benefits of political action. Sales to the government measure both the dependence on political action and the existence of direct ties with specific agencies or departments. Our goal has been not to discriminate among theoretical models of political investment (which do not yet exist) but to specify a simple theoretical model consistent with the empirical model we estimate. Such an approach allows us to test the value of an organiza-

TABLE 1

Corporate PAC Contributions to Congressional Candidates in 124 Industries (Three-Digit SIC), 1978–86

YEAR	TOTAL CONTRIBUTIONS ($)	LARGEST SINGLE-INDUSTRY CONTRIBUTION ($)	INDUSTRIES MAKING NO CONTRIBUTION	AVERAGE NONZERO CONTRIBUTION ($)
1978	8,846,904	1,409,900	57	132,043
1980	15,268,120	1,873,400	41	183,935
1982	17,690,584	2,045,600	39	208,124
1984	20,281,440	2,480,500	39	238,605
1986	24,721,880	2,715,400	40	294,308

Note: All figures are in 1988 dollar equivalents.

tionally constrained investment conception of corporate political action.

DATA AND TECHNIQUE

Our dependent variable is corporate campaign contributions to all U.S. House candidates, taking industries as the unit of observation. These data are available by individual PAC from the Federal Election Commission. We merged individual corporate PAC contributions with firm data from COMPUSTAT for the five election cycles 1978–86 and then aggregated up to the SIC three-digit industry level. The data collection process captures 50%–60% of the corporate PACs (listed separately from the trade association records, there being no overlap between the two) listed in the Federal Election Commission data for each election and about 80% of the dollar amount of contributions. The 124 industries in the sample are mainly in the 200–399 (manufacturing) range along with a few 100-level (agricultural and mining) and 400-level (services) industries. Industries in the sample and their contributions levels are listed in Appendix C.

Table 1 shows the growth of political activity in the 124 industries comprising the sample. Total contributions almost triple in real terms (all dollar figures are given in 1988-dollar-equivalent units) over the sample, from around $8.8 million in 1978 to almost $25 million in 1986. Both the intensity of participation by active industries, and the number of industries making contributions, grows significantly. The largest total contribution by a single industry almost doubles, from $1.4 million in 1978 to $2.7 million in 1986, and the average nonzero contribution rises from $132,000 to $294,000. Further, the number of industries making no contributions falls from 57 to 40.

The values of the variables are calculated for two different samples: the full 124-industry sample and the subsample of 110 industries where complete data for the full model are available. The two samples appear generally similar (see Appendix B for summary statistics and precise variable definitions), though industries with the largest average government sales, most antitrust indictments, and most variable profit streams are excluded in the smaller sample, reducing the sample variation of these regressors.

The methodological problem is that the dependent variable is limited below, at zero. Industries where it is not profitable to make political contributions or where the collective-action problem cannot be solved make no contributions. Zero contributions occur in 216 (35%) of the 620 observations in the full 124-industry-and-five-election sample. Such a probability mass at a single point implies biased and inconsistent ordinary least squares estimates. A possible solution is to throw out the zero-contribution observations and then estimate an equation on the rest of the sample with OLS. This approach eliminates the mass-point problem but introduces sample selectivity bias, again yielding biased and inconsistent coefficient estimates.

We can write the HECKIT (Heckman 1976, 1979) model as follows:

$$z_i^* = X_{1i}\beta_1 + \epsilon_{1i} \qquad (2)$$

$$y_i = X_{2i}\beta_2 + \epsilon_{2i}. \qquad (3)$$

Equation 2 is the sample selection equation where z_i^* is an unobserved index of the propensity to undertake political action. We do not observe this index but do observe an indicator variable z_i that equals 1 if $z_i >$ 0 and equals 0 otherwise (in our case, $z_i = 1$ if any firms in the industry have active PACs). Equation 3 is the contributions equation where y_i is observed only when $z_i = 1$. If $X_1 = X_2$, $B_1 = B_2$ and $e_1 = e_2$, then the model is identical to the TOBIT model. On the other hand, if these conditions do not hold, then TOBIT imposes invalid restrictions on the data. We show in Appendix A that the TOBIT restrictions are rejected in our sample. Consequently, we use the HECKIT estimator to allow B_1 to differ from B_2, while continuing to assume $X_1 = X_2$. We assume that e_1 and e_2 are bivariate normal random variables with correlation coefficient ρ.

The basic problem with just estimating equation 3 with OLS is that the expected value of the error term is both nonzero and correlated with the independent variables; that is,

$$E[y_i \mid z_i = 1] = X_{2i}\, B_2 + E[e_{2i} \mid z_i = 1]. \qquad (4)$$

TABLE 2

Determinants of Corporate PAC Contributions to House Candidates by 124 Industries, 1978–86

VARIABLE	EQ. 1: PROBIT COEF.	EQ. 1: PROBIT S.E.	EQ. 2: HECKMAN[a] COEF.	EQ. 2: HECKMAN[a] S.E.
Constant	−1.167	.45*	−241,199	103,076*
Trend	.117	.47*	40,915	9,741**
Private Sales	.227	.03**	21,198	2,924**
(Private sales)^2	−.001	.0002**	−64	16**
Government sales	.708	.35*	132,302	15,402**
(Government sales)^2	−.012	.01	−2,320	358**
Regulated industry	.260	.26	167,292	39,831**
Diverse industry	−1.172	.38**	−394,612	92,199**
Concentration ratio	.037	.017*	3,549	3,697
(CR)^2	−.00053	.00021	−38	38
Cumulative antitrust	.010	.017	9,316	3,682*
S.D. of profit	3.105	.61**	222,127	71,195**
Geog. spread	−.002	.000034	−390	89**
IMR	—	—	182,087	60,294**
Dependent variable	0/1		dollars	
Sample	620		404	
Log-likelihood/R^2	−251		.601	

[a]Selectivity-bias-corrected OLS with corrected standard errors (Heckman). Data are on 124 three-digit industries for five elections expressed in 1988 dollars; 404 nonzero observations and 216 at 0. To allow more significant digits, the sales data used in these regressions are in one hundred's of millions of 1988 dollars.
*$p \leq .05$.
**$p \leq .01$.

Greene gives the expectation of the error term in equation 4 as

$$E[e_{2i} \mid z_i = 1] = \rho\sigma_y\{f(Z_i)/1 - F(Z_i)\},$$

where $Z_i = (X_{1i}B_1/\sigma_{e1})$ and f and F are the normal and cumulative normal densities, respectively (1993, theorem 22.4).

Intuitively, accounting for the sample selection process generates another regressor, $f(Z_i)/1 - F(Z_i)$, which needs to be incorporated into the contributions equation. This variable is generally called the inverse Mills ratio (IMR), or the Hazard rate. The HECKIT technique first estimates a PROBIT model on equation 2 (using the (0, 1) indicator variable z) to calculate an estimate of the IMR for each data point. Then this equation is estimated using OLS:

$$y_i = X_{2i}\, B_2 + g\, \hat{\text{IMR}} + v_{2i}.$$

HECKIT provides consistent estimates of B_2, though the OLS standard errors are biased. We compute the consistent standard errors as derived by Greene (1993, 713).

RESULTS

The sample is a pooled time-series cross section, so our first task is to find out whether the time-series pooling assumption is valid. In all the regressions reported here, there is a trend variable (trend = 1 in 1978 and goes up by 1 in each period to 5.0 in the 1986 election) included as a regressor. The variable imposes the restriction that the intercept shifts an equal amount between each election. This restriction can be tested by replacing the trend variable with four dummy variables that let the intercept shift freely and then comparing the fit of the two equations with a likelihood ratio test. In all cases, the appropriateness of the trend variable cannot be rejected, even at the .10 confidence level.

We also test for the stability of the other coefficients in the regression over time using likelihood ratio tests. The hypothesis that a pooled sample is appropriate at the .05 level, once the trend intercept shift is allowed, cannot be rejected. Thus the annual estimates do pool over the years in our sample, and treating these data as a single sample is legitimate.

Equations 1 and 2 carry out the Heckman procedure (Table 2). The PROBIT model from equation 2 provides an estimate of the IMR that is used as an additional regressor in the reported OLS regression. The selectivity-corrected OLS model shows all variables correctly signed and significant at the .01 level except concentration.[12] This regression explains 60% of the variation in contributions across politically active industries. Also, the coefficient on the IMR is positive and significant in equation 3, suggesting that selectivity is a factor in these data. In other words, OLS estimations on this sample would produce biased estimates of the true coefficients. The PROBIT model (equation 1) correctly classifies 80% of the cases in the sample. The misclassified cases are split almost evenly between inactive industries predicted to be making contributions (61 cases) and contributing industries predicted to be inactive (64 cases).

Our technique allows a comparison of the effects of

TABLE 3

Adding Import Competition, Interest Rates, and Wage Rates in a 110-Industry Subsample

VARIABLE	EQ. 1: PROBIT COEFF.	EQ. 1: PROBIT S.E.	EQ. 2: HECKMAN[a] COEFF.	EQ. 2: HECKMAN[a] S.E.	EQ. 3: PROBIT COEFF.	EQ. 3: PROBIT S.E.	EQ. 4: HECKMAN COEFF.	EQ. 4: HECKMAN S.E.
Constant	−1.818	.53**	−326,652	87,574**	−2.078	821*	−700,220	128,954**
Trend	.099	.51	29,002	7,287**	.072	.052	29,187	7,136**
Private sales	.230	.031**	18,786	2,108**	.238	.031**	17,779	1,991**
(Private sales)^2	−.002	.000042**	−90	11.6**	−.001	.00018**	−89	11**
Gvt. sales	1.108	.42**	160,011	40,024**	1.190	.43**	148,410	39,055**
(Gvt. sales)^2	−.231	.12*	28,875	8,134**	−.242	.12*	29,964	7,885**
Regulated industry	.243	.33	137,784	33,606**	.187	.35	103,870	36,318**
Diverse industry	−1.315	.41**	−192,803	65,357**	−1.453	.44**	−168,490	58,913**
Conc. ratio	.067	.022**	9,529	3,145**	.072	.023**	7,459	3,161*
(CR)^2	−.00083	.00025**	−119	30.6**	−8.6E-4	.00026**	−105	32**
Cum. antitrust	.084	.031**	9.063	2.75**	.099	.034**	7,185	2,681**
S.D. of profit	2.295	.65**	257,523	84,712**	2.637	.83**	−7,445	106,357
Geog. spread.	−.002	.00036**	−179	73*	−.002	.00037**	−12	7.2
Import share	—	—	—	—	−.040	.02	9,134	2,828**
(Imp. share)^2	—	—	—	—	8.6E-4	.00041*	−199	67**
Real wage	—	—	—	—	−.040	.055	33,469	8,223**
BAA bond rate	—	—	—	—	.062	.034	7,052	4,670
IMR	—	—	96,197	44,742*	—	—	91,362	44,136*
Dependent variable	0/1		dollars		0/1		dollars	
Sample	550		357		550		357	
χ^2/R^2	276		.68		284		.78	

[a]Selectivity-bias-corrected OLS with corrected standard errors (Heckman). Data are on 110 three-digit industries for five elections expressed in 1988 dollars; 357 nonzero observations and 193 at 0. In order to generate coefficients with more significant digits, the sales data used in these regressions are entered as one hundred's of millions of 1988 dollars.
*$p \leq .05$.
**$p \leq .01$.

the explanatory variables on two different decisions by industries: the decision to form a PAC and then the decision on the amount that the PAC will spend. The PROBIT equation estimates the probability that the industry has at least one active PAC, and the selectivity-corrected OLS contribution equation predicts the total amount contributed. This approach allows the separate impacts of the independent variables to be identified at each stage. For example, concentration is strongly related to the decision to create a PAC but turns out to have no influence on the amount contributed. The significant concentration coefficients in the PROBIT equation show that higher industrial concentration raises the marginal probability of positive political activity in any industry, up to a concentration ratio of 35%. In contrast, regulation and antitrust indictments are insignificant in the PROBIT equation but positive and significant in the selectivity-corrected contribution model. Regulated industries contribute almost $170,000 more than an (otherwise similar) unregulated industry, and each antitrust indictment raises industry contributions by $9,300, other factors held constant.

Consider now the rest of the results in equation 2. The significant trend coefficient implies that average industry contributions are increasing about $41,000 per year, after controlling for the effect of our independent variables. Private and government sales both increase contributions at a decreasing rate (i.e., coefficients on squared terms are negative), but the effect of government sales is dramatically larger compared with the results from the earlier method. Fifty million dollars in private sales produces about $10,600 in contributions, while an equal amount of sales to the government is associated with $65,500 of industry PAC money.[13] The industries with the most extreme heterogeneity of product lines contribute almost $400,000 less than average. Geographically concentrated industries also contribute significantly less, suggesting that they can use alternate avenues of exercising political influence. Each one-standard-deviation increase in geographic concentration lowers contributions by over $85,000. Finally, industries with greater variability in past profit streams contribute significantly more to political campaigns. Every one-standard-deviation increase in this risk-proxy raises contributions about $40,000.

These results show that the simple organizationally constrained investment model of political activity has considerable explanatory power. We shall add the import, wage, and interest-rate variables to the model and consider the results in more detail. These variables are available only for the 110-industry, 550-observation subsample.

Table 3 adds import share, import share squared, real wages, and the BAA bond rate to the regressors from Table 2, with the sample reduced by 14 industries because of missing data. Equations 1 and 2 reestimate the two-equation selectivity model using the original variable set from the previous analysis.

The only differences from the Table 2 results are that concentration now significantly affects both contribution levels and the probability of participation, and the coefficient on the square of government sales is now positive and significant. The other variables have the same signs as before and are statistically significant.

Equations 3 and 4 in Table 3 contain our results with the four new variables added. Again, compare the standard errors on variables between the PROBIT equation estimating the probability of forming a PAC and the selectivity bias corrected OLS equation estimating the amount of contributions. Regulation and wages are insignificant in the participation decision yet positive and significant for explaining variations in the level of political contributions across industries. On the other hand, geographic concentration and the variability of industry profits are highly significant in the participation equation but much less important in the contribution regression. The BAA bond rate is significant at the .10 level in the PROBIT model, but not in the contribution model. All other variables are significant, at least at the .05 level, in both equations.

We can use the estimates in equation 4 to describe the effect that changes in the variables have on industry political contributions in this subsample. The average level of private sales in this subsample is 834 (meaning the average firm in the average industry has sales of $834 million), which implies contributions of $142,000. An increase of one standard deviation raises contributions to $397,400, an increase of more than a quarter of a million dollars. The contribution-maximizing level of sales is $9.9 billion (only one sample industry has larger average firm sales), implying $888,000 in contributions.

The average level of government sales is $19 million, which is associated with $29,300 in marginal political contributions. A one-standard-deviation increase in government sales raises predicted contributions to $153,800, an increase of more than 400%. These results suggest that at the margin, having government as a customer increases industry political activity more than having private-sector customers. The hypothesis that the two types of sales have identical effects on contributions can be rejected at the .01 level. Regulation also raises contributions more than $100,000 per election, and every antitrust indictment increases industry contributions by $7,200. This last variable ranges from 0 to 35 in this subsample. Greater government involvement with firms either greatly increases the return to political activity or dramatically lowers the costs of collective action by having politicians readily available to coordinate industry activities.

The effect of industry concentration on contributions is increasing up to 35%, just below the sample mean of 41%. At 35% concentration, predicted marginal contributions are about $132,000. A one-standard-deviation increase above 35% (to 53%) reduces the predicted effect of concentration on contributions to only $99,500. At levels of concentration above 70%, the marginal effect of concentration on contributions is negative.[14]

Import share also significantly affects industry PAC contributions. At the sample mean penetration of 10.3%, contributions due to imports are predicted to be about $73,000. A one-standard-deviation increase (to 21.6%) in import penetration raises contributions to about $104,000. Beyond the 23% import level, the marginal effect of import competition on industry contributions begins to fall, reaching zero at around 46%.

Industries that pay higher wages also make greater political contributions. Every one-dollar increase in industry wages increases PAC contributions by around $33,000. Every percentage point increase in interest rates raises each industry's contribution about $7,000, though this effect is not strongly significant. In general, however, our prediction that higher input prices increase political activity is strongly supported in these data.

Geographic concentration is still negative, though only marginally significant in this sample. Each one-standard-deviation increase in geographic concentration lowers contributions about $26,000. The diverse industry dummy is still negative and significant, with a coefficient of −$168,000. These results continue to show the importance of organizational factors on industry political activities.

Finally, the coefficient on the IMR is still positive and significant, showing the importance of our technique's correction for sample selection bias. The general fit of the model is quite good. The R-squared of .79 in the contribution equations means that we are explaining about 80% of the variation in contributions across both industries and time. The PROBIT model predicting the existence of political activity correctly classifies 81% of the 550 cases in the sample. Industry political activity can be explained quite well with a basic model accounting for profit opportunities and free-riding costs.

EMPIRICAL EXAMPLES FROM 1986

We shall consider in more detail the contribution patterns of some selected industries. First, Table 4 contains summary statistics on the independent variables grouped by amount of contributions in 1986 into four categories: no contributions (40 cases), positive contributions less than $100,000 (45 cases), contributions between $100,001 and $500,000 (23 cases), and contributions greater than $500,000 (16 cases). The results show that industries making very similar contributions are often quite heterogeneous. While average sales rises as contributions rise, the standard deviations in each cell for both private and government sales are very large. There is little evidence of a trend across contribution categories for any of the other variables, though both real wages and percentage regulated jump in the highest contribution category. There are however, regulated industries that

TABLE 4

Average Industry Characteristics by Contribution Group, 1986

VARIABLE	NO CONTRIBUTIONS	$1–$100,000	$100,000–$500,000	>$500,000
No. of industries	40	45	23	16
Private sales	207 (220)	460 (453)	1,012 (810)	2,788 (3,033)
Government sales	5.7 (23)	7.0 (11)	15.0 (33)	406 (1,259)
Regulated indust. (% of group)	2.5 (15)	11 (31)	17 (39)	50 (51)
Diverse indust. (% of group)	5.0 (22)	2.2 (15)	4.3 (21)	12.0 (34)
Concentration ratio	37.5 (16)	39.4 (15)	44.1 (16)	48.1 (23)
Antitrust actions	3.05 (7)	3.11 (4)	6.17 (7)	4.56 (6)
Geographic concentration	870 (1,000)	1,100 (1,000)	3,400 (6,000)	1,350 (1,000)
Import share[a]	12.29 (13)	10.14 (12.5)	10.27 (7.5)	5.93 (5.9)
Real wage[a]	10.16 (2.25)	10.48 (1.75)	10.62 (1.46)	12.42 (1.55)

Note: Numbers in parentheses are the standard deviations of the group averages.
[a]Available for the 110-industry sample only.

make few contributions and low-wage industries that make large ones.

Second, we provide five examples of how our model works to predict industry contributions in Table 5. We examine the predicted contributions for the cigarette, aircraft, motor vehicle, trucking, and petroleum-refining industries made by equation 4 in Table 3; that is, the entries give the dollar amount of predicted contributions attributed to each individual independent variable. That number is expressed in thousands of 1988 dollars and is computed by multiplying the value of each variable for each industry by the relevant regression coefficient. We have rounded off the figures to the nearest thousand dollars.

In the cigarette industry (Table 5, col. 1) there are a few, large, geographically dense firms. Actual contributions from this industry in 1986 are $603,000; our regression predicts contributions of $642,000. Private

TABLE 5

Sources of Predicted Contributions (thousands of dollars) in Five Selected Industries, 1986

VARIABLE	CIGARETTES	AIRCRAFT	MOTOR VEHICLES	TRUCKING	PETROLEUM REFINING
Private sales	877	279	484	85	870
Government sales	.0	2,165	171	23	867
Regulated	.0	.0	.0	104	.0
Concentration	−126	52	86	131	130
Antitrust	28	28	163	129	86
Import share	.0	49	115	.0	64
Real wage	461	455	438	418	506
Geographic conc.	−90	−17	−93	−21	−36
Fixed factors[a]	−508	−508	−508	−508	−508
Total predicted contributions	642	2,523	856	374[b]	2,083
Actual contributions	603	2,486	1,092	402	2,715

Note: The technique of using specific industries as examples is drawn from Bartels (1991). The predictions here come from the coefficients estimated earlier in Model 4, Table 3.
[a]Sum of those effects that do not vary cross-sectionally and are therefore fixed for all industries. These include intercept, trend, and interest rate variable.
[b]In this case, the value of the IMR is large enough to raise the predicted contribution significantly ($13,000) above what the reported variables predict, an indication of the importance of what would otherwise be selectivity bias in the estimation procedure.

sales account for \$877,000, concentration for −\$126,000, and geographic concentration for −\$90,000. The aircraft industry, contributed \$2,486,000 in 1986, while our model's predicted contribution is 2,523,000. Here, sales to the government is the driving factor, accounting for over 2 million dollars in campaign contributions. Note that neither of these industries is significantly regulated by Pittman's 1977 standards.

The third industry in Table 5 is motor vehicles, or SIC category 371 (vehicle bodies assembly, not final sales). Actual 1986 contributions by this industry are \$1,092,000; our predicted contribution is \$856,000. In this industry, antitrust trouble and import penetration account for about \$280,000 of the total contribution. Sales concentration and geographic concentration offset each other, and government sales explains most of the rest of the prediction. Trucking and courier services is examined in Table 5, column 4. Regulation, sales concentration and antitrust trouble are the main factors driving our predicted contribution of \$374,000. The actual industry total is \$402,000. Trucking is geographically dispersed, has low average sales to the government, faces no import competition, and has very small average firm size compared to the other industries in our example. Yet trucking contributions approach those of the cigarette industry.

Finally, consider the petroleum refining industry. Petroleum refiners contributed \$2,715,000 in 1986, the largest industry contribution in our data. Our model "only" predicts a contribution of about \$2.1 million. A large average firm size (\$870,000) and significant sales to the government (\$867,000) are the largest factors affecting contributions here. However, sales concentration, antitrust trouble, import competition, and high wages also have a significant predicted effect. Our \$700,000 underprediction may be indirect evidence supporting Evans's claim that "oil PACs [are] the most ideological" of all corporate PACs (1988, 1048). While our simple cost–benefit model does predict a very large contribution, petroleum refiners contributed even more.

The tenacious reader will have noticed that industry wages are associated with large contribution numbers but have received little emphasis in our exposition of Table 5. That is because there is not much variation in wages across the five chosen industries. Consider a case of two industries similar in many respects but with different average wages. The sawmill industry (SIC 242) contributed \$262,000 in 1986, the papermill industry, (SIC 262) \$583,000. Both are made up small firms with few sales to the federal government, and neither has much history with the antitrust authorities. Yet there exists (and our model predicts) about a \$300,000 difference in their political contributions. Of the difference, \$104,000 is due to higher wages in the papermill industry, and another \$104,000 is attributed to the fact that papermills are significantly regulated (according to Pittman) and sawmills are not. The rest of the difference is attributed to the greater concentration of the papermill industry.

CONCLUSION

We have investigated the industrial organization of corporate PACs over the period 1978–86. Though the allocation of PAC monies among candidates for political office has been extensively studied, we are the first to present even a simple empirical model of corporate political activity and then investigate *which* industries contribute and *how much* they give. Our empirical results support two theoretical propositions: (1) the evidence is consistent with the notion that industries follow investment-oriented goals in political activity, and (2) the ability of industries to achieve these goals is conditioned by both the benefits that political action brings and the costs of achieving cooperation and organizing collective action. Between 60% and 80% of the variation in contributions is explained in the empirical models. Coefficient signs and significance levels are robust, showing general consistency across time, changes in the sample, and inclusion or omission of independent variables.

We feel our evidence is sufficient to reject the null hypothesis that variations in total PAC contributions are based on idiosyncratic internal goals, at least at the corporate PAC level. Wright's (1985) influential work only directly addresses the behavior of five large trade associations. We argue that attaining real political leverage requires concerted contributions by a group of PACs and therefore study corporate PACs at the industry level. However, it is still an open question whether the factors we use to explain corporate PAC contribution levels can explain total trade association PAC activities. We plan in future work to study the relationships between corporate PACs and industry trade associations.

In closing, one further caveat seems in order. Because our focus has been on organization and collective action problems, we have taken the industry as the appropriate unit of observation. The definition of *industry*, however, has been quite narrow—the collection of corporations within a three-digit SIC code. A more appropriate definition of industry might well include unions and trade associations drawn from the same SIC, reflecting a functional, rather than class, definition. A corporation manufacturing automobiles may share more political goals (trade restrictions on imports, blocking more stringent emission standards, etc.) with the United Auto Workers than with corporations that export semiconductors. If this (currently untested) claim is correct, the traditional division of corporations and unions into political adversaries is not a useful one. The industry, more broadly construed to include all economic actors with an interest in the industry's fortunes, may ultimately prove to be the more useful unit of analysis.

APPENDIX A: THE TROUBLE WITH TOBIT

This appendix discusses the TOBIT technique, which is widely used in political science to solve the problem of a censored sample (particularly in the study of campaign finance; see, e.g., Grier and Munger 1993). Though there are alternate approaches (see Greene 1990, chap. 21 for a good discussion), TOBIT is the most common choice. The problems with TOBIT are not widely understood, however. In particular, TOBIT requires (in our case) that the determinants of *both* the participation and contribution decisions have exactly the same effects.

The classic TOBIT model (Tobin 1958) assumes that there is an index variable y^*, linearly related to the independent variables,

$$y_i^* = X_i\beta + \epsilon_i. \quad \text{(A1)}$$

The observed dependent variable y_i is generated as follows:

$$y_i = y_i^* \text{ if } X_i\beta + \epsilon_i > 0; \text{ otherwise } y_i = 0. \quad \text{(A2)}$$

Given that the errors are independently and identically distributed normal, the coefficients of this model can be estimated using maximum likelihood.

As we note in the text, TOBIT models force a single set of coefficients to explain both whether the dependent variable will be observed and its value conditional on being observed. Cragg (1971) points out that it is not obvious that the occurrence of limit observations and the regression model for the observed data should be so closely related. Cragg assumes that the probability of limit observations is independent of the regression model. Greene (1993) shows that this restriction in the TOBIT model can be tested by comparing the fit of the TOBIT model with the combined fit of (1) a PROBIT model predicting the probability of a nonlimit observation and (2) a truncated normal regression on the nonlimit data.

Table A-1 presents some preliminary results, and Greene's test of the TOBIT model versus Cragg's variant. The ordinary least squares regression in equation 1 and the TOBIT in equation 2 have the same signs and significance levels. Equations 3 and 4 (Table A-2) decompose the participation decision and the contribution level into distinct parts. A PROBIT equation is used to predict political activity and then a truncated regression on the 404 positive contributions. The results of these separate procedures can now be compared with the TOBIT model, which assumes the two components are determined in a single equation. Summing the log-likelihood functions of equations 3 and 4 and comparing that sum to the TOBIT log-likelihood produces a chi-squared statistic of 444, which strongly rejects the TOBIT assumption. In the truncated contributions regression, all variables are correctly signed and significant at the .01 level. While none of the substantive conclusions in our empirical work would change if we used the TOBIT model throughout, the model is clearly rejected by the data. The PROBIT and selectivity-corrected least squares regressions used in the text provide better information.

TABLE A-1

Testing the Tobit Restrictions

INDEPENDENT VARIABLES	EQUATION 1 (OLS)	2 (TOBIT)	3 (PROBIT)	4 (TRUNCATED)
Constant	−68,020	−151,609	−.216	−1,760,330
	(21,801)**	(47,675)**	(.26)	(271,656)**
Trend	23,709	33,685	.120	106,914
	(6,425)**	(8,772)**	(.047)*	(10,586)**
Private sales	11,568	14,069	.196	19,452
	(639)**	(832)**	(.026)**	(1,926)**
Government sales	27,601	33,470	.641	61,368
	(2,763)**	(3,630)**	(.33)*	(8,754)**
Regulated industry	156,234	168,418	.327	698,545
	(26,891)**	(35,160)**	(.26)	(127,240)**
Diverse industry	−151,056	330,420	−1.157	−785,631
	(50,690)**	(79,428)**	(.38)**	(262,752)**
Concentration ratio	1,134	1,685	−.008	12,335
	(545)*	(736)**	(.0053)**	(2,452)**
Cumulative Antitrust	5,205	8,160	.009	38,440
	(2,303)*	(3,022)	(.17)	(9,636)**
S.D. of profit	149,138	287,391	3.132	529,299
	(47,800)**	(60,631)**	(.6)**	(150,797)**
Geographic spread	−169	−454	−.002	−857
	(40)**	(62)**	(.0003)**	(271)**
Dep. var.	dollars	dollars	0/1	dollars
Sample size	620	620	620	404
R^2/log-likelihood	.56	−5,728	−265	−5,241

Note: Data are on 124 three-digit industries for five elections expressed in 1988 dollars. There are 404 nonzero observations and 216 at 0. Numbers in parentheses are standard errors. To generate coefficients with more significant digits, the sales data used in these regressions are entered as one hundred's of millions of 1988 dollars.
*$p \leq .05$.
**$p \leq .01$.

APPENDIX B: DESCRIPTIONS AND SOURCES FOR VARIABLES

The industrial concentration, regulation, and import share variables do not vary over time, and the interest rate variable does not vary cross-sectionally. Wages and profits only vary at the two-digit level; that is, in any year all three-digit industries with a common two-digit home are assigned the same wage and profit numbers.

Total Industry Contributions (Dependent Variable). Each corporation on the COMPUSTAT data base was matched against the Federal Election Commission master list of corporate PACs (Nonparty Spread File, Reports on Financial Activity) for each election year in the sample (1978, 1980, 1982, 1984, 1986). If a corporation was not identified as having a PAC, the contributions for that firm were listed as zero; otherwise, the total contributions of the PAC to House candidates were listed. Many PACs were neither identified as having corporate sponsors, nor had an identifiable company name revealed in their registered PAC title. These PACs were dropped from the sample. The firm-level data were then aggregated up to the three-digit SIC industry level, using the SIC codes listed on COMPUSTAT, by adding up all the contributions within an industry.

Average Private Sales. Obtained from COMPUSTAT; item no. 12 on industrial database. Gross sales (the amount of actual billings to customers for regular sales completed during the period) reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers. Value is in millions of dollars and is annual (as are all COMPUSTAT variables). Our variable represents the average of sales over firms in the three-digit industry.

Average Government Sales. Data on proportion of industry total sales that went to the federal government were obtained from Russell Pittman; original data came from Bureau of the Census 1985a–d. This proportion was multiplied by industry total sales to yield an estimate of dollar sales to the federal government.

Regulated Industry. Dummy variable, equal 1 if industry is regulated. Obtained from Pittman 1977 for four-digit industries. If the three-digit industry contained at least one regulated four-digit industry, it was considered regulated.

Concentration Ratio. Data were obtained from Russell Pittman; actual values represent corrected (by Department of Justice) concentration ratios for 1982, with original data coming from Bureau of the Census 1985a.

Cumulative Antitrust Indictments. Data were obtained from Gerry Miller and used in Miller 1989 and Miller, Shughart, and Tollison 1990. These data were originally compiled by Miller under a Freedom of Information Act request from the Department of Justice and Federal Trade Commission. Miller tracked indictments of all firms and made the data available to us at the four-digit SIC level. We aggregated up to the three-digit level and created a moving (cumulative) sum of industry violations.

Geographic Concentration. The variable is a Herfindahl index, calculated for each industry j as $\Sigma i\ (\text{Sales}_i/\text{Sales})^2$, where sales in the ith state are calculated using the COMPUSTAT state IDs for each corporation in the sample, and the denominator of the ratio is total industry j sales.

Industry Profits. The variable is "corporate profits without adjustments" contained in the Bureau of Economic Analysis Income and Wealth Division's gross product originating (GPO) by industry, table 6.1F. These data are annual, available in an industry grouping very similar to the two-digit SIC. We adjusted these data for inflation using industry-specific price indices and gave the appropriate two-digit profit figure to each three-digit industry in the sample.

Diverse Industry. Source data come from COMPUSTAT Industrial Segment File, where the number of segments (roughly, products) are reported by each firm, up to a maximum of 10. We averaged these data by industry (mean = 1.7, standard deviation = .65) and then defined a "diverse industry" as one with mean number of products more than two standard deviations above the sample average; that is, all industries whose firms average more than three product lines are coded 1.0 and the others .00.

Import Share. Data were obtained from Don Clark and used in Clark, Kaserman, and Mayo 1990. Import share is defined as total imports divided by total shipments for the industry. Original data were four-digit SIC level, aggregated up to the three-digit level.

Wage Rate. From CITIBASE data bank. Variables are "average hourly earnings of production workers" (LE6M20–LE6M39), corresponding to two-digit SICs. We adjusted for inflation using the gross national product deflator and gave the appropriate two-digit "real wage" figure to each three-digit industry in the sample.

BAA Bond Rate. From CITIBASE data bank. Values are the annual average rate charged on BAA rating bonds, from 1978 through 1986.

TABLE B-1

Data Summary

VARIABLE AND NO. INDUSTRIES	MEAN	S.D.	MINIMUM	MAXIMUM
Contributions				
124	140,010	326,940	.00	2,715,400
110	130,110	313,250	.00	2,715,400
Avg. private sales (millions)				
124	796.37	1,646	2.81	18,519
110	834.32	1,729	2.81	18,519
Avg. government sales (millions)				
124	49.82	363	.00	5,087
110	18.94	69	.00	629
Concentration Ratio (4-firm)				
124	40.81	17.08	10.00	93.00
110	41.08	16.20	10.50	86.00
Cum. antitrust				
124	2.54	4.03	.00	44.00
110	2.56	3.55	.00	35.00
S.D. of Profit				
124	.151	.18	.007	2.24
110	.138	.12	.007	.57
Regulated indust.				
124	.14	.35	.00	1.00
110	.12	.32	.00	1.00
Diverse indust.				
124	.048	.214	.00	1.00
110	.045	.208	.00	1.00
Geographic Herf. index				
124	3,929	2,245	636	9,925
110	3,868	2,222	636	9,925
Wave rate				
110	10.57	1.91	6.23	15.14
Import share				
110	10.28	11.33	.00	56.10
BAA bond rate				
110	12.55	2.13	9.45	15.34

APPENDIX C

This appendix gives information about the industries used in the sample and their total contributions over the period 1978–1986. The industry definitions and descriptions are taken from the Department of Commerce Standard Industrial Classifications, using 3-digit industries. The contribution totals are the sum of contributions reported to the Federal Election Commission, by corporate PAC, aggregated into these industry definitions. The dollar amounts were all transformed to real (1988 dollar) values, and then summed from 1978–86.

109	Miscellaneous Metal Ores (0)	131	Petroleum & Natural Gas Extraction (1,608)
138	Oil & Gas Field Services (978)	162	Heavy Construction, Except Highway (0)
201	Meat Products (531)	202	Dairy Products (157)
203	Preserved Fruit & Vegetables (0)	204	Grain Mill Products (838)
205	Bakery Products (1,225)	206	Sugar & Confectionary Products (70)
207	Fats & Oils (505)	208	Beverages (2,879)
209	Misc. Foods & Kindred Products (25)	211	Cigarettes (1,358)
221	Broadwoven Textile Mills (cotton) (483)	222	Broadwoven Textile Mills (manmade) (70)
225	Knitting Mills (26)	227	Carpets & Rugs (42)
232	Men's & Boy's Furnishings (142)	233	Women's & Misses' Outerwear (0)
234	Women's & Children's Undergarments (0)	239	Misc. Fabricated Textile Products (3)
242	Sawmills & Planing Mills (863)	243	Millwork, Plywood & Structural (906)
245	Wood Buildings & Mobile Homes (0)	251	Household Furniture (0)
252	Office Furniture (7)	253	Public Building & Related Furniture (0)
259	Misc. Furniture & Fixtures (0)	261	Pulp Mills (0)
262	Paper Mills (2,817)	263	Paperboard Mills (76)
265	Paperboard Containers & Boxes (10)	271	Newspapers (0)
272	Periodicals (109)	273	Books (0)
275	Commercial Printing (214)	276	Manifold Business Forms (9)
277	Greeting Cards (0)	278	Blankbooks & Bookbinding (11)
279	Printing Trade Services (0)	281	Industrial Inorganic Chemicals (586)
282	Plastics Materials & Synthetics (1,144)	283	Drugs (4,580)
284	Soap, Cleaners & Toilet Goods (328)	285	Paints & Allied Products (355)
286	Industrial Organic Chemicals (35)	287	Agricultural Chemicals (516)
289	Misc. Chemical Products (184)	291	Petroleum Refining (10,525)
295	Asphalt Paving & Roofing Materials (0)	301	Tires & Inner Tubes (167)
302	Rubber & Plastic Footwear (117)	306	Fabricated Rubber Products (46)
314	Nonrubber Footwear (1)	321	Flat Glass (0)
322	Glass & Glassware, Pressed/Blown (640)	323	Products of Purchased Glass (0)
324	Cement, Hydraulic (228)	325	Structural Clay Products (109)
326	Pottery & Related Products (0)	327	Concrete, Gypsum & Plaster Products (164)
329	Misc. Nonmetallic Mineral Products (109)	331	Blast Furnace & Basic Steel Products (1,654)
332	Iron & Steel Foundries (92)	333	Primary Nonferrous Metals (1,349)
334	Nonferrous Products	335	Nonferrous Rolling & Drawing (149)
336	Nonferrous Foundries (8)	339	Misc. Primary Metal Products (0)
341	Metal Cans & Shipping Containers (215)	342	Cutlery, Hand Tools & Hardware (18)
343	Plumbing & Heating (Nonelectric) (21)	345	Screw Machine Products (0)
346	Metal Forgings & Stampings (33)	347	Metal Services (51)
348	Ordnance & Accessories (0)	349	Misc. Fabricated Metal Products (0)
351	Engines & Turbines (134)	352	Farm & Garden Machinery (2,627)
353	Construction & Related Equipment (915)	354	Metalworking Machinery (48)
355	Special Industry Machinery (22)	356	General Industrial Machinery (736)
357	Computer & Office Equipment (711)	358	Refrigeration & Service Machinery (148)
359	Industrial Machinery (137)	361	Electric Distribution Equipment (990)
362	Electrical Industrial Apparatus (261)	363	Household Appliances (434)
364	Electric Wiring & Lighting Equipment (0)	365	Household Audio & Video Equipment (267)
366	Communications Equipment (996)	367	Electronic Components & Accessories (450)
369	Misc. Electrical Equipment & Supplies (145)	371	Motor Vehicles & Equipment (4,013)
372	Aircraft & Parts (8,505)	373	Ship & Boat Building & Repair (0)
374	Railroad Equipment (16)	375	Motorcycles, Bicycles & Parts (25)
376	Guided Missiles, Space Vehicles & Parts (4,233)	379	Misc. Transportation Equipment (0)
381	Search & Navigation Equipment (1,934)	382	Measuring & Controlling Devices (472)
384	Medical Instruments & Supplies (47)	385	Ophthalmic Goods (0)
386	Photographic Equipment & Supplies (200)	387	Watches, Clocks, Watchcases & Parts (0)
391	Jewelry, Silverware & Plated Ware (40)	394	Toys & Sporting Goods (153)
395	Pens, Pencils, Office & Art Supplies (0)	396	Costume Jewelry & Notions (0)
399	Misc. Manufactures (0)	401	Railroads (2,636)
421	Trucking & Courier Services (Nonair) (1,026)	422	Public Warehousing & Storage (0)
441	Deep Sea Foreign Freight Transportation (171)	451	Air Transportation, Scheduled (2,992)
461	Pipelines, Except Natural Gas (69)	481	Telephone Communications (5,116)
483	Radio & Television Broadcasting (48)	491	Electric Services (2,580)
492	Gas Production & Distribution (2,492)	493	Combination Utility Services (1,355)

Notes

The authors thank David Austen-Smith, Dennis Coates, Tyler Cowen, James Friedman, Russell Pittman, Robert Tollison, and Richard Wagner for helpful comments on earlier drafts. Don Clark, Gerry Miller, John Mayo and Russell Pittman provided useful data.

1. An exception is Hall and Wayman 1990. They find that the use of time by committee members is strongly correlated with contributions.

2. Andres (1985) examines the Fortune 500 firms for 1980 (though his sample inexplicably contains only 426 observations). Masters and Keim (1985) and Humphries (1991) examine the Fortune 1000 manufacturing firms in the year 1982. Masters and Keim add about 150 nonmanufacturing firms, as well. Grier, Munger, and Roberts (1991) examine the percentage of firms with PACs in 96 manufacturing industries (regardless of size, provided the firms are listed in the Compustat database) in 1984. McKeown (1994) examines 118 firms at three different points in time.

3. There are a variety of measures of industry structure in

the economics–industrial organization literature, with the most common being the four-firm concentration ratio. This ratio can be defined as the sum of total sales of the largest four firms in the industry, divided by the total sales of the entire industry. Obviously, a concentration ratio of one means that there are only four (or fewer) firms. A concentration ratio of .10 would mean that the largest four firms account for only 10% of the total sales (and hence market power) of the industry.

4. Boies chooses 10 variables by looking at pairwise coefficients, then derives a four-variable model from stepwise OLS regressions, in effect using two pretest estimators, each of which are biased and inconsistent.

5. It is worth pointing out that the empirical model we will estimate based on this abstract profit function is a reduced form, capturing the aggregate effects of variables that may effect both the costs and the benefits of political action. The main reason we specify a formal profit function at all is to justify inclusion of the input price variables, which are then implied as direct comparative statics results of the model.

6. We subscript $I(\phi)_i$ because different industries will exercise very different levels of influence depending on the political support among voters—and other industries—for the policy or service in question. This function is designed to focus just on the marginal impact of PAC contributions by the industry.

7. The exact mechanism by which influence is obtained through contributions is left unspecified here. Two possible modeling approaches are Denzau and Munger 1986 and Baron 1994.

8. The evidence on corporate PACs (Eismeier and Pollock 1988; Handler and Mulkern 1982, Matasar 1986, Morrison 1992), based on both perceptions of researchers and interviews with company executives and lobbyists, would appear to indicate that corporate PACs are fairly directly controlled by the sponsoring organization. This top-down control is quite different from the looser and more anarchic setting in which trade associations work (Bauer, Pool, and Dexter 1963; Wright 1985). Further, as Grier and Munger (1991) show, the allocations of corporate and trade association PAC contributions are statistically distinct and must be analyzed separately.

9. The general form of the Herfindahl index is the sum of the squares of some fractions that sum to one. It is widely used to measure market structure (the sum of the squares of the market shares of all firms). In this case, the "share" variable is the proportion of total sales that each state represents for the industry.

10. As Snyder (1989) shows, the issue of optimal dispersion of "power" is a difficult one. The issue depends in part on the ability of a group (e.g., in this case, of employees at manufacturing plants) to control a single district or to spread among several districts. The probability of being pivotal in multiple districts is higher if the workers are spread out; the probability of being pivotal in at least one district is obviously higher if all the workers are in one district. It may not be true, therefore, that geographic diversity has a monotonic effect in either direction.

11. The average number of product lines per industry is 1.7. The cut-off point for being considered a "diverse" industry is 3.0. We ran regressions using product lines directly. In a linear specification, it is negative but insignificant; adding the square turns the linear coefficient positive; and the square coefficient is negative and significant. Since it seems strange to estimate a quadratic function for a variable that ranges from 1 to 4.1, we used the dummy variable described in the text.

12. Standard OLS estimates are inconsistent, and the standard errors are incorrect (see Greene 1993; Heckman 1979). The standard errors reported here are corrected, using the procedure Greene derives from Heckman's consistent estimator. All our regressions were estimated with LIMDEP version 5.1 and checked with SHAZAM version 7.0.

13. The average level of sales to the federal government in the full sample is $50 million.

14. These results are broadly similar to those of Grier, Munger, and Roberts (1991), who find that the influence of concentration on the number of PACs in an industry is nonlinear, first increasing and then decreasing, for the year 1984.

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