Testing theories of lobbying

David Foster*

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Abstract

What does lobbying do? Informational theories argue that lobbyists provide politicians information about the quality of policies, while quid pro quo theories argue that lobbyists exchange things of value for policy favors. Existing work presumes that lobbyists target their friends, seemingly supporting informational theories. But drawing conclusions based on whether firms lobby ostensible allies or opponents is rife with ambiguities and inferential problems. Appealing to the theory of firm diversification from financial economics, I derive competing empirical implications of each theory that depend minimally on knowledge of lobbied politicians' preferences. I then use data to construct a measure of firm-level issue diversification and test the competing predictions. The results show that issue-diversified firms spend less on lobbying and are less likely to spend anything on lobbying, supporting an informational theory of lobbying.

Keywords: lobbying, formal model, firm diversification, information, influence

*University of California, Berkeley (foster@berkeley.edu).

What does lobbying do? Existing literature has presented two different types of answer to this question. Informational theories focus on the provision of information about the quality of a policy under consideration. In one potential formulation, the lobbyist tells the politician whether a policy should be enacted; in others, the lobbyist's policy information increases legislative productivity. Lobbying therefore informs politicians and allows them to produce better policy. In contrast, quid pro quo theories maintain that lobbyists exchange something of value for policy favors. These are sometimes called "vote-buying" theories, though this is overly narrow. Although an exchange of money for votes obviously fits within this class of theories, so can other sorts of exchange. For example, a committee chair may schedule certain bills in exchange for a lucrative job after retirement. Or a member may spend more time working on a lobbyist's priorities in exchange for contributing to an aligned PAC. Lobbying therefore distorts policy priorities in favor of the wealthy and well-connected.

Clearly then, which model better explains lobbying in practice has important normative implications. And pitting these theories against one another empirically requires generating testable implications that discriminate between them. Most notably, an extensive literature has explored the questions of whether or why lobbyists appear to target friends, with most work concluding that lobbyists target their allies (e.g., Bauer, Pool, and Dexter 1972, 353). This observation is taken to support an informational theory. After all, under a quid pro quo, resources are spent most efficiently on politicians who weakly disagree. In contrast, if lobbying primarily involves the provision of information, a lobbyist may wish to provide information to an ally (Schnakenberg 2017).

But drawing inferences about lobbying from politicians' revealed preferences is fraught with difficulty. Bronars and Lott (1997) examine how PAC contributions differentially affect a politician's voting behavior in the term before retirement, finding no difference and seemingly supporting the idea that lobbyists target friends. Yet this excludes the possibility that politicians hold out hope for lucrative post-retirement lobbying jobs (Diermeier, Keane, and

Merlo 2005). Other work shows that when a politician's prior position is consistent with that of an interest group, they are more likely to be lobbied by that group (Hojnacki and Kimball 1998, 1999). Yet a politician's observed alignment with a lobbyist's interests is an equilibrium outcome of the lobbying itself, which may span decades (Snyder 1992).

More fundamentally, defining friendship as agreement with policy positions neglects the possibility of disagreement over priorities. A politician who agrees with an interest group may nevertheless prefer to spend time on something else. The interest group may therefore need to buy a legislator's time to achieve its preferred outcome (Denzau and Munger 1986; Hall and Wayman 1990). Thus, what outwardly appears to be lobbying a friend may constitute a quid pro quo. This implies that even if we could perfectly observe politicians' true policy positions absent any effect of lobbying, observing politicians being lobbied by those who agree with said positions would still not support informational theories.

I therefore develop theory and derive observable implications that depend minimally on politicians' preferences. Instead, the theory hinges on the interests of business firms themselves.[1] Although observing politicians' underlying (i.e. pre-lobbying) interests is difficult, it is easy to observe whether a firm would want to help some industry when doing so would hurt some other industry. One may simply check whether the firm produces output in the first or the second industry. Importantly though, a firm may produce in *both* industries—termed a *diversified* firm as opposed to a *single-segment* firm. Crucially, each theory of lobbying has opposite implications for how a diversified firm should behave compared to a single-segment firm. Under informational theory, a single-segment firm would never be able to credibly communicate the relative magnitude of a policy's effects on its industry compared to that of the other. Yet a diversified firm may be able to do so.[2] This therefore implies that diversified

1. While some work explores conflicts of interest between lobbyists and clients (Stephenson and Jackson 2010; Schiff et al. 2015), I abstract away from this.

2. A diversity of literature examines not only unverifiable but also verifiable information. Some even assume away lobbyists' credibility problem entirely (Austen-Smith and Wright 1994). I focus presently

firms may spend more on lobbying. Under quid pro quo theory, a single-segment firm will be greatly affected by policy that helps one industry and hurts the other. Yet a diversified firm, effectively already diversified against this political risk, may be less concerned. This therefore implies that single-segment firms may spend more on lobbying.

I present empirical results that support the latter story. Firms that have a stake in different industries that are politically related to each other tend to lobby more. Because such firms are potentially somewhat hedged against political risks, it is striking that they choose to lobby more. But if credibly communicating information to members of Congress is important, this result makes sense. While it is beneficial for policymakers to have relevant information, the normative implications may still be cause for concern. First, moneyed interests may bias policymaking through the specific policy questions about which they choose to acquire information. Second, while firms might actually be able to choose credibility through the mix of business segments that they select, many competing interests are unable to do this.

Firm diversification and lobbying

A literature in economics and management has explored the relationship between firm diversification and lobbying. For the most part, it makes an informal theoretical argument for a positive relationship (Zardkoohi 1985; Grier, Munger, and Roberts 1991; Schuler 1996; Brasher and Lowery 2006). The argument is that the more business areas in which a firm is involved, the more opportunities that it will have to influence public policy, making the firm more likely to lobby.

However, this does not obviously comport with economic or political realities. A diversified firm may have concern over more industries, but its concern over each industry will diminish proportionally when holding firm size constant. At the same time, evidence sug-

on transmission of unverifiable information through cheap talk (Crawford and Sobel 1982). My general supposition is that all else equal, alignment of preferences makes informational lobbying more effective.

gests that there are large entry costs to lobbying (Kerr, Lincoln, and Mishra 2014) and that only the firms lobbying the most intensely enjoy positive returns (Chen, Parsley, and Yang 2015). Arguably, an *unrelatedly* diversified firm (e.g., producing musical instruments and cars) will need to make separate lobbying investments in each industry, implying a negative relationship between diversification and lobbying. On the other hand, a *relatedly* diversified firm (e.g., producing oil and renewable energy) may hold a product portfolio with internally conflicting policy interests (Kim 2008), once again implying a negative relationship between diversification and lobbying (as predicted in the present quid pro quo model). The present paper makes a novel theoretical contribution in this area by systematically organizing these potential conflicting motivations and deriving competing empirical implications.

Empirically, the same political economy literature generally demonstrates a positive relationship between diversification and lobbying, as does at least one paper that explores related questions (Cao et al. 2018).[3] The present article makes a novel empirical contribution through its construction of a measure of *political* diversification, which is pitted against ordinary diversification in the regression models employed. Specifically, I appeal to the tools of network analysis to understand which industries are politically related by examining the degree to which they tend to lobby in the same issue areas.

A model of informational lobbying by a firm

I present the first of two formal models from which respective competing empirical implications are derived. The key feature of the informational model is that having a stake in both industries can lend the firm credibility in communicating policy-relevant information to a politician.

3. However, Schuler (1996) finds an insignificant effect of diversification on steel firms' trade petitions.

Formal definition

Preliminaries

A firm F may produce output in two different industries. A politician P considers whether to enact a policy that will alter each industry's cost of capital. The firm decides whether to hire a lobbyist, following which the firm privately observes the effects of the policy. If the firm has hired a lobbyist, it sends a cheap talk message to the politician about the effects of the policy. Next, the politician decides whether to implement the policy or preserve the status quo. Finally, firm profits are realized.

Utility functions

The firm shall have the following utility (i.e. profit) function:

$$U_F = (d_1 p_1 - r_1)k_1 + (d_2 p_2 - r_2)k_2 - u\left(l_1^2 + l_2^2\right) - w(l_1 + l_2)^2.$$

Letting i denote the industry, k_i is capital, d_i is managerial ability, p_i is the price of output, r_i is the (realized) cost of maintaining capacity, l_i is labor, and u and w are cost parameters. Assume that the production technology requires one unit of capital and one unit of labor to produce one unit of output. Then we may write the utility function as follows:

$$U_F(k_1, k_2; r_1, r_2) = (d_1 p_1 - r_1)k_1 + (d_2 p_2 - r_2)k_2 - u\left(k_1^2 + k_2^2\right) - w(k_1 + k_2)^2.$$

Next, the politician has the following utility function:

$$U_P(e) = -\gamma_1(\tilde{r}_1 - e\Delta_1)^2 - \gamma_2(\tilde{r}_2 + e\Delta_2)^2$$

where γ_i is concern for industry i, $\tilde{r}_i$ is the status-quo cost of maintaining capacity, e indicates

whether the politician enacts the policy, and $\Delta_i > 0$ is the effect of the policy on r_i (negative for r_1, and positive for r_2). The relationship between r_i and $\tilde{r}_i$ is therefore as follows:

$$r_i = \tilde{r}_i + e(-1)^i \Delta_i.$$

Finally, assume without loss of generality that $\gamma \equiv \gamma_1 = 1 - \gamma_2$.

Sequence of moves

The sequence of moves is as follows:

1. Managerial ability $\{d_1, d_2\}$ is drawn from a distribution and revealed only to the firm.
2. The firm publicly commits to a vector of capacity $\{k_1, k_2\}$.
3. The firm decides whether to acquire the ability to send a cheap talk message to the politician by hiring a lobbyist at cost c.
4. The effects of the policy $\{\Delta_1, \Delta_2\}$ are drawn from a distribution and revealed only to the firm.
5. If a lobbyist has been hired, the firm sends a cheap talk message m to the politician.
6. The politician decides whether to enact the policy, indicated by $e = 1$.
7. Payoffs are realized and the game ends.

Assumptions

I assume the following about the distribution of $\{\Delta_1, \Delta_2\}$:

Assumption 1 (Distribution of policy effects)**.** *Let* $\overline{\Delta}_1 > \underline{\Delta}_2 > 0$ *and* $\overline{\Delta}_2 > \underline{\Delta}_1 > 0$*. With probability* q*,* $\{\Delta_1, \Delta_2\} = \left\{\overline{\Delta}_1, \underline{\Delta}_2\right\}$*, and with probability* $1 - q$*,* $\{\Delta_1, \Delta_2\} = \left\{\underline{\Delta}_1, \overline{\Delta}_2\right\}$*.*

This assumption simply states that there are two possibilities: the policy may reduce costs in industry 1 more than it increases costs in industry 2, or it may reduce costs less in industry 1 than it increases them in industry 2. Under the first possibility, the policy would be socially

efficient, while in the latter, it would be inefficient. In the present setting, this structure of policy is a natural adaptation of that employed in, for example, Ellis and Groll (2020). A key part of this assumption is that while the politician knows the directions of the policy's effects, she does not know the relative magnitudes. This is what the firm may attempt to communicate to the politician.

Given this, it is natural to assume the following message space:

Assumption 2 (Message space)**.** *The message* $m \in \{g, b\}$.

Here g is a mnemonic for "good" (i.e. socially efficient), while b is a mnemonic for "bad" (i.e. socially inefficient). These structures of policy and the message space thus capture the nontrivial case in a parsimonious may.

Beliefs

Specifying the politician's beliefs about the state of the world is unnecessary, as no message need be off-path. Additionally, we will see that the politician's beliefs about $\{d_1, d_2\}$ are irrelevant given her observation of $\{k_1, k_2\}$.

Summary

Let $i \in \{1, 2\}$. The exogenous parameters are d_i, p_i, $\tilde{r}_i$, u, w, γ, c, q, $\underline{\Delta}_i$, and $\overline{\Delta}_i$. The endogenous choices are k_i, the firm's decision whether to employ a lobbyist, the message m, and e. The random variables are Δ_i. As a sequential game of imperfect information, the natural equilibrium concept is perfect Bayesian equilibrium (PBE).

Discussion

The firm's utility function follows Maksimovic and Phillips (2002, 2007, 2013). Prior work in financial economics had wrestled with the question of why firms diversify and how this explains the seeming empirical pattern that diversified firms are valued at a discount compared to single-segment firms (Bettis 1981; Lewellen, Loderer, and Rosenfeld 1989; Montgomery 1994; Berger and Ofek 1995; Anderson et al. 2000; Matsusaka 2001). One common explanation, exemplified by Lewellen, Loderer, and Rosenfeld, suggested that there may exist agency problems between management and shareholders, with managers inefficiently seeking to reduce their own exposure to risk through firm diversification. In contrast, Maksimovic and Phillips present a simple model that hinges on firms having industry-specific levels of managerial ability, combined with standard assumptions of diminishing returns to production in each industry (the terms containing u) and diseconomies of scale (the terms containing w). I presently augment the firm's considerations to include the possibility that it might alter each industry's cost of capital with informational lobbying to the politician.

The structure of the politician's utility, meanwhile, can be seen as a microfoundation of an ideal point in a policy space. Here the politician has some mix of concern for costs in each industry. If concern for one industry were very high, producers in the other industry may be seen as an opponent of the politician, but only because there exists a distributional conflict. If given the opportunity, the politician is assumed always to prefer to make each industry better off to the extent that doing so does not make the other industry worse off.

More generally, informational lobbying is modeled mostly in the spirit of Crawford and Sobel (1982) and Potters and Winden (1990). While subsequent work has explored alternative informational environments and possibilities for establishing credibility, my general presumption is that alignment of preferences makes credible communication of policy information easier.

Analysis and empirical implications

It should be immediate that a single-segment firm could never credibly communicate information about the policy. It follows that such a firm would never invest in lobbying capacity, regardless of what the politician prefers.

A diversified firm may be credible, but it must prefer the policy to pass precisely when it is socially efficient. This holds when

$$U_F\left(k_1, k_2; \tilde{r}_1 - \underline{\Delta}_1, \tilde{r}_2 + \overline{\Delta}_2\right) \leq U_F\left(k_1, k_2; \tilde{r}_1, \tilde{r}_2\right) \leq U_F\left(k_1, k_2; \tilde{r}_1 - \overline{\Delta}_1, \tilde{r}_2 + \underline{\Delta}_2\right),$$

which is equivalent to

$$\frac{\underline{\Delta}_2}{\overline{\Delta}_1} \leq \frac{k_1}{k_2} \leq \frac{\overline{\Delta}_2}{\underline{\Delta}_1}. \tag{1}$$

For an informative message to serve a purpose, we require an analogous condition of the politician. That is, she must prefer good policy to the status quo and the status quo to bad policy. This implies

$$\frac{2r_2\underline{\Delta}_2 + {\underline{\Delta}_2}^2}{2r_1\overline{\Delta}_1 - {\overline{\Delta}_1}^2 + 2r_2\underline{\Delta}_2 + {\underline{\Delta}_2}^2} \leq \gamma \leq \frac{2r_2\overline{\Delta}_2 + {\overline{\Delta}_2}^2}{2r_1\underline{\Delta}_1 - {\underline{\Delta}_1}^2 + 2r_2\overline{\Delta}_2 + {\overline{\Delta}_2}^2}. \tag{2}$$

Then the politician's concern weight placed on Industry 1 must be intermediate.

If the firm is credible and the politician prefers to implement socially efficient policy, we still require that its expected benefit from hiring a lobbyist exceed the cost. When the politician's prior belief that policy is good (call it σ) implies implementing the policy, the benefit is stopping it when it is bad. When the politician's prior belief implies not implementing the policy, the benefit is getting it implemented when it is good. Then a

credible firm hires a lobbyist whenever

$$c \leq \begin{cases} q\Big(U_F\left(k_1, k_2; \tilde{r}_1 - \overline{\Delta}_1, \tilde{r}_2 + \underline{\Delta}_2\right) - U_F\left(k_1, k_2; \tilde{r}_1, \tilde{r}_2\right)\Big) & \sigma \text{ implies status quo} \\ (1-q)\Big(U_F\left(k_1, k_2; \tilde{r}_1, \tilde{r}_2\right) - U_F\left(k_1, k_2; \tilde{r}_1 - \underline{\Delta}_1, \tilde{r}_2 + \overline{\Delta}_2\right)\Big) & \sigma \text{ implies policy} \end{cases}$$

which can be rewritten as

$$c \leq \begin{cases} q\left(\overline{\Delta}_1 k_1 - \underline{\Delta}_2 k_2\right) & \sigma \text{ implies status quo} \\ (1-q)\left(\overline{\Delta}_2 k_2 - \underline{\Delta}_1 k_1\right) & \sigma \text{ implies policy} \end{cases} \tag{3}$$

I summarize these results as follows:

Proposition 1. *A single-segment firm never hires a lobbyist. A diversified firm hires a lobbyist if and only if Conditions 1, 2, and 3 are satisfied.*

Proof. In text. □

We are ready for this model's empirical implication:

Implication 1. *Diversified firms will pay more to lobby than single-segment firms.*

It would be surprising of course if we observed in the data that single-segment firms *never* lobbied, as this model predicts. But the core idea is that having an interest in different industries will allow the firm to credibly communicate information about policies that affect both industries, to the firm's benefit. The ability to credibly communicate to the politician makes lobbying more productive, implying that more resources will be spent on it.

A model of quid pro quo lobbying by a firm

The key insight of this model is that a single-segment firm (in at least one of the industries) would have the greatest interest in influencing policy that reallocates capital costs between the two industries, holding total capital constant. This implies that diversified firms will lobby less than single-segment firms in at least one of the two industries.

Formal definition

Preliminaries

As before, a firm F may produce output in two different industries. A politician P has control over a one-dimensional policy that redistributes capital costs between each industry. The firm may choose to pay the politician to enact a specific policy. Following this, the politician selects a policy and firm profits are realized.

Utility functions

The firm's utility function shall be as before, except subtracting any amount s paid to the politician.

Next, the politician's utility function is modified as follows:

$$U_P(x) = -\gamma\left(\tilde{r}_1 - x\right)^2 - (1-\gamma)\left(\tilde{r}_2 + x\right)^2 + \theta s$$

where $x \in (-r_2, r_1)$ is policy and $\theta > 0$ is concern for money. The relationship between r_i and $\tilde{r}_i$ is therefore as follows:

$$r_i = \tilde{r}_i + x(-1)^i.$$

Sequence of moves

The sequence of moves is as follows:

1. Managerial ability $\{d_1, d_2\}$ is drawn from a distribution.
2. The firm commits to a vector of capacity $\{k_1, k_2\}$.
3. The firm provides a contribution in exchange for selecting a specific policy x.
   (a) With probability $t \in [0, 1]$, the firm commits to a contribution schedule contingent on policy.
   (b) With probability $1 - t$, the politician commits to a policy menu contingent on the contribution granted.
4. The politician selects policy.
5. Payoffs are realized and the game ends.

Summary

Let $i \in \{1, 2\}$. The exogenous parameters are d_i, p_i, $\tilde{r}_i$, u, w, γ, β_i, θ, and t. The endogenous choices are k_i, s, and x. As a sequential game of perfect information, the natural equilibrium concept is subgame-perfect Nash equilibrium (SPNE).

Discussion

Here, the quid pro quo is modeled straightforwardly in the spirit of Grossman and Helpman (1994), with a single buyer and seller of policy. It is not obvious who should have proposal power. Hence, with probability t, the firm proposes and extracts the surplus from the exchange, with the politician doing so otherwise. This will allow us to see that results do not depend on who proposes.

Analysis and empirical implications

First, I determine the politician's optimum excluding contributions. This is

$$x_P^* = \gamma r_1 - (1-\gamma) r_2$$

Next, I maximize joint utility of the politician and firm, weighing the firm by θ:

$$x^* = \gamma r_1 - (1-\gamma) r_2 + \frac{k_1 - k_2}{2}\theta$$

An equilibrium requires that this point be implemented. Should the firm gain proposal power, the minimum amount that it must pay the politician to implement x^* is

$$\frac{U_P(x_P^*) - U_P(x^*)}{\theta} = \frac{(k_1 - k_2)^2}{4}\theta \tag{4}$$

Should the politician gain proposal power, the maximum amount that it may request from the firm to implement x^* is

$$U_F(k_1, k_2)\big|_{x=x^*} - U_F(k_1, k_2)\big|_{x=x_P^*} = \frac{(k_1 - k_2)^2}{2}\theta. \tag{5}$$

Obviously firm willingness to pay exceeds politician willingness to receive. The following proposition summarizes expected equilibrium contributions, denoted $\mathbb{E}[s^*|k_1, k_2]$:

Proposition 2. *In expectation, the firm contributes* $\frac{(k_1-k_2)^2}{4}(2-t)\theta$.

Proof. In text. □

To reach an empirical implication relating lobbying to firm conglomeration, we must of course consider how $\mathbb{E}[s^*|k_1, k_2]$ changes given changes in k_1 and k_2. Notice that $K \equiv k_1 + k_2$

is observable. This is because we have assumed that the production technology requires one unit of labor for each unit of capital, and the data reveal the quantity of labor employed. We may additionally observe k_i if $k_j = 0$. This corresponds to knowing that a firm operates in a single-segment, which the data also reveal. Then consider the following function:

$$\ell(k_1) \equiv \mathbb{E}[s^*|k_1, K - k_1].$$

Notice that $\ell'(k_1) = \nabla_{(1,-1)}\mathbb{E}[s^*|k_1, k_2]$, which corresponds to the predicted change in equilibrium expected contributions given an instantaneous increase in Industry 1 capital when holding fixed the quantity of labor employed. It is easily verified that $\ell(0) = \ell(K)$ and that $\ell''(k_1) > 0$. Then I reach the following empirical implication:

Implication 2. *Holding labor fixed, single-segment firms will pay strictly more to lobby compared to diversified firms.*

The idea here is that the firms most affected by policy will have the greatest incentive to influence it through contributions. And the most affected firms are those whose investments are entirely tied to a single industry, with no countervailing benefit in one industry to any cost imposed in the other.

Empirical evidence

I first present a novel measure of political diversification, which does not simply summarize how many business segments are in a firm but incorporates information about whether those segments are politically related to one another, as well as the size of each segment. Next, I present the empirical models and identifying assumptions. Finally, I discuss the data and give results from the empirical estimation.

A measure of political diversification

I first determine the share of lobbying expense in year t related to issue area a, denoted L_j^{at}, that a firm j whose sales are entirely in industry i would be predicted to incur. For each pair $\{a, t\}$, I employ the following linear model (to be estimated with ordinary least squares):

$$L_j^{at} = \beta_1^{at}\iota_{1j}^{at} + \cdots + \beta_N^{at}\iota_{Nj}^{at} + \epsilon_j \tag{6}$$

Here, ι_{ij}^t is the fraction of firm j's sales that are in industry i at time t, and ϵ_i is a mean-zero firm-specific residual. As the model has no constant, β_i^{at} gives the desired quantity.

I then use this information to determine how closely different industries are related, as intermediated by the issue codes associated with business segments' lobbying activity. In particular, I use the coefficients to construct a weighted bipartite adjacency matrix (Hoffman 2020). Here the matrix represents the bipartite network of segments and issue areas, with segments as the first class of nodes and issue areas as the second class of nodes. Neither segments nor issues are linked to others of their own class, but are only connected through the other class. Letting A represent the number of issue areas, the adjacency matrix for time t is given as follows:

$$\mathbf{B^t} = \begin{bmatrix} \beta_1^{1t} & \beta_1^{2t} & \cdots & \beta_1^{At} \\ \beta_2^{1t} & \ddots & & \vdots \\ \vdots & & \ddots & \vdots \\ \beta_N^{1t} & \cdots & \cdots & \beta_N^{At} \end{bmatrix} \tag{7}$$

Letting b_{xy}^t be the element of $\mathbf{B^t}$ in row x and column y, b_{cd} gives the strength of the connection between industry segment c and issue area d. The unipartite projection of this matrix that provides edge weights directly connecting business segments is given by $\mathbf{U^t} = \mathbf{B^{t\prime}B^t}$. Letting u_{xy}^t represent the element in the xth row and yth column of $\mathbf{U^t}$, I take the

relatedness ρ^t of arbitrary segments c and d at time t to be as follows:

$$\rho^t(c,d) = \begin{cases} u^t_{cd} & c \neq d \\ 0 & c = d \end{cases} \tag{8}$$

I finally incorporate these business segment relatedness values into a novel firm-level measure of political diversification. Existing literature has proposed measures of firm diversification more generally, but they do not readily allow for edge weights to vary across any arbitrary pair of business segments.[4] I therefore employ the following measure of firm j's political diversification at time t:

$$\pi^t_j \equiv \sum_{c \in \mathbb{S}} \sum_{d \in \mathbb{S}} \rho^t(c,d) P^t_{jc} P^t_{jd} \tag{9}$$

where $\mathbb{S}$ is the set of business segments and P^t_{ji} is the fraction of firm j's sales that are from business segment i at time t. One interpretation of this measure is the expected relatedness weight between two randomly drawn segments of a firm, given that they are drawn with

4. Most notably, Jacquemin and Berry (1979) propose the following "entropy" measure:

$$E \equiv \sum_{i=1}^{N} P_i \ln(1/P_i)$$

Here N is the number of business segments of a firm and P_i is its share of business in segment i. Palepu (1985) modifies this as follows to measure related diversification:

$$DR \equiv \sum_{j=1}^{M} \left(\sum_{i \in j} P^j_i \ln(1/P^j_i) \right) P^j$$

Here, M is the number of industry groups, P^j is the share of a firm in industry group j, and P^j_i is the proportion of the firm in industry group j that is specifically in industry i. This of course presumes that whether two industries are related is binary and that relatedness must be transitive, assumptions that do not serve the present purpose.

replacement and with probabilities equal to their fraction of the firm's sales.

To ensure that I capture the effect of political diversification, I additionally construct an analogous measure of ordinary diversification, incorporating no information about the political relatedness of business segments. This is

$$\delta_j^t \equiv \sum_{c \in \mathbb{S}} \sum_{d \in \mathbb{S}} \mathbb{1}_{c \neq d} P_{jc}^t P_{jd}^t \tag{10}$$

where $\mathbb{1}_{c \neq d}$ is an indicator function.

Data and empirical models

I obtain panel data on North American firms from 1999 to 2020 from Compustat. The data include financial information as well as sales and business segment classification for each division. In particular, I use two-digit North American Industry Classification System (NAICS) codes to classify firm divisions into business segments. I merge this with LDA data as compiled and cleaned by Kim (2020). I adjust dollar amounts for inflation using Bureau of Labor Statistics series CPIAUCSL.

I consider two different outcomes: the natural logarithm of firms' total lobbying spending in year t, and whether firms' lobbying is zero or positive in year t. For each outcome Y_j^t, I estimate the following baseline model using OLS with robust standard errors:

$$Y_j^t = \beta \pi_j^t + \gamma \delta_j^t + \mathbf{X_j^{t\prime}} \cdot \theta + \zeta^t + \epsilon_j^t$$

Here, political diversification π_j^t is the key independent variable, while ordinary diversification δ_j^t is an important control variable. $\mathbf{X_j^{t\prime}}$ is a vector of covariates, including financial information and the proportion of sales associated with each business segment. Finally, ζ^t is a year fixed-effect, and ϵ_j^t is a firm-year residual. I additionally estimate a version of this

model that includes firm fixed effects:

$$Y_j^t = \beta\pi_j^t + \gamma\delta_j^t + \mathbf{X_j^{t\prime}} \cdot \theta + \zeta^t + \eta_j + \epsilon_j^t$$

Here, η_j represents firm fixed effects.

Results

Results are presented in Table 1. The effect of political diversification is consistently positive and highly significant. Politically diversified firms spend more on lobbying, and they are more likely to spend a positive amount. This provides support for the informational model of lobbying, thus failing to support the quid pro quo model.

The other result of substantive interest is the effect of ordinary diversification. Although prior economics literature has found a positive effect, here the effect is only positive in the cross-sectional regressions when not including firm fixed effects, and in particular, only marginally significant when the outcome is the probability of lobbying. This suggests that the positive effect presented in related work may actually be attributable to the effect of political diversification on lobbying incentives.

Conclusion

These results point toward an informational model of lobbying and away from a model in which something of value is exchanged for policy. This latter category may be seen to include not only quid pro quo models but also legislative subsidy models. While legislative subsidies may substantively constitute "information," it is not information as usually understood in models of credible communication. Rather, information is assumed to be credible or verifiable and effectively functions as a grant of resources. The results therefore underscore the

Outcome	$\ln(lobby_j^t + 1)$	$\ln(lobby_j^t + 1)$	$\mathbb{1}_{lobby_j^t>0}$	$\mathbb{1}_{lobby_j^t>0}$
Specification	CS	FE	CS	FE
Political diversification	13.29^{***}	9.41^{***}	1.266^{***}	$.753^{***}$
	(4.63)	(3.09)	(.375)	(.271)
Ordinary diversification	$.439^{**}$	$-.435^{***}$	$.032^{*}$	$-.033^{**}$
	(.223)	(.162)	(.018)	(.014)
Market value of equity (ln)	$.631^{***}$	$.284^{***}$	$.048^{***}$	$.022^{***}$
	(.013)	(.015)	(.001)	(.001)
Sales	$.000^{***}$	$.000^{***}$	$.000^{***}$	$.000^{***}$
	(.000)	(.000)	(.000)	(.000)
Intangible assets (%)	$.310^{***}$	$-.188^{**}$	$.021^{***}$	$-.016^{**}$
	(.064)	(.084)	(.005)	(.007)
Leverage ratio (ln)	$.294^{***}$	$.047^{***}$	$.022^{***}$	$.003^{***}$
	(.008)	(.007)	(.001)	(.001)
Tobin's Q (ln)	$.168^{***}$	$-.297^{***}$	$-.035^{***}$	$-.023^{***}$
	(.011)	(.019)	(.001)	(.002)
Return on assets	$.000^{*}$	$-.000$	.000	$-.000$
	(.000)	(.000)	(.000)	(.000)
Stock compensation (ln)	$.796^{***}$	$.265^{***}$	$.056^{***}$	$.018^{***}$
	(.017)	(.011)	(.001)	(.001)
N	109,658	109,658	109,658	109,658
R^2	.260	.212	.222	.172

Table 1: Estimated regression coefficients. Standard errors are reported in parentheses. All models include year fixed effects and business segment controls.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

importance of credibility in making lobbying effective. While the indirect method of reaching this conclusion has proved useful in avoiding inferential problems, future research should find a way to incorporate the role of politicians. Specifically, researchers should do more to understand and separate the factors that contribute to politicians' ideal points and actions.

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