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THE DYNAMICS OF FIRM LOBBYING

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ABSTRACT

We study the determinants of the dynamics of firm lobbying behavior using a panel data set covering 1998-2006. Our data exhibit three striking facts: (i) few firms lobby, (ii) lobbying status is strongly associated with firm size, and (iii) lobbying status is highly persistent over time. Estimating a model of a firm's decision to engage in lobbying, we find significant evidence that up-front costs associated with entering the political process help explain all three facts. We then exploit a natural experiment in the expiration in legislation surrounding the H-1B visa cap for high-skilled immigrant workers to study how these costs affect firms' responses to policy changes. We find that companies primarily adjusted on the intensive margin: the firms that began to lobby for immigration were those who were sensitive to H-1B policy changes and who were already advocating for other issues, rather than firms that became involved in lobbying anew. For a firm already lobbying, the response is determined by the importance of the issue to the firm's business rather than the scale of the firm's prior lobbying efforts. These results support the existence of significant barriers to entry in the lobbying process.

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1 Introduction

Lobbying is a primary avenue through which firms attempt to change policy in the United States, with total expenditures outnumbering campaign contributions by a factor of nine. While lobbying by businesses is a frequently debated issue in popular discourse, there is little systematic empirical evidence on these behaviors at the firm level.² We use a matched data set on firms' lobbying expenditures and operations to study the determinants of direct firm lobbying over time. We find significant evidence for the existence of up-front costs that are associated with beginning to lobby. These costs affect firms' decisions of whether or not to invest in the political process over time and influence how they react to changes in the policy environment. Moreover, firms that are already lobbying show a significant propensity and ability to adjust their efforts to maximize profits. We hope that our findings will help guide future work in political economy and stimulate further inquiry into understanding the decisions of firms to affect the political process.

Prior empirical work on firm participation in the policy making process is small, due in many cases to data constraints. Most of the available evidence that we do have comes from data on campaign contributions. These contributions often come from Political Action Committees (PACs), which can be set up and organized by firms but which must raise money from voluntary donations from individuals.³ These studies have addressed such questions as the correlation between political activity and firm size as well as the effect that contributions have on a firm's stock market price.⁴ Bombardini (2008) in particular has developed a model in which up-front costs affect firms' decisions of whether or not to lobby. She uses data on campaign contributions to demonstrate that her approach fits the data on the industry-level structure of tariffs better than prior models. Grossman and Helpman (2001) also consider a model in which there are fixed costs associated with lobbying. Little work has been done, however, either empirically or theoretically, in looking at the determinants of firm efforts in a dynamic context. With the exception of Facchini, Mayda, and Mishra (2011), the empirical literature on the political economy of international labor movements is also quite thin.⁵

²See Ansolabehere, de Figueiredo, and Snyder (2003) and Facchini, Mayda, and Mishra (2011). Recent firm-level exceptions include Igan, Mishra, and Tressel (2011) and Chen, Parsley, and Wang (2010).

³Direct political contributions by firms were prohibited by the Tillman Act of 1907. A 2010 decision by the Supreme Court in *Citizens United v. Federal Election Commission* granted corporations, unions, and individuals the right to donate unlimited funds to outside groups to campaign for or against candidates. Our discussion of the legal framework for lobbying focuses on the 1998-2006 period that we analyze empirically.

⁴See Grenzke (1989), Grier, Munger, and Roberts (1994), Romer and Snyder (1994), Hansen and Mitchell (2000), Chen, Parsley, and Yang (2010), and Cooper, Gulen, and Ovtchinnikov (2010). Fisman (2001), Faccio (2006), Faccio, McConnell, and Masulis (2006), Fisman, Fisman, Galef, and Khurana (2006), Jayachandran (2006), and Bertrand, Kramarz, Schoar, and Thesmar (2011) also study politically connected firms.

⁵The literature on the political economy of trade, in contrast, is much further developed

To shed light on these issues, we match data on firms' lobbying expenditures with other aspects of their operations. These data exhibit several striking features. The first is that few firms lobby, even in our sample of publicly traded firms—only 10% of the firms in our sample engage in lobbying in one or more years over our sample period of 1998-2006. Lobbying is strongly related to firm size. This is especially true at the extensive margin of whether or not to lobby but less so at the intensive margin of how much to spend on lobbying once the decision has been made to participate in the process. Finally, we find that lobbying status is highly persistent over time. The probability that a firm lobbies in the current year given that it lobbied in the previous year is 92%.

Given the stability of these facts over time, we consider the idea of whether they are driven by up-front costs that are associated with beginning to lobby. Such costs could include: learning the complex laws about lobbying; educating newly hired lobbyists about the details of the firm's interests, characteristics, and vulnerabilities; developing a lobbying agenda; researching what potential allies and opponents are lobbying for; and investigating how best to attempt to affect the political process (e.g., in which policy makers to invest).⁶ To the extent that lobbying represents a legislative subsidy to sympathetic policy makers (Deardorff and Hall 2006), politicians may also require such an initial investment of resources to signal a firm's willingness to support them over time. The qualitative literature on lobbying has long stressed the importance of establishing continuing relationships with policy makers for the effectiveness of lobbying efforts. If the benefits from lobbying then fall disproportionately on large firms, then only these companies will have the incentive to pay this up-front cost.

To test these ideas, we construct a dynamic empirical model of firm lobbying behavior. This approach implies a reduced form specification for the probability that a given firm lobbies in a particular year. In this model firms have to pay a one-time sunk cost when they begin to lobby. These costs then create an option value associated with continuing to lobby that alters firms' intertemporal decisions. Once firms get in, they tend to stay in because they would prefer not to spend the money to set up a lobbying operation again in the near future. When we take the model to the data, we find strong evidence for the existence of these entry costs. Even after accounting for a number of other factors that would drive firm behavior, we see that these up-front costs exert a significant influence on firm decisions over time.

To further test these predictions, we then look in depth at a specific policy shift that has been the subject of significant public debate: the dramatic decline in the limit on H-1B visas that occurred in 2004. This decline was due to the expiration of prior legislation and offers a special natural experiment (e.g., Kato

theoretically and empirically (e.g., Grossman and Helpman 1994, Goldberg and Maggi 1999, Mitra 1999, Gawande and Bandyopadhyay 2000, Magee 2002, Bombardini and Trebbi 2011).

⁶We abstract from the decision to lobby by setting up an in-house lobbying department or by hiring external consultants. While setting up a whole office for in-house operations is likely more expensive, if a firm employs a lobbyist externally the new hire still has to spend a significant amount of time learning the particular needs and characteristics of their new client and how items currently on the agenda will affect them specifically.

and Sparber 2011). We show that this event precipitated a significant shift in firms' lobbying behavior. Constructing a smaller panel of firms that are likely to be responsive to shifts in immigration policy, we find that changes in the cap had little effect on the extensive margin of lobbying. In other words, the decline in the limit on H-1B visas did not induce new firms to lobby. The decline did, however, significantly shift lobbying resources towards high-skilled immigration issues amongst firms that had lobbied previously for other issues. Moreover, we show that the manner in which this shift occurs among firms already lobbying indicates little constraint on adjustments across issues important for firms. We consider the large shift in the intensive margin relative to that of the extensive margin as corroborating evidence for the existence of these barriers to entry.

Our paper contributes to the nascent empirical literature on lobbying and represents one of the first to study lobbying behavior at the firm level. Our results argue that the dynamic nature of lobbying status is a feature that should be included in both future theoretical and empirical work. Selection into lobbying is driven by a number of distinct factors, and studies that fail to address this issue will find biased results. This applies to a wide range of topics, from the impact of lobbying on firm performance to the determinants of trade protectionism. More generally, we contribute to understanding the microfoundations of how political institutions function. Understanding these foundations is crucial for a number of questions in political economy.⁷ Entry costs can effectively "fix the players in the game" with respect to the set of firms engaged in the process. These costs can thus influence policy choices through altering the composition of firms that lobby on issues. In particular, the persistence induced by these costs likely allows firms and politicians to be able to predict what groups will work to support or oppose various policy changes. Moreover, stability in this interface between government and firms may induce persistence in political and economic institutions or raise the prospects of regulatory capture.

In the next section we describe our data and a number of features of these data that are suggestive of the existence of up-front costs. We then develop our model of firm behavior and empirical approach in Section 3. We present the results from our baseline estimations as well as a number of robustness checks in Section 4. Section 5 considers evidence on these costs from responses to changes in immigration policy. Section 6 concludes and further discusses some implications of entry costs to lobbying.

2 Data and Stylized Facts

Our data come from a number of sources. The primary information on firms' operations comes from Compustat and serves as the platform upon which we

⁷For example, Snyder (1990, 1992), Aghion, Alesina, and Trebbi (2004), Alesina and Rosenthal (1995), and Grossman and Helpman (2001).

build. Information on industry imports comes from the Center for International Data at the University of California at Davis (Feenstra, Romalis, and Schott 2002). Information on lobbying behavior is possible due to the Lobbying Disclosure Act of 1995, subsequently modified by the Honest Leadership and Open Government Act of 2007. This act requires individual companies and organizations to provide a substantial amount of information on their lobbying activities. Since 1996, intermediaries who lobby on behalf of companies and organizations have to file semi-annual reports to the Secretary of the Senate's Office of Public Records (SOPR). Since 2007, quarterly reports have to be filed. These reports list the name of each client, the total amount of funds that they have received from each client, and a pre-specified set of general issues for which they lobbied for each client. All firms with in-house lobbying departments are similarly required to file reports, stating their total lobbying expenditures directed towards in-house lobbying activities or external lobbyists. Legislation requires the disclosure not only of the dollar amounts actually received/spent but also of the issues that were lobbied for. Appendix Table A1 shows the list of 76 general issues given to each respondent, at least one of which has to be entered. For each general issue, the filer is also required to list the specific issues which were lobbied for during the semi-annual period. Thus, unlike PAC contributions, lobbying expenditures of companies can be associated empirically with very specific, targeted policy areas.⁸

We compile comprehensive data on lobbying behavior from the websites of the Center for Responsive Politics (CRP) and the SOPR in Washington D.C. Appendix Figure A1 shows part of the report filed by Microsoft for its lobbying expenditures between January - June 2005. Microsoft lists "immigration" as a general issue and lists "H-1B visas", "L-1 visas", and "PERM (Program Electronic Review Management System)" as specific issues under immigration. Besides immigration, Microsoft also lists eight other issues in this report that are not shown. Given our interest in studying firms' responses to changes in high-skilled immigration policy in Section 5, we went through the specific issues listed in each report under immigration and determined which firms were lobbying for what. The specific issues that are listed are often bills proposed in the U.S. House and Senate. For example, H.R. 5744: Securing Knowledge, Innovation, and Leadership Act of 2006 and S. 1635: L-1 Visa Reform Act of 2004 are bills that we deemed to be relevant for high-skilled immigration.⁹

⁸ According to the Lobbying Disclosure Act, the term "lobbying activities" refers to "lobbying contacts and efforts in support of such contacts, including preparation and planning activities, research and other background work that is intended, at the time it is performed, for use in contacts, and coordination with the lobbying activities of others." The term "lobbying contact" refers instead to "any oral or written communication (including an electronic communication) to a covered executive branch official or a covered legislative branch official". Further, a lobbyist is "any individual (1) who is either employed or retained by a client for financial or other compensation; (2) whose services include more than one lobbying contact; and (3) whose lobbying activities constitute 20 percent or more of his or her services during a three-month period." Any person meeting these criteria must register as a federal lobbyist under the Lobbying Disclosure Act.

⁹ H.R. 5744, for example, included provisions for increasing the annual H-1B visa cap and revised student visa provisions. Other bills, such as H.R. 4437: Border Protection, Antiterror-

In addition to mentioning specific bills, firms also mention "H-1B visas," "L-1 visas," "high-skilled immigration," and the like in their lobbying reports. We define a firm to be lobbying for high-skilled immigration in any of these cases.¹⁰ For our analysis of firms' responses to changes in immigration policy, we also use data on applications for H-1B visas and the ethnic composition of a firm's workforce. These data are described in Section 5.

One central concern in studying the dynamics of firm lobbying is measurement error in the variable for lobbying status. Under the Lobbying Disclosure Act, lobbying firms are required to provide a good-faith estimate rounded to the nearest \$20,000 of all lobbying-related income in each six-month period. Likewise, organizations that hire lobbyists must provide a good-faith estimate rounded to the nearest \$20,000 of all lobbying-related expenditures in a six-month period. An organization that spends less than \$10,000 in any six-month period does not have to state its expenditures. If lobbying is disclosed in such cases, the figure is reported in the data as zero. Thus as long as a firm spent \$10,000 or more, lobbying status will be correctly observed. Looking at the data, average yearly lobbying expenditures for active firms are \$475,000. The mean expenditure for a firm the first time we observe them lobbying outside of the start of the sample is \$111,000. Median values are \$164,000 and \$74,000, respectively. These figures indicate that measurement error induced by reporting requirements is likely to be minimal.

We begin by establishing a number of new facts about the lobbying behavior of firms over time. We consider a balanced panel of U.S.-headquartered firms over the period 1998-2006 that have full sales and employment data. This approach allows us to abstract from the decision to take a company public as well as entry and exit into production. This results in a sample of 3,260 firms and 29,340 observations. Table 1 presents a number of descriptive statistics on this sample for all firms, as well as broken out by firms that lobby and those that do not. As mentioned above, when we match these data to our Compustat sample, we find that very few firms lobby. This is striking, as our data only contain publicly traded companies. These firms are by and large quite sizable and thus more likely than private firms to lobby.

We further find both the intensive and extensive margins of lobbying are related to firm size. The average firm that lobbies sell roughly four times more

ism, and Immigration Control Act of 2005 and S.2611: Comprehensive Immigration Reform Act of 2006, are related to immigration but do not include provisions directly related to high-skilled immigration. Bills pertaining to high-skilled immigration are detailed in the Data Appendix available from the authors. One important piece of legislation is H.R. 4818: Consolidated Appropriations Act, which in 2005 exempted up to 20,000 foreign nationals holding a master's or higher degree from the cap on H-1B visas. The bill was signed into law in December, 2004.

¹⁰Lobbying data consist of semi-annual lobbying disclosure reports and are posted online. Annual lobbying expenditures are calculated by adding mid-year totals and year-end totals. Whenever there is a discrepancy between data on income and expenditures, CRP uses information from lobbying reports on expenditure. With both the lobbying data and the patenting data described later, we invested substantial effort in identifying subsidiaries and appropriately linking them to parent firms. Data in Compustat are based on each company's fiscal year. As discussed below, we lag Compustat data by one year when merging.

than firms that do not lobby. Employment and assets are similarly three-and-a-half times and two times larger, respectively. While firms that lobby are only slightly more likely to engage in research and development (R&D), they tend to spend a significantly larger amount on R&D if they do engage in it. These results are consistent with the literature on campaign contributions, reflecting the correlation between lobbying efforts and PAC contributions.¹¹ Amongst firms that do lobby, there is a correlation of 28% between sales and lobbying expenditures and 19% between employment and lobbying expenditures. The somewhat weaker correlation between firm size and lobbying on the intensive margin relative to that on the extensive margin is suggestive of the existence of barriers to entry. Indeed, if no such barriers existed, we would expect a significantly stronger correlation between firm size and lobbying expenditures on the intensive margin.

A particularly striking feature of the data is the high degree of persistence of firm lobbying behavior over time. Given that a firm lobbied last year, the unconditional likelihood of lobbying in the current year is 92%. When we look at this figure across industries, we find very similar results, with almost all two-digit NAICS industries having a persistence rate above 80%.¹² Considering changes over time, entry and exit appear partly driven by the bi-yearly election cycle. Interestingly, entry seems to happen in the year before an election, rather than in the year of the election itself. These results suggest that firms may need to invest early in certain political outcomes. Patterns of exit, in contrast, seem to be unrelated to the election cycle.

Figure 1 plots the number of total firms lobbying as well as the total number of entries and exits in each year of our sample. Entries and exits are small relative to the overall number of firms lobbying, reflecting the high level of persistence amongst firms. The total number of firms that lobby in our sample increases steadily over time, with entries in each year regularly outnumbering exits. This pattern is consistent with the findings of Blanes i Vidal, Dracaz, and Fons-Rosen (2011), who document that total lobbying expenditures were roughly twice as large in 2006 as they were in 1998. The two facts that (i) lobbying status is highly persistent over time and (ii) lobbying is strongly associated with firm size mean that the intensive margin of lobbying dominates annual changes in lobbying expenditures. Thus, in a typical year 96% of expenditures were made by firms that lobbied in the previous year. Figure 2 plots the total amount of lobbying expenditures based on which year firms first began lobbying in the sample. The vast majority of resources spent over time are accounted for by firms that were lobbying at the beginning of the sample, and this remains true even by the end of our sample eight years later. Firms that entered and first lobbied in 1999, for example, account for a small amount of expenditures, even after several years.

¹¹See Tripathi, Ansolabehere, and Snyder (2002), Facchini, Mayda, and Mishra (2011), and Ludema, Mayda, and Mishra (2010).

¹²Igan and Mishra (2011) also find evidence of persistence in lobbying behavior in the case of financial industry lobbyists.

3 Model and Estimation Strategy

To test for the existence of up-front costs associated with beginning to lobby directly, we consider a dynamic model of firm behavior. Our approach is akin to the models used in the literature on international trade, particularly that of Roberts and Tybout (1997).¹³ The essential logic of the model is that if there are no up-front costs to beginning to lobby, one should expect firms to start and stop lobbying freely. That is, they should optimize based on today's problem and not worry about the future. If there are such costs, however, then there is an option value associated with being involved in the political process that should alter firms' inter-temporal decisions.

We begin by defining $\pi_{it}(p_t, s_{it})$ as the additional profits that firm i could make in year t if it lobbies. This level is dependent on exogenous processes p_t , such as the business cycle and political climate, and firm-level state variables s_{it} , such as the capital stock. In defining $\pi_{it}(p_t, s_{it})$ as the additional profit that a firm could make in period t if it lobbied relative to the state in which it did not lobby, the model is able to accommodate the fact that the firm has other avenues through which it can affect policy outcomes. We assume that once they begin, lobbying firms can alter the amount that they spend costlessly, making π_{it} the profit-maximizing level of additional profits.¹⁴ We further define L_{it} as an indicator variable for whether the firm lobbies in year t . $L_{it}^{(-)} = \{L_{it} \mid j = 0, 1, 2, \dots, J_i\}$ denotes the firm's lobbying history where J_i is the firm's age and $L_{it}^{(+)} = \{L_{i,t+j} \mid j \geq 0\}$ represents the firm's choice of lobbying activities in the future. The first time that firms lobby, they have to pay a one-time cost F_0 . Similarly, if the firm stopped lobbying j periods ago and now wants to lobby it has to pay the re-entry cost F_j .¹⁵

In order to account for the possibility that re-entering the process after only a few years of not lobbying is less (or more) costly than entering anew, we define the re-entry cost F_j as the expenditure a firm needs to incur if it stopped lobbying j periods ago and wants to begin again. Related, we define $\tilde{L}_{i,t-j} = \left(L_{i,t-j} \prod_{k=1}^{j-1} (1 - L_{i,t-k}) \right)$ as an indicator for whether the firm last lobbied j periods ago. Using this expression, we can then write the net period t profits for the firm as

$$R_{it} \left(L_{it}^{(-)} \right) = L_{it} \left[\pi_{it}(p_t, s_{it}) - F_0 (1 - L_{i,t-1}) - \sum_{j=2}^{J_i} (F_j - F_0) \tilde{L}_{i,t-j} \right].$$

¹³See also Dixit (1989), Baldwin and Krugman (1989), Bernard and Jensen (2004), Das, Roberts, and Tybout (2007), and Lincoln and McCallum (2011).

¹⁴We abstract from the precise mechanisms through which lobbying can increase firm profits. For empirical evidence on lobbying and profits at the firm level, see Chen, Parsley, and Yang (2010) and Igan, Mishra, and Tressel (2011).

¹⁵The model can easily be extended to include a cost of exiting. The coefficients on lagged lobbying status, ξ below, would then also be a function of these costs.

Given this expression, we can write the firm's dynamic problem. It selects the sequence $L_{it}^{(+)}$ that maximizes the expected present value of payoffs today subject to the discount rate δ . Thus the firm chooses

$$V_{it}(\Omega_{it}) = \max_{L_{it}^{(+)}} E_t \left(\sum_{j=t}^{\infty} \delta^{j-t} R_{ij} \mid \Omega_{it} \right).$$

In a dynamic programming context, we can thus write the firm's choice of whether or not to lobby today L_{it} as the value that meets the following condition

$$V_{it}(\Omega_{it}) = \max_{L_{it}} R_{it} \left(L_{it}^{(-)} \right) + \delta \cdot E_t \left\{ V_{i,t+1}(\Omega_{i,t+1}) \mid L_{it}^{(-)} \right\},$$

where $E_t(\cdot)$ is the expected future value in period t conditional on the information set Ω_{it} . Using our expression for $R_{it} \left(L_{it}^{(-)} \right)$ from above and comparing the difference in the net benefits between choosing $L_{it} = 1$ versus $L_{it} = 0$, the firm will lobby in the current period if

$$\pi_{it}(p_t, s_{it}) + \delta [E_t(V_{i,t+1}(\Omega_{i,t+1}) \mid L_{it} = 1) - E_t(V_{i,t+1}(\Omega_{i,t+1}) \mid L_{it} = 0)] \geq \quad (1)$$

$$F_0 - F_0 \cdot L_{it-1} + \sum_{j=2}^{J_i} (F_j - F_0) \tilde{L}_{i,t-j}.$$

Here the term $\delta [E_t(V_{i,t+1} \mid L_{it} = 1) - E_t(V_{i,t+1} \mid L_{it} = 0)]$ represents the option value associated with being able to lobby tomorrow without having to pay the up-front entry cost, which is dependent on expectations about future benefits. We can use the expression in (1) to derive an estimating equation to test for the existence of up-front costs that are associated with beginning to lobby. In order to simplify notation, we first define

$$\pi_{it}^* \equiv \pi_{it}(p_t, s_{it}) + \delta [E_t(V_{i,t+1}(\Omega_{i,t+1}) \mid L_{it} = 1) - E_t(V_{i,t+1}(\Omega_{i,t+1}) \mid L_{it} = 0)].$$

This provides an expression for the expected benefits that the firm plans to receive if it lobbies today. We can then write the firm's choice as a binary decision problem

$$L_{it} = \begin{cases} 1 & \pi_{it}^* - F_0 + F_0 \cdot L_{it-1} + \sum_{j=2}^{J_i} (F_0 - F_j) \tilde{L}_{i,t-j} \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

This expression collapses if there are no entry or exit costs, and the firm lobbies if $\pi_{it}(p_t, s_{it}) \geq 0$. That is, the firm decides to lobby solely based on what is most profitable today. If the factors that determine π_{it} are properly accounted for, we should observe an absence of state dependence in lobbying status.

To proceed with estimation, we need to develop an estimate of $\pi_{it}^* - F_0$. These terms are likely determined by a number of factors, including firm characteristics such as firm size and industry status as well as external time-varying factors such as the election cycle. We thus parameterize $\pi_{it}^* - F_0$ with the functional form

$$\pi_{it}^* - F_0 \approx \mu_i + X'_{it} \beta + \phi_t + \varepsilon_{it}.$$

The μ_i term controls for unobserved time-invariant characteristics that induce persistence in lobbying. These effects will account for a significant amount of the variation in firms' industry choices and geographic locations. ϕ_t similarly controls for year effects, such as the business cycle and changes in the overall political environment. The term $X'_{it}\beta$ accounts for shifts in firm characteristics, including the logarithms of sales, assets, employees, research and development expenditures, and the level of industry imports. These variables will allow us to account for changes in firm size and issues related to intellectual property rights. We lag these variables by one period to avoid issues of simultaneity. It is worth noting that the variables in $\mu_i + X'_{it}\beta + \phi_t + \varepsilon_{it}$ will affect the firm's choice to lobby based both on how they influence the current level of profits as well as the option value associated with having already established a presence in the policy making process. Thus, even if lobbying may not yield significant returns today, it may be wise to begin lobbying as an investment in future political outcomes.

This approximation then leads to the estimating equation

$$L_{it} = \mu_i + X'_{it}\beta + \xi \cdot L_{it-1} + \zeta_2 \cdot \tilde{L}_{i,t-2} + \zeta_3 \cdot \tilde{L}_{i,t-3} + \phi_t + \varepsilon_{it}, \quad (2)$$

where $\xi = F_0$ and $\zeta_j = F_0 - F_j$. Here we assume that re-entry costs are substantively different than F_0 for only three years. Our primary object of interest is the coefficient ξ . If ξ is estimated to be substantially different than zero, our results would suggest that the up-front costs of beginning to lobby are empirically relevant for determining firms' lobbying decisions over time.

4 Model Estimation Results

Table 2 presents results from estimating the specification in (2) with several approaches. The dependent variable in each regression is an indicator for whether firm i lobbied in year t . As a first pass, column (1) presents simple correlation results for the firm characteristics most closely associated with lobbying status. The regression includes controls for three-digit NAICS industry, state, and year fixed effects. State and industry fixed effects correspond to the primary one for the firm, although operations may exist elsewhere. Standard errors are clustered at the level of the firm in all specifications. Consistent with our results in Table 1, we find statistically significant evidence of an association between lobbying status and sales, employment, and research and development expenditures. The level of industry imports, measured at the four-digit level, demonstrate a positive relationship but are not statistically significant.¹⁶

¹⁶We exclude large conglomerate firms in Compustat in our baseline specification due to the difficulty of assigning them to particular industries. Our results are robust to their inclusion by defining these firms as constituting their own industry. Similar to other studies, we code a minimal value of R&D expenditures for those observations with missing or zero values. We find comparable results when excluding this covariate from the estimations.

Our main estimations are found in columns (2)-(8). We use the dynamic panel data estimator of Blundell and Bond (1998) in columns (2)-(6) and consider an OLS fixed effects estimator in columns (7)-(8).¹⁷ In each of our specifications, we find evidence in favor of the existence of up-front costs to beginning to lobby. The coefficients on lagged lobbying status are economically important and statistically significant. Controlling for other factors, lobbying in the prior period raises the probability that a firm lobbies in the current period by 88%. The coefficients are also similar across specifications, suggesting that our approach is robust. Our baseline specification is found in column (2). Interestingly, firm sales are still a statistically significant predictor of firm lobbying status even after controlling for past lobbying status, albeit with a smaller magnitude. In column (3) we include additional controls for prior lobbying status, finding that the costs of re-entering and beginning to lobby again are fairly similar to the costs of entering anew. Column (4) alternatively drops the firm-specific controls $X'_{it}\beta$ in equation (2). The results in both columns yield comparable results to the baseline approach in column (2).

One concern with the approach that we have taken in columns (2)-(4) is whether the specification fully accounts for free-rider behavior in lobbying. Specifically, separately including firm and time fixed effects in our parameterization may miss changes in industry dynamics over time. In columns (5) and (6), we test the robustness of our approach to these concerns. Column (5) reports estimations that include a measure of total lobbying expenditures by other public companies in firm i 's three-digit NAICS industry. We include a lagged measure of other-firm industry lobbying, and the results are similar when using a current measure. In column (6) we include interacted industry-year fixed effects at the two-digit NAICS industry classification level. This will allow us to capture differences in time effects across industries. In both specifications, we find similar results for the coefficient on lagged lobbying status. Including both the measure of other-firm industry lobbying and industry-year fixed effects also yields similar results. As an additional robustness check, we found little change in the coefficient on lagged lobbying status when controlling for a firm's within-industry rank in terms of sales or employment over time. This rank is calculated at the two-digit NAICS level. Dropping firms in industries that were the most lobbying-intensive or concentrated in terms of sales also yielded similar results.

To get an alternative perspective on these results, we also estimate equation (2) with a within fixed effects estimator. This approach is attractive in that it dispenses with some of the assumptions inherent in using the estimator of Blundell and Bond (1998).¹⁸ Given the length of the panel ($T = 9$), however, we expect the coefficient on lagged lobbying status to be biased downward due

¹⁷We use lags of order two as instruments. As a check on the validity of the GMM approach, we considered the specification test suggested by Arellano and Bond (1991). These tests fail to suggest any problems with this approach. Roodman (2006) reviews dynamic panel data models at length.

¹⁸Bernard and Jensen (2004) discuss the econometric challenges associated with estimating a similar specification in the context of identifying the determinants of export status.

to the problems raised by Nickell (1981). The results are reported in columns (7) and (8). The first approach considers lagged lobbying status whereas the second includes additional controls for prior lobbying status. While giving a smaller coefficient on lagged lobbying status, both specifications still find statistically significant evidence in favor of the existence of up-front costs associated with beginning to lobby. We also find statistically significant results with the estimator of Arellano and Bond (1991), although these results are more sensitive across variants. Appendix Table 3 reports the results from a number of these robustness checks.

5 Evidence From Immigration Policy

To get a better sense of the nature of these entry costs and how they affect the dynamics of firm lobbying behavior, we next study lobbying related to a particular change in U.S. legislation: the expiration of the expansion of the cap for H-1B temporary work visas that occurred in 2004. Looking at how firms respond to policy shifts offers us another window on the question of whether or not there are barriers to entry for firms that wish to lobby. Indeed if these barriers are sufficiently large, the entry costs should discourage firms from beginning to lobby in response to changes in the policy environment. Given the lack of work on the political economy of immigration at the firm level, we begin by describing the policy change in detail and documenting stylized facts about lobbying for immigration for the firms in our sample. We then proceed with our main analyses of how firms responded to these policy changes and how our findings corroborate our conclusions from the estimations of the model.

The H-1B is the primary visa that governs temporary high-skilled immigration to the United States for work in science and engineering. Immigrant workers are an important source of science and engineering talent for the United States; in the 2000 Census, immigrants accounted for 24% and 47% of all scientists and engineers with bachelors and doctorate educations, respectively. Immigrant scientists and engineers also accounted for more than half of the net increase in the U.S. science and engineering labor force since 1995 in the Current Population Survey (CPS). Many U.S. firms are very dependent upon immigrants for their science and engineering workers.¹⁹

Since the Immigration Act of 1990 established the program, there has been a limit to the number of H-1B visas that can be issued per year. While other

¹⁹Related papers include Lowell and Christian (2000), Lowell (2000, 2001), Stephan and Levin (2001), Matloff (2003), Zavodny (2003), Kirkegaard (2005), Miano (2005), Borjas (2006), Rosenzweig (2006), Chellaraj, Maskus, and Mattoo (2008), Hanson (2009), Hanson, Scheve, and Slaughter (2009), Tambe and Hitt (2009), Mithas and Lucas (2010), Hunt and Gauthier-Loiselle (2010), Kerr and Lincoln (2010), Kato and Sparber (2011), Hunt (2011), Foley and Kerr (2011), Peri (2011), and Borjas and Doran (2011). Freeman (1971) and Ryoo and Rosen (2004) provide classic discussions of the science and engineering labor market.

aspects of the program have remained relatively stable, this cap has changed substantially. The cap has also been the subject of significant public debate and lobbying efforts. Over the period 1995-2006, there were more than 3,000 news articles about the visa cap. Bill Gates and other prominent industry executives have repeatedly testified before Congress in favor of the cap's expansion, while domestic groups opposed to H-1B workers have lobbied strongly against it. Executives of high-tech firms often argue that higher H-1B admissions are necessary to keep U.S. businesses competitive, to spur innovation and growth, and to keep firms from shifting their operations abroad. Detractors, on the other hand, argue that the program displaces American workers, lowers wages, and discourages on-the-job training.

Figure 3 plots the evolution of the numerical limit on H-1B visa issuances over time. The cap was initially set at 65,000 visas until legislation in 1998 and 2000 significantly expanded the program to 195,000 visas.²⁰ These changes expired in 2004, and the cap fell back to 65,000 visas. This limit has been binding since, despite being raised by 20,000 in 2006 through an "advanced degree" exemption. Figure 4 similarly plots the number of months that it took to reach the cap in each year. Following Congressional pressure and an audit by the firm KPMG, U.S. Citizenship and Immigration Services (USCIS) started announcing in 2000 when the cap for fiscal year had been reached. Coinciding with the downturn in high-technology sectors in the early 2000s, the cap took 12 months to reach in 2001 and was not reached at all in 2002 and 2003. This changed abruptly, however, in 2004 when the limit fell back to 65,000 visas.

We use the 2004 change in visa allocations to analyze how firms sensitive to the H-1B program adjusted their lobbying behavior at the intensive versus extensive margins. The 2004 change is an attractive laboratory for several reasons. Most important, the expiration offers a natural experiment to study the determinants of lobbying behavior. One of the challenges in the empirical work on lobbying has been to establish a causal link between lobbying behavior and policy changes (e.g., Facchini, Mayda, and Mishra 2011; Igan, Mishra, and Tressel 2011). Our empirical strategy allows us to better isolate a causal link between changes in policy environments and lobbying behavior. The expiration of legislation also isolates changes in policy environments in exogenous ways that are often not possible with the enactment of legislation (e.g., Romer and Romer 2010). In our context, the date of the expiration was set several years before (when the cap was raised), and the issue was not central to firms during the three preceding years due to full or excess visa supply. When the cap returned to the lower limit, firms had strong reason to believe that lobbying on the H-1B issue could influence policy choices. Firm lobbying was an important factor in

²⁰These two expansions were contained in the American Competitiveness and Workforce Improvement Act of 1998 and the American Competitiveness in the Twenty-First Century Act of 2000. See Reksulak et al. (2006) and Public Law 105-777, Division C, American Competitiveness and Workforce Improvement Law, Section 416(c)(2). The cap is only for new H-1B issuances; applications for renewals for another three years are exempt from this limit. Universities, government research laboratories, and certain nonprofit organizations were exempted from this cap in 2001.

the increases in the cap level enacted in 1998 and 2000.²¹

Finally, studying this policy experiment offers the advantage that we are able to measure firm sensitivity to high-skilled immigration issues in a precise way that is difficult for many issues. As we discuss next, we use information from each firm’s Labor Condition Applications (LCAs) and the ethnic composition of its science and engineering workforce for these measures. These specialized dependencies allow for falsification tests and extensions that may not be feasible for lobbying related to issues where the main determinant is simply firm size. Our expectation is that we should see a significant shift in the intensive margin towards lobbying for high-skilled immigration but little response in the extensive margin if up-front costs for lobbying pose a large enough barrier to entry.

Our first metric of dependency is based upon LCAs. To hire a foreign worker under the H-1B program, an employer must first submit an LCA to the U.S. Department of Labor (DOL). The LCA lists a specific person the firm wishes to hire, and the primary purpose of the LCA is to demonstrate that the worker in question will be employed in accordance with U.S. law. The second step in the application process after the LCA is approved is to file a petition with the USCIS, which makes the ultimate determination about the visa application.²² While data on the H-1B visa issuances are not available, the DOL releases micro-records on all applications it receives, numbering 1.8 million for 2001-2006. These records include firm names, and we match the firm names on LCA records to the firms in our Compustat database. This provides us a measure of firms’ demand for H-1B visas, independent of whether or not a visa is actually granted. Firms seeking a large number of H-1B visas are likely to be very sensitive to the downward adjustment of the cap and have reason to lobby for its expansion.²³

Our second metric uses information on the ethnic composition of firms’ science and engineering employees. Firms that employ many immigrant scientists and engineers are likely to be very sensitive to the H-1B program. To estimate this dependency, we obtained data on each firm’s patents and inventors from the U.S. Patent and Trademark Office (USPTO). While we are unable to directly discern immigrant status for inventors, we can discern the probable ethnicities of inventors through their names. The basic approach uses the

²¹Adjustments to the H-1B cap affect firms in important ways, and this impact is likely to be similar in magnitude to many other lobbying efforts (i.e., the issue is important to the firm but the complete fate of the firm does not rest solely on this policy choice). Back-of-the-envelope calculations using the CPS suggest that raising the H-1B cap by 65,000 visas would increase the U.S. science and engineering labor force by about 1.2%, holding everything else constant. This increase would be about half of the median annual growth rate of science and engineering workers, calculated at 2.7% during the period. Kerr and Lincoln (2010) analyze how H-1B population levels affect dependent firms’ invention rates.

²²Different employers can simultaneously seek visas for the same prospective employee, although firms generally make applications only on behalf of committed workers due to the time and legal fees involved. The application fee for a firm with 26 or more full-time employees was \$2,320 in 2008.

²³LCAs can list more than one potential immigrant employee; the average across our sample is 2.5 employees per LCA record. Our reported results use LCA record counts; we find very similar elasticities and precision when using employee-weighted record counts.

fact that inventors with the surnames Chang or Wang are more likely to be of Chinese ethnicity than of Hispanic ethnicity, while the opposite is true for Martinez and Rodriguez. We use two commercial ethnic databases that were originally developed for marketing purposes, and the name matching algorithms have been extensively customized for the USPTO data. The match rate is 99% and is verified through several quality assurance exercises.²⁴ The H-1B program draws primarily from India and China, which account for over half of all visas during our sample period, and the great majority of those related to science and engineering. Firms that employ a large number of Chinese and Indian scientists and engineers are again likely to be very sensitive to the cap's level.

We develop a panel data set of 171 major firms over 2001-2006 for whom we can construct these measures of dependency on the H-1B visa. This period presents an interesting time to study lobbying behavior, as the main identifying variation during the period corresponds to the expiration of the expansion of the H-1B cap expansion in 2004. The time frame is also partially dictated by the availability of LCA and lobbying data.

Our sample construction requires that each firm appears in the Compustat database in all six years, is headquartered in the United States, and that it accounts for at least 0.05% of total U.S. domestic patents. Reflecting the extreme skewness of the firm size distribution, this group of 171 firms accounts for more than \$3 trillion of worldwide production annually despite the modest size of our sample. Gabaix (2010) notes the particular influence of very large firms on aggregate economic outcomes, and our work continues in this vein to describe their efforts to shape the political process. Table 3 presents a number of descriptive statistics on these firms. These firms are significantly larger and more likely to lobby overall than our initial sample described in Table 1. About 70% of these firms lobby in at least one year over the period 2001-2006, and 20% lobby for immigration. Reflecting the greater share of high-tech firms in this sample, roughly three-quarters of firms that lobby for immigration specifically lobby for high-skill immigration. On average 18% of firms' patents are developed by inventors of Indian and Chinese ethnicity, and the typical firm files for 94 LCA applications annually.²⁵

We begin our analysis in Table 4. These estimations present simple regression evidence documenting that firms that are more dependent on high-skilled immigration tend to lobby more on this topic. The results are similar when we consider a more generic indicator for lobbying for any immigration-related issue, reflecting the fact that the majority of the firms in our sample that lobby for immigration list high-skilled immigration in the specific issues sections of their reports. The specific links to our two measures of dependency, however, are sharper for lobbying specific to high-skilled immigration. As a falsification exercise, there are no significant associations between LCA applications or Chi-

²⁴This methodology is further explained in Kerr (2007, 2008) and Kerr and Lincoln (2010). Kerr and Lincoln (2010) also describe the LCA data in further detail.

²⁵Our core estimations have 846 observations, which is a slight decline from a maximum sample size of 855 observations from crossing 171 firms and five years (once lagging is introduced); the dropped observations are due to missing covariates.

nese and Indian patenting and lobbying for non-immigration related issues like Clean Air and Water, Consumer Product Safety, or Retirement.

Figure 5 illustrates how firms responded to the cap expiration. We find suggestive evidence that lobbying efforts for high-skilled immigration issues intensified once the H-1B cap was reduced in 2004 and became binding again for the private sector. Figure 5 plots the fraction of firms lobbying for high-skilled immigration and the ratio of new H-1B issuances to the cap. These two measures track each other closely, with the fraction of firms lobbying for immigration issues doubling from 6% to 12% between 2003 and 2004. Our data further suggest that these adjustments were significantly larger by firms that were already lobbying. Although only half of the firms that lobbied for high-skilled immigration in 2004 previously lobbied for the issue in 2003, all of them had lobbied for at least one issue in the prior year. Indeed, there is no firm-year observation in which the firm lobbied for high-skilled immigration and did not lobby in the prior year for some other issue. All of the adjustments among these major patenting firms in response to the policy change were intensive margin adjustments, indicative of substantial barriers to entry in lobbying that we found evidence of in the larger Compustat sample.

Table 5 provides regression evidence on firms' responses to these policy changes using the specification

$$L_{it} = \mu_i + X'_{it}\beta + \delta \cdot \ln HS_{i,t_0} \cdot CapBinds_t + \phi_t + \varepsilon_{it}. \quad (3)$$

This approach quantifies how firms adjusted their lobbying efforts after the large decline in available visas in 2004, and in particular how this adjustment depends on a firm's dependence on high-skilled immigrants. L_{it} is an indicator function for whether firm i lobbied in year t , X_{it} is a set of firm-level characteristics, HS_{i,t_0} represents a firm's initial dependence on high-skilled immigration, and $CapBinds_t$ equals one for the years 2004-2006 and is zero otherwise. The covariates in X_{it} include the logarithms of firm sales, R&D expenditures, and industry level imports as well as types of technologies patented by the firm and the geographic region of the patented technologies. We lag each of these characteristics by one year to avoid issues of simultaneity, and we find similar results using contemporaneous values or excluding the controls entirely. μ_i denotes a vector of firm fixed effects which controls for unobservable firm-specific characteristics that do not vary over time. ϕ_t accounts for global shocks that affect all the firms equally across different time periods.

The HS_{i,t_0} dependencies can be high, exceeding the shares in the general population. As an example, over 30% of Intel's U.S. patents during this period come from Chinese and Indian workers. We measure our dependencies using 2001 data only so that they are predetermined, initial values at the start of the sample period. The log transformation ensures that outliers in dependency do not overly influence our results. The firm and year fixed effects control for the main effects of the interaction $\ln HS_{i,t_0} \cdot CapBinds_t$. Standard errors are clustered at the cross-sectional level of the firm.

Table 5 reports estimations of equation (3) for indicators of high-skilled immigration lobbying and lobbying overall. We find strong evidence of a shift

in 2004 in lobbying for immigration. Reported results focus on lobbying for high-skilled immigration, and results are similar for overall immigration. Firms with a higher number of LCA applications and greater ethnic patenting by Chinese and Indian inventors in 2001 lobbied more intensively for high-skilled immigration-related issues when the H-1B cap became binding in 2004-2006. A firm with a 10% higher dependence on foreign-born workers is 0.3%-0.4% more likely to lobby for immigration issues during years 2004-2006. At the same time, when we consider overall lobbying status as the dependent variable we find no evidence of extensive margin adjustments to these policy changes. This pattern suggests that the increased lobbying for high-skilled immigration came from firms who were already lobbying adjusting the issues over which they lobbied. We interpret these shifts in lobbying behavior towards high-skilled immigration issues as evidence for adjustments along the intensive margin, which we further investigate below.

This response is precisely measured. Moreover, the difference in coefficient magnitude between columns (1) and (2) is to be expected, as the LCA metric represents actual demand for H-1B visas while the ethnic patenting measure is more of a general determinant of visa demand. The former measure will be somewhat sharper as visas are used for other occupations like accountants and consultants, too. Reassuringly, these measured effects are also extremely localized to immigration lobbying. Unreported estimations repeat the regressions in columns (1) and (2) for other lobbying issues. Among the twenty top issues on which firms lobby, the only other issue with an economically or statistically significant coefficient when using the LCA dependency is Science/Technology, which is understandable given its link to the H-1B program. Only two issues are linked to the ethnic patenting measure: Consumer Issues/Safety/Protection with a positive elasticity and Financial Institutions/Investments/Securities with a negative elasticity. These cases appear spurious. Overall, this is a very localized response given that these twenty top issues include lobbying on other labor issues (e.g., unions), patent policy, and trade.

Table 6 further explores firms' intensive-margin adjustments. We restrict the sample to those firms which lobbied for at least one issue in every year. The results shown in columns (1) and (2) are very similar to those in Table 5. This confirms that new firms did not enter into lobbying in response to the policy change. We instead find that all of the response comes from existing firms who have already undertaken the set-up costs (e.g. establishing an in-house lobbying department, establishing contacts with legislators) commencing lobbying for high-skilled immigration issues. These results are consistent with our findings in Section 4.

Columns (3) and (4) take this test one step further. The model makes the prediction that if a firm is already lobbying, it adjusts the amount and direction of the lobbying it conducts freely and in a profit-optimizing manner. This would suggest that once a firm is lobbying, it should shift to lobbying for high-skilled immigration if it is important to the firm independent of the overall size of the firm's lobbying efforts. Some firms like General Electric and Microsoft lobby the government on many issues. Over the 2001-2006 period, more than 70 firms in

our sample lobbied on at least ten issues in one year, and 11 firms lobbied on 25 or more issues at once. It follows from our model in Section 3 that the elasticity of response among lobbying firms should depend only on the importance of the H-1B issue, and not on the scale of overall lobbying activity. A firm only lobbying on a few issues should adjust as much as a similarly dependent firm lobbying on many issues.

We test this prediction in columns (3) and (4) among the firms that always lobby. We create an indicator variable for a firm being above or below the median 2001 lobbying expenditures for this group of firms that always lobbies. We then interact our core regressors with this indicator variable. The main effects now quantify the response evident among firms that always lobby but conduct smaller amounts of lobbying than their peers. The interaction quantifies the differential effect for firms that conduct the greatest lobbying efforts. At the bottom of the table, we provide the linear combination of these two coefficients, which represents the total elasticity for the upper half of the sample. In the LCA case, the elasticity declines slightly in the upper half, while the elasticity rises slightly in the ethnic patenting case. Both differences, however, are extremely small and have t-statistics less than 0.5. The same pattern is again evident when using broader lobbying related to immigration. These findings strongly suggest that the choice to lobby on an issue, once lobbying, depends on the importance of the issue and not the overall scale of lobbying being undertaken by the firm. Adjusting the issues for which the firm lobbies appears to be relatively easy.

Table 7 provides a tabular summary of these effects. The left-hand columns tabulate traits where we split firms into ten groups based upon whether they lobbied or not in the 2001-2003 period and based upon the strength of their LCA demand. The latter is measured as quintiles based upon each firm's average LCA usage during the sample period. The right-hand columns provide a similar decomposition using the ethnic patenting based dependency. Panel A describes the observation count in each bin. By definition, there are an equal number of firms in each dependency quintile, but the share of firms that lobbied during 2001-2003 is not restricted to be the same. Firms with the lowest dependencies are fairly evenly split on whether or not they lobbied in 2001-2003, while the share lobbying in 2001-2003 increases substantially in the highest dependency bins. Panel B gives the average values of the dependency metric in each bin. These dependencies increase as one moves down the quintile bins, and the dependencies within each row are very similar between firms that lobbied in 2001-2003 versus those that did not. This pattern is by construction and gives a sense of the relative importance of the high-skilled immigration topic across bins.

Panel C gives the share of firms that lobby at least once during the 2001-2003 period on high-skilled immigration issues. By definition, these shares are zero for the firms that did not lobby at all during 2001-2003. Among those that did lobby on at least one issue, the share lobbying on high-skilled immigration is very small until it jumps to over 25% in the highest dependency quintile. Panel D provides the share lobbying on high-skilled immigration in at least one year during the 2004-2006 period after the cap becomes binding. The picture

is striking: among firms that did not lobby in 2001-2003, there is virtually no entry into high-skilled immigration lobbying. On the other hand, some firms who lobbied during 2001-2003 on other issues start lobbying on high-skilled immigration even though their dependency is very low. Looking back at Panel B, this latter group has only 2%-3% of the dependency of the firms in the highest quintile who had not lobbied before and continued to not lobby (e.g., 4.2 vs. 127.6 and 2.4 vs. 103.5). The final set of rows confirm this. Panel E tabulates the fraction of firms who start lobbying for high-skilled immigration topics during 2004-2006; this share is calculated over the pool of firms in each bin who did not lobby on high-skilled immigration topics during 2001-2003. Looking down the rows in Panel E, entry is closely tied to dependency; comparing the column pairs, entry depends strongly on prior lobbying efforts.²⁶

This lack of a response along the extensive margin, along with the strong intensive margin adjustments, demonstrates that barriers to entry played a significant role in shaping how firms responded to these policy changes. If the costs to beginning to lobby had not played a substantial role, we would have expected significant adjustments along the intensive margin as well as the extensive margin for dependent firms. This further suggests that these costs also play a large role in shaping the responses of firms to changes in the political environment.

While not our central focus, these results also shed light on a debate within the political economy literature. Some authors have suggested that lobbyists are specialists that focus primarily on a particular set of issues. An alternate view is that lobbyists can influence a wide range of issues, within the constraints of whom they know. Our results suggest that firms can shift the set of issues that they lobby for relatively easily. This provides suggestive evidence for the ‘access’ hypothesis as opposed to the ‘expertise’ hypothesis. These results are consistent with the recent work of Bertrand, Bombardini, and Trebbi (2011) and Blanes i Vidal, Dracaz, and Fons-Rosen (2011).

²⁶The one firm that began lobbying in 2004-2006 for high-skilled immigration that did not lobby on any issue in 2001-2003 is Nike. Nike began lobbying in 2004 with five issues not related to immigration (e.g., sports, trade). Nike began lobbying on high-skilled immigration in 2005. There are no cases where a firm lobbied for high-skilled immigration during 2001-2003 and stopped lobbying for the topic during 2004-2006.

Firms are not required to list the amount they spend for specific topics. One measure of intensity is the number of years that specific topics are listed by firms, and the patterns using this metric provide a similar story. Of the ten firms that lobbied on high-skilled immigration topics during 2001-2003, only Motorola lobbied for the topic in more years during 2001-2003 than in 2004-2006 (three years vs. two years). Texas Instruments is the only firm reporting lobbying for high-skilled immigration in every year; eight firms lobbied for high-skilled immigration in every year during 2004-2006. When looking among firms that began lobbying regarding high-skilled immigration in 2004-2006, the dependency level of firms lobbying in all three years is ten-fold higher than the dependency level of firms that lobby for the topic in one or two years.

6 Conclusions

While lobbying has been the subject of intense debate in the recent past, there is little systematic empirical evidence on lobbying behavior at the firm level. This paper makes a contribution towards filling this gap. In our panel of publicly-traded, U.S.-headquartered firms over the period 1998-2006, three stylized facts emerge: (i) few firms lobby, (ii) lobbying is strongly associated with firm size, and (iii) lobbying behavior exhibits a high degree of persistence. We develop a dynamic model of firm behavior to rationalize these findings, and show that the existence of entry costs can explain all three findings. Our estimations of the model find significant evidence for the existence of these costs across a number of approaches. We test the predictions of the model using a natural experiment in the area of immigration policy—the expiration of the increased cap on H-1B visas that occurred in 2004. Using a panel data set of 171 major firms over 2001-2006 with detailed information on lobbying activities, we find that firms dependent on high-skilled immigration adjusted their lobbying behavior towards immigration-specific issues in response to the shock. While the response was very flexible among firms already lobbying, we do not find adjustments on the extensive margin—i.e., firms that were not lobbying on any issue prior to the shock did not start lobbying in response to the shock.

These results support the existence of significant barriers to entry in the process of lobbying. These costs can substantially limit the extensive margin response by firms to changes in policy environments. This rigidity due to entry costs makes the set of firms engaged in the lobbying process relatively stable for many issues. These costs can thus influence the policy making process and the choices made through the set of actors that lobby on issues. The composition of firms that are advocating on a specific issue are likely to be a non-representative sample of business interests generally. As the high-skilled immigration case illustrates, the group of lobbyists may not even include the voices of all of the most influenced firms if entry barriers are large enough. Moreover, both firms and politicians will be able to reasonably forecast who will support or oppose certain policies among those already engaged in the lobbying process. This mechanism may induce persistence in political and economic institutions. The limited changes in the set of firms lobbying coupled with the long-term relationships that firms build with policy makers may also raise the prospects of regulatory capture.

A better understanding of the role that firms play in policy determination through their lobbying efforts is an essential research objective. Continuing with the high-skilled immigration example, there are only a handful of studies that consider the role of firms in the immigration process or the consequences of policy choices on those firms. The size of this literature is somewhat surprising given the fact that the H-1B program centers on a firm-sponsored visa: the firm identifies the worker it wishes to hire, applies for a visa on their behalf, potentially applies for a green card on behalf of the worker, and generally has a guaranteed period of time during which the worker is tied to the firm. Not

surprisingly, firms attempt to define the rules of these procedures. Moreover, they lobby extensively for the capacity to make as many of these hires as they wish. Our understanding of high-skilled immigration policies requires an appreciation of the firm's roles in policy determination. The same is certainly true, if not more so, in other high profile issues like government support to automobile companies and airlines, the strength and scope of regulations on financial services, and so on. The existence of entry costs to lobbying—and their impact on firm dynamics and the composition of firms lobbying on policy issues—is an important ingredient for future theoretical and empirical work in this vein.

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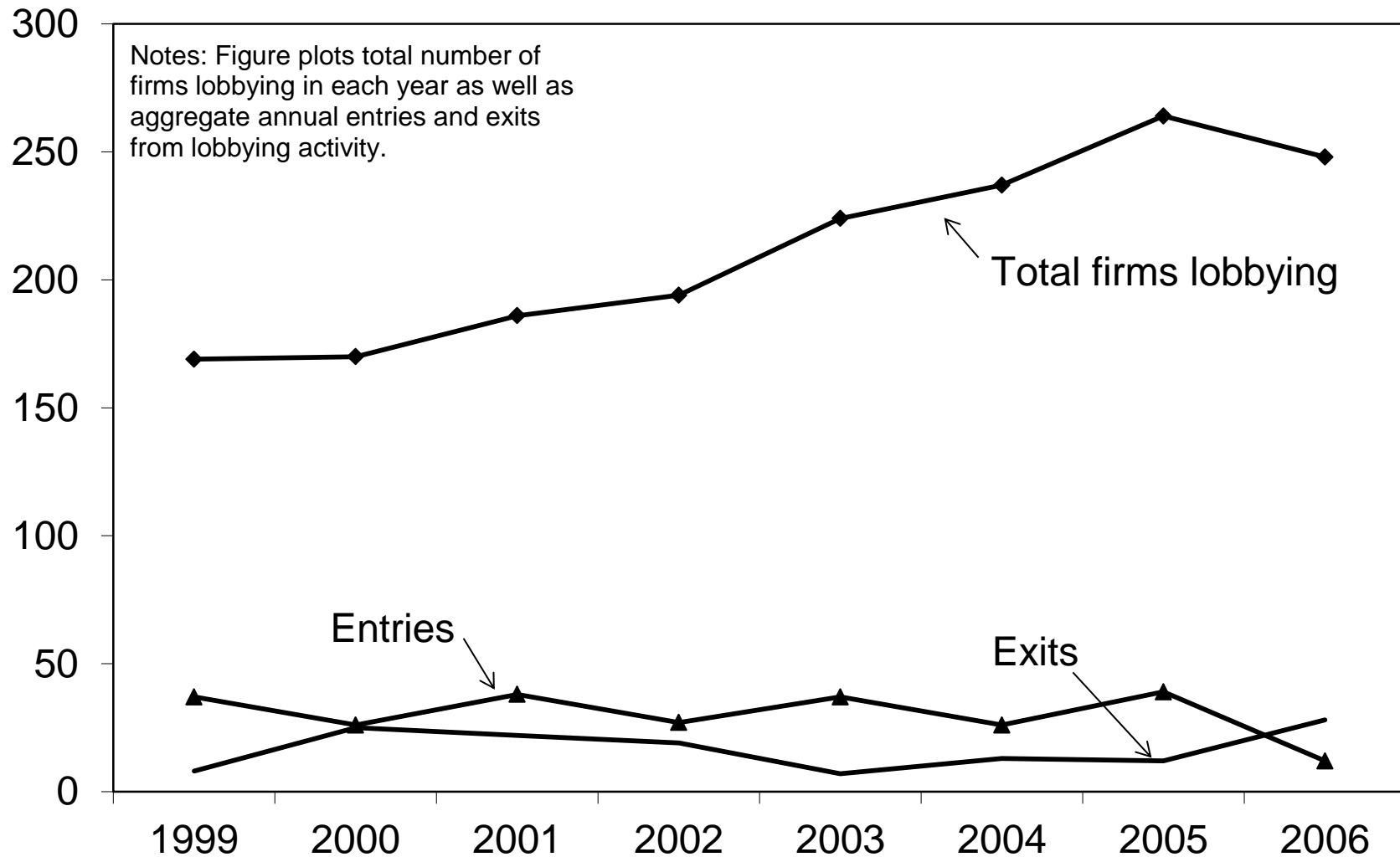
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Fig. 1: Entries, Exits, & Total Firms Lobbying



**Fig. 2: Aggregate Annual Expenditures
by Entry Cohort**

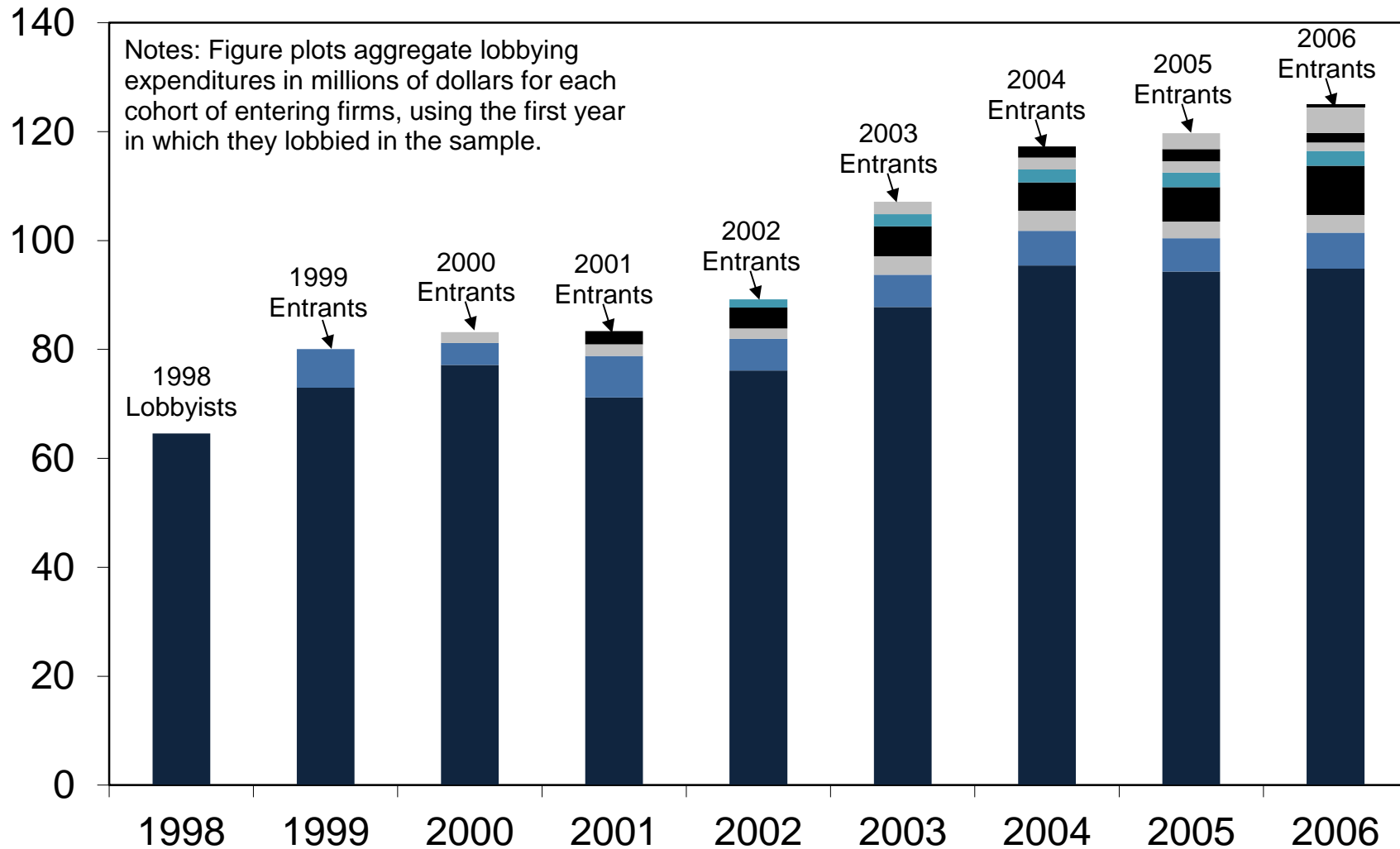


Fig. 3: Evolution of H-1B Visa Cap

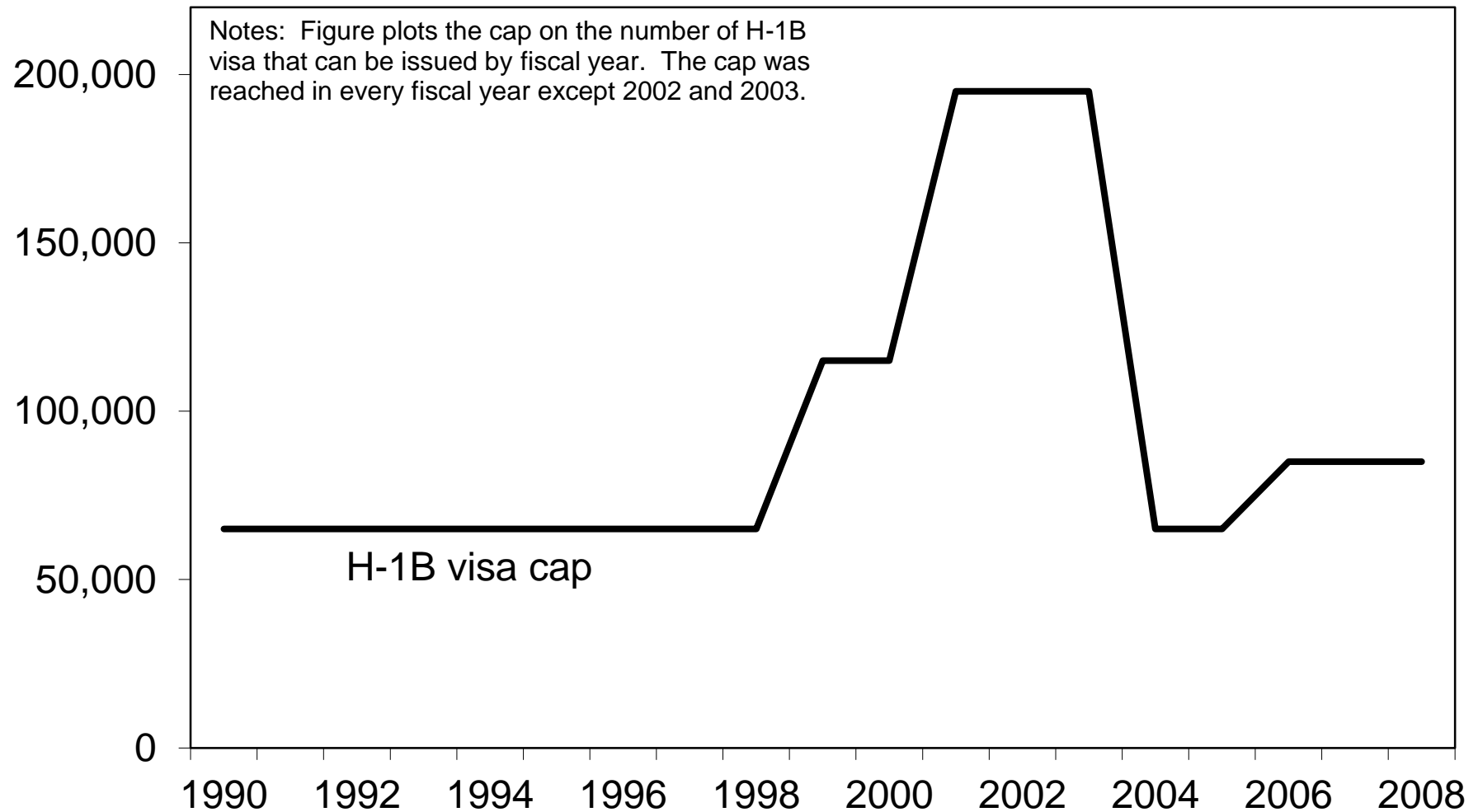


Fig. 4: Months to Reach H-1B Visa Cap

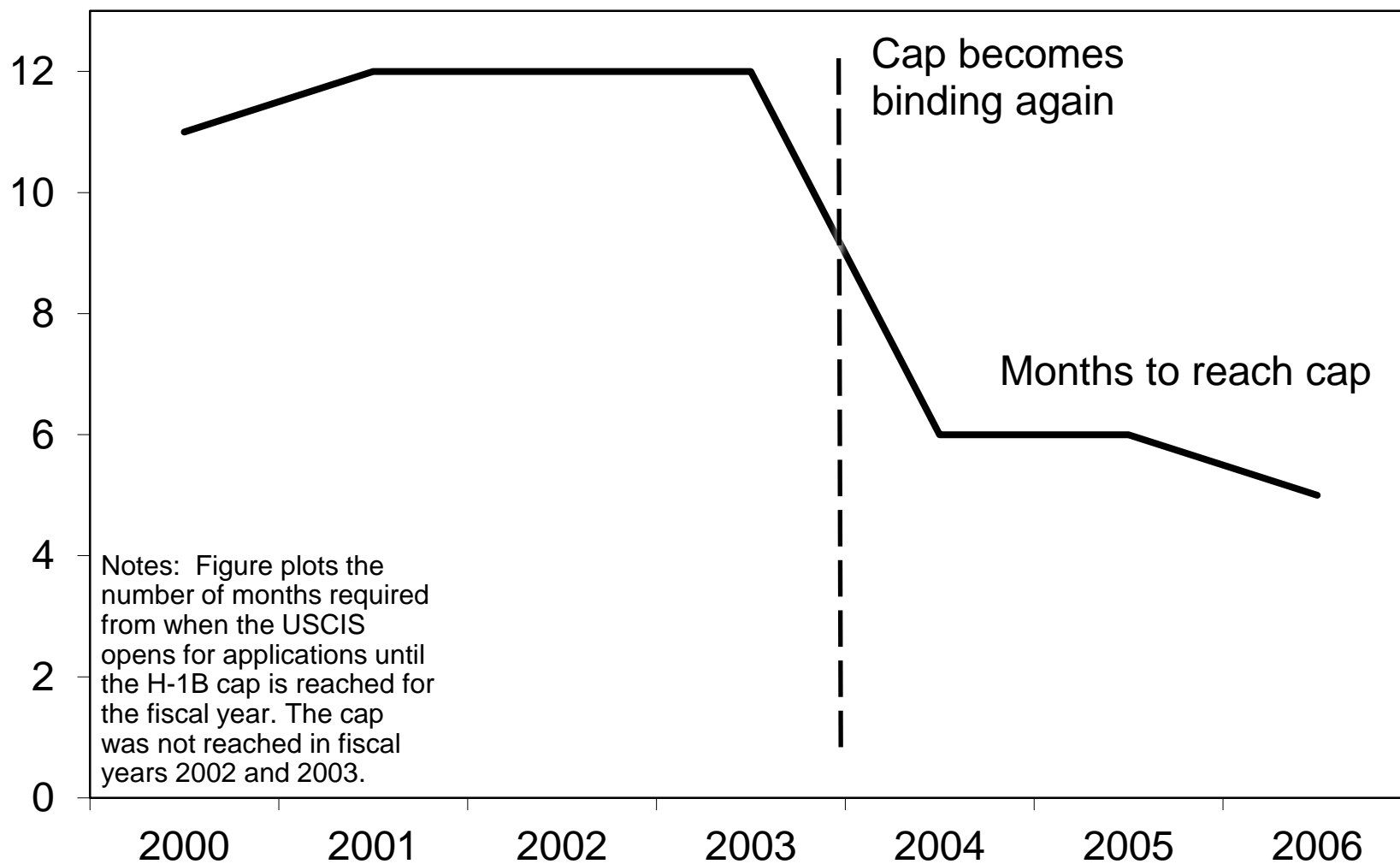


Fig. 5: H-1B Visas and Lobbying Behavior

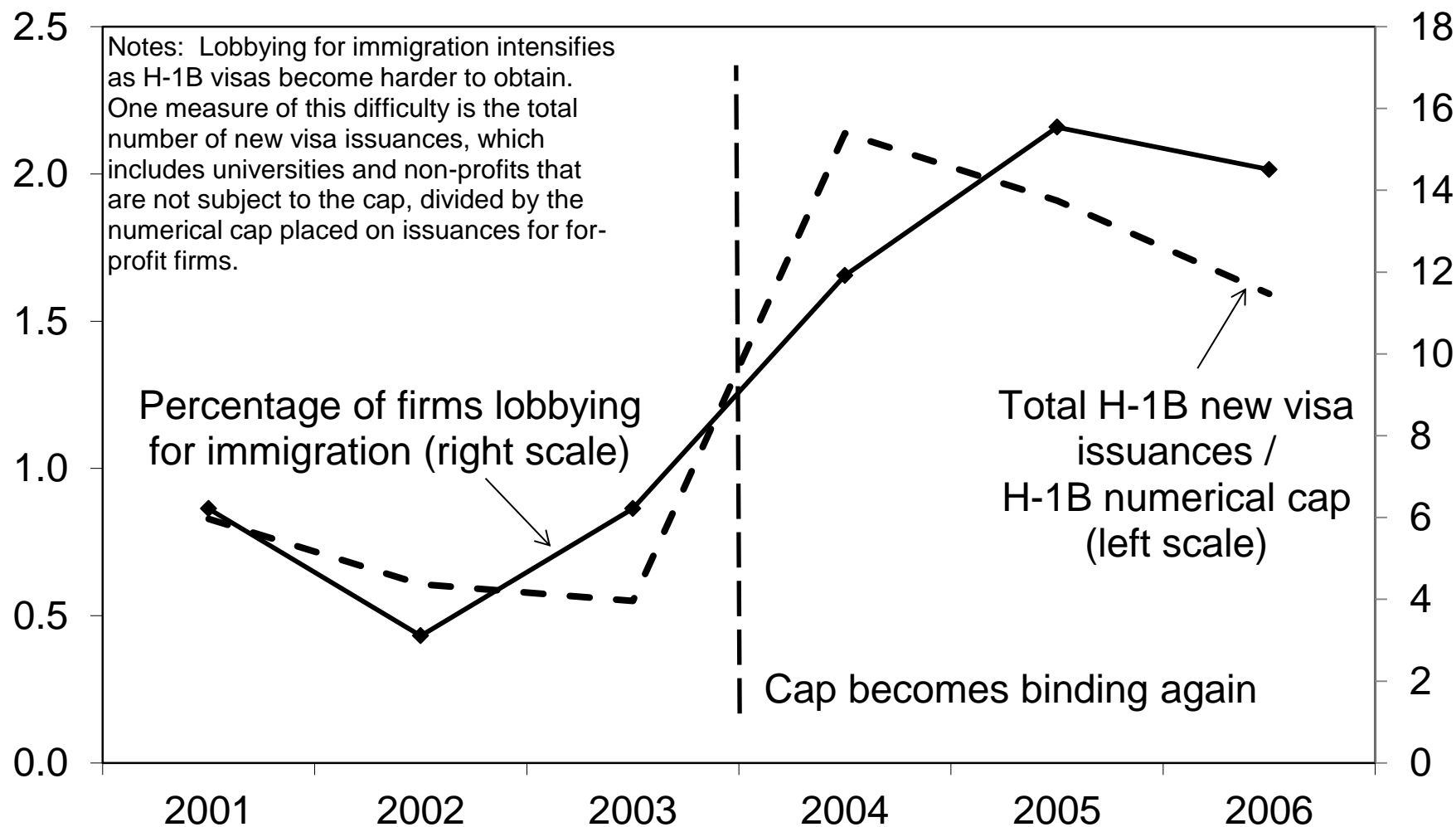


Table 1: Descriptive Statistics for Firm Panel

	All Firms	Non-Lobbying Firms	Lobbying Firms
Annual Sales (\$m)	1,823 (8,046)	1,423 (7,179)	5,407 (12,995)
Annual Employment (k)	8 (38)	7 (37)	23 (45)
Annual Assets (\$m)	4,046 (30,732)	3,726 (31,764)	6,914 (18,896)
Share of Firms Engaging in R&D (%)	44 (50)	43 (49)	53 (50)
Annual R&D Expenditures (\$m)	91 (462)	50 (297)	1,874 (8,245)
Median Lobbying Expenditures (\$m)			0.164
Average Lobbying Expenditures (\$m)			0.475 (0.892)
Share of Firms that Lobby in a Given Year (%)	6.2		
Share of Firms that Ever Lobby (%)	10.0		
Number of Firms	3,260	2,933	327
Observations	29,340	26,397	2,943

Notes: The sample includes 3,260 firms over 1998-2006 for a total of 29,340 observations. Firm operations data are taken from Compustat. Annual R&D expenditures figures are only for firms that perform some R&D. Median and Average Lobbying Expenditures figures are similarly only for firms that lobby. Dollar amounts are in constant 1998 dollars. Standard deviations are denoted in parentheses.

Table 2: Determinants of Lobbying Participation by Publicly-Listed U.S. Firms

Dependent Variable is an (0,1) Indicator Variable for Lobbying Participation by Firm								
	OLS with State, Industry, and Year FE	Blundell-Bond (1998) Dynamic Panel Estimator					OLS with Firm and Year FE	OLS with Firm and Year FE
		Firm and Year FE	Firm and Year FE	Firm and Year FE	Firm and Year FE	Firm and Industry-Year FE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(0,1) Lobbied Last Year		0.8848 (0.0432)	0.8448 (0.0376)	0.8846 (0.0442)	0.8766 (0.0427)	0.8810 (0.0434)	0.4429 (0.0232)	0.3385 (0.0279)
(0,1) Last Lobbied Two Years Ago			0.1557 (0.1565)					0.0347 (0.0458)
(0,1) Last Lobbied Three Years Ago			0.0693 (0.0773)					0.0184 (0.0478)
Log Sales	0.0071 (0.0023)	0.0046 (0.0021)	0.0031 (0.0024)		0.0020 (0.0022)	0.0034 (0.0021)	0.0005 (0.0006)	0.0000 (0.0007)
Log Employment	0.0144 (0.0031)	-0.0042 (0.0038)	-0.0010 (0.0050)		0.0017 (0.0038)	-0.0021 (0.0040)	0.0016 (0.0015)	0.0022 (0.0019)
Log R&D Expenditures	0.0065 (0.0013)	0.0004 (0.0009)	-0.0004 (0.0010)		-0.0010 (0.0010)	-0.0003 (0.0012)	0.0010 (0.0009)	0.0003 (0.0009)
Log Industry Imports	0.0005 (0.0017)	0.0002 (0.0003)	0.0006 (0.0003)		0.0001 (0.0003)	0.0000 (0.0010)	0.0006 (0.0007)	0.0003 (0.0008)
Log Lobbying by Other Firms in Industry					0.0056 (0.0024)			

Notes: Regressions estimate the determinants of lobbying participation by publicly-listed U.S. firms. Column 2 is our baseline approach using the Blundell-Bond (1998) Dynamic Panel Estimator. Firm-specific characteristics are lagged by one year to avoid issues of simultaneity. Industry x year fixed effects are defined at the two-digit level of the NAICS industry classification. Regressions include 26,080 observations from 3,260 firms, are unweighted, and cluster standard errors by firm. Columns 3 and 8 have 19,560 observations.

Table 3: Descriptive Statistics for Firm Lobbying Panel on High-Skilled Immigration

	All Firms	Firms Not Lobbying for High-Skilled Immigration Issues	Firms Lobbying for High-Skilled Immigration Issues
<u>Firm Operations</u>			
Annual Sales (\$m)	14,680 (31,725)	11,561 (25,555)	32,073 (51,334)
Annual Employment (k)	44 (67)	38 (64)	77 (76)
Annual Assets (\$m)	22,604 (65,144)	20,085 (68,196)	36,651 (41,899)
Annual R&D Expenditures (\$m)	753 (1,431)	579 (1,281)	1,720 (1,798)
<u>Patenting Efforts</u>			
Annual Patent Count	236 (482)	152 (222)	704 (1,001)
Annual U.S. Domestic Patents by Chinese and Indian Inventors	43 (99)	24 (40)	151 (206)
<u>Immigration Visa Applications</u>			
Annual Labor Condition Application Count	94 (258)	49 (80)	345 (576)
<u>Lobbying Efforts (% of Firms)</u>			
Lobbying for Any Issue	62		
Lobbying for Any Issue, at least one year	70		
Lobbying for Immigration	10		
Lobbying for Immigration, at least one year	20		
Lobbying for High-Skilled Immigration	7		
Lobbying for High-Skilled Immigration, at least one year	15		
Average Annual Lobbying Expenditure (\$m)	1.3		
Median Annual Lobbying Expenditure (\$m)	0.2		

Notes: The sample includes 171 U.S.-headquartered firms over 2001-2006 for a total of 1,026 observations. A list of these firms is in Appendix Table 2. We collect lobbying efforts from mandated lobbying reports filed with Congress biannually. Patent data are from the United States Patent and Trademark Office. We identify inventors of Chinese and Indian ethnicity through inventor names. Labor Condition Applications (LCA) are an initial step in the H-1B application process. We collect these LCA records from the Department of Labor. Firm operations data are taken from Compustat. Dollar amounts are in constant 1998 dollars. Standard deviations are denoted in parentheses.

Table 4: Determinants of Lobbying for High-Skill Immigration Issues

	(0,1) Indicator for High-Skilled Immigration Lobbying			
	(1)	(2)	(3)	(4)
Log Sales	0.039 (0.020)	0.022 (0.018)	0.011 (0.015)	0.019 (0.024)
Log Employment	-0.011 (0.021)	-0.008 (0.019)	-0.001 (0.017)	0.007 (0.026)
Log R&D Expenditures		0.028 (0.012)	-0.003 (0.013)	-0.005 (0.019)
Log Industry Imports			-0.001 (0.002)	-0.006 (0.008)
Log US Chinese & Indian Patents			0.020 (0.008)	0.021 (0.009)
Log LCA Applications			0.031 (0.013)	0.025 (0.013)
Controls	Basic	Basic	Basic	Extended

Notes: Estimations consider determinants of lobbying efforts over 2001-2006. Firm-specific characteristics are lagged by one year to avoid issues of simultaneity. Basic controls include year fixed effects. Extended controls further include industry-year fixed effects, controls for types of technologies patented, and controls for geographic regions of patenting activity. Regressions include 846 observations, are unweighted, and cluster standard errors by firm.

Table 5: Entry into High-Skilled Immigration Lobbying with Binding H-1B Cap

	(0,1) High-Skilled Immigration Lobbying		(0,1) Any Issue Lobbying	
	(1)	(2)	(3)	(4)
(0,1) Binding H-1B Issuances Cap x Log Firm LCA Application Counts in 2001	0.043 (0.014)		-0.008 (0.009)	
(0,1) Binding H-1B Issuances Cap x Log Firm Chinese & Indian Patenting in 2001		0.029 (0.012)		-0.019 (0.014)
Firm and Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Covariates	Yes	Yes	Yes	Yes

Notes: See Table 4. Estimations consider entry into lobbying for immigration issues when the H-1B visa issuances cap became binding for the private sector. Firm dependencies are measured in 2001 and interacted with an indicator variable for sample years when the cap was reached (2004-2006). Main effects are absorbed into the firm and year fixed effects, respectively. Firm covariates include variables reported in Table 3 (e.g., lagged sales, lagged R&D expenditures, types of technologies patented, and geographic regions of patenting activity). Regressions include 846 observations, are unweighted, and cluster standard errors by firm.

Table 6: Lobbying Adjustments among Persistent Lobbying Firms

	(0,1) High-Skilled Immigration Lobbying			
	(1)	(2)	(3)	(4)
(0,1) Binding H-1B Issuances Cap x Log Firm LCA Application Counts in 2001	0.042 (0.020)		0.054 (0.021)	
(0,1) Binding H-1B Issuances Cap x Log Firm Chinese & Indian Patenting in 2001		0.030 (0.019)		0.025 (0.019)
(0,1) Binding H-1B Issuances Cap x Log Firm LCA Application Counts in 2001 x (0,1) Above Median Lobbying Firm			-0.013 (0.020)	
(0,1) Binding H-1B Issuances Cap x Log Firm Chinese & Indian Patenting in 2001 x (0,1) Above Median Lobbying Firm				0.008 (0.022)
Firm and Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Covariates	Yes	Yes	Yes	Yes
Estimated Elasticity for Above Median Firm			0.042 (0.021)	0.033 (0.022)

Notes: See Table 5. Sample is restricted to firms that lobby for at least one issue in every year, for 443 observations.

Table 7: Lobbying Adjustments to High-Skilled Immigration across Distribution

	LCA-Based Dependency			Ethnic Patenting-Based Dependency	
	Firms Not Lobbying on Any Issue 2001-2003	Firms Lobbying on 1+ Issue 2001-2003		Firms Not Lobbying on Any Issue 2001-2003	Firms Lobbying on 1+ Issue 2001-2003
	(1)	(2)		(3)	(4)
A. Observation Count					
Least Dependent	114	96	Least Dependent	72	138
2nd Quintile	78	126	2nd Quintile	108	96
3rd Quintile	72	132	3rd Quintile	84	120
4th Quintile	72	138	4th Quintile	72	132
Most Dependent	24	174	Most Dependent	24	180
B. Average Dependency Measure					
Least Dependent	4.6	4.2	Least Dependent	2.2	2.4
2nd Quintile	15.8	14.6	2nd Quintile	6.9	6.6
3rd Quintile	26.6	29.9	3rd Quintile	12.5	13.8
4th Quintile	62.1	66.7	4th Quintile	26.2	31.3
Most Dependent	127.6	401.3	Most Dependent	103.5	172.4
C. Share Lobbying for High-Skilled Immigration Issues 2001-2003					
Least Dependent	0.00	0.00	Least Dependent	0.00	0.00
2nd Quintile	0.00	0.00	2nd Quintile	0.00	0.00
3rd Quintile	0.00	0.05	3rd Quintile	0.00	0.05
4th Quintile	0.00	0.04	4th Quintile	0.00	0.05
Most Dependent	0.00	0.28	Most Dependent	0.00	0.27
D. Share Lobbying for High-Skilled Immigration Issues 2004-2006					
Least Dependent	0.00	0.06	Least Dependent	0.00	0.13
2nd Quintile	0.00	0.10	2nd Quintile	0.04	0.06
3rd Quintile	0.00	0.14	3rd Quintile	0.00	0.05
4th Quintile	0.08	0.22	4th Quintile	0.00	0.23
Most Dependent	0.00	0.48	Most Dependent	0.00	0.50
E. Share Entering Lobbying for High-Skilled Immigration Issues Among Those Not Already Lobbying for the Issue					
Least Dependent	0.00	0.06	Least Dependent	0.00	0.13
2nd Quintile	0.00	0.10	2nd Quintile	0.06	0.06
3rd Quintile	0.00	0.10	3rd Quintile	0.00	0.00
4th Quintile	0.08	0.18	4th Quintile	0.00	0.19
Most Dependent	0.00	0.29	Most Dependent	0.00	0.32

Notes: Table summarizes lobbying dynamics regarding high-skilled immigration. Columns 1 and 2 tabulate traits where we split firms into ten groups based upon whether they lobbied or not in the 2001-2003 period and upon the strength of their LCA demand. The latter is measured as quintiles based upon each firm's average LCA usage during the sample period. Columns 3 and 4 provide a similar decomposition using the ethnic patenting dependency. Panel A provides the observation count in each bin. Panel B gives the average values of the dependency in each group. Panel C gives the share of firms that lobby at least once during the 2001-2003 period on high-skilled immigration issues. Panel D provides the share lobbying on high-skilled immigration in at least one year during the 2004-2006 period after the cap becomes binding. Panel E tabulates the share of firms who start lobbying for high-skilled immigration topics during 2004-2006; this share is calculated over the pool of firms in each bin who did not lobby on high-skilled immigration topics during 2001-2003.

Appendix Figure 1: Sample Lobbying Report for Microsoft

00000343475

Clerk of the House of Representatives
Legislative Resource Center
B-106 Cannon Building
Washington, DC 20515

Secretary of the Senate
Office of Public Records
232 Hart Building
Washington, DC 20510

RECEIVED
SECRETARY OF THE SENATE
PUBLIC RECORDS

05 AUG 15 PM 12: 53

00000343475

LOBBYING REPORT

Lobbying Disclosure Act of 1995 (Section 5) - All Filers Are Required to Complete This Page

1. Registrant Name Microsoft Corporation			
2. Registrant Address <input type="checkbox"/> Check if different than previously reported Address 1401 Eye Street, NW Suite 500 City Washington State/Zip (or Country) DC 20005			
3. Principal Place of Business (if different from line 2) City Redmond State/Zip (or Country) WA 98052			
4. Contact Name Karin Gess	Telephone (202) 263-5900	E-mail (optional) kgess@microsoft.com	5. Senate ID # 25204-12
7. Client Name <input checked="" type="checkbox"/> Self			6. House ID # 31174000

TYPE OF REPORT 8. Year 2005 Midyear (January 1-June 30) ☒ OR Year End (July 1-December 31) ☐

9. Check if this filing amends a previously filed version of this report ☐

10. Check if this is a Termination Report ☐ >> Termination Date _____

11. No Lobbying Activity ☐

INCOME OR EXPENSES - Complete Either Line 12 OR Line 13

<p>12. Lobbying Firms</p> <p>INCOME relating to lobbying activities for this reporting period was:</p> <p>Less than \$10,000 <input type="checkbox"/></p> <p>\$10,000 or more <input type="checkbox"/> >> \$ _____ (income (nearest \$20,000))</p> <p>Provide a good faith estimate, rounded to the nearest \$20,000 of all lobbying related income from the client (including all payments to the registrant by any other entity for lobbying activities on behalf of the client).</p>	<p>13. Organizations</p> <p>EXPENSES relating to lobbying activities for this reporting period were:</p> <p>Less than \$10,000 <input type="checkbox"/></p> <p>\$10,000 or more <input checked="" type="checkbox"/> >> \$ <u>\$4,540,000.00</u> Expenses (nearest \$20,000)</p> <p>14. REPORTING METHOD. Check box to indicate expense accounting method. See instructions for description of options.</p> <p><input type="checkbox"/> Method A. Reporting amounts using LDA definitions only</p> <p><input type="checkbox"/> Method B. Reporting amounts under section 6033(b)(3) of the Internal Revenue Code</p> <p><input checked="" type="checkbox"/> Method C. Reporting amounts under section 162(e) of the Internal Revenue Code</p>
--	--

Signature _____ Date 8/12/2005

Printed Name and Title Jack Krumholz - Managing Dir. of Federal Gov't Affairs Page 1 of 19

Appendix Figure 1: Sample Lobbying Report for Microsoft, continued

00000343484

Registrant Name: Microsoft Corporation

Client Name: Microsoft Corporation

LOBBYING ACTIVITY. Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code IMM (one per page)

16. Specific Lobbying issues

H-1B visas

L-1 visas

Program Electronic Review Management System (PERM) regulations

17. House(s) of Congress and Federal agencies contacted

☐ Check if None

Department of Commerce

Department of Labor

Executive Office of the President

House of Representatives

Senate

18. Name of each individual who acted as a lobbyist in this issue area

Name	Covered Official Position (if applicable)	New
Buckner, Marland		No
Corley, Scott		Yes
Gelman, Matt		No
Houston, James		No
Ingle, Ed	White House	No
Krumholtz, Jack		No
Otto, Lori	Senate Republican Policy Committee	No

19. Interest of each foreign entity in the specific issues listed on line 16 above

☒ Check if None

Signature _____ Date 8/12/2005

Printed Name and Title Jack Krumholtz - Managing Dir. of Federal Gov't Affairs Page 10 of 19

Appendix Table 1: List of Lobbying Issues

Accounting	Economics/Economic Development	Pharmacy
Advertising	Education	Postal
Aerospace	Energy/Nuclear	Railroads
Agriculture	Environmental/Superfund	Real Estate/Land Use/Conservation
Alcohol & Drug Abuse	Family Issues/Abortion/Adoption	Religion
Animals	Firearms/Guns/Ammunition	Retirement
Apparel/Clothing Industry/Textiles	Financial Institutions/Investments/Securities	Roads/Highway
Arts/Entertainment	Food Industry (Safety, Labeling, etc.)	Science/Technology
Automotive Industry	Foreign Relations	Small Business
Aviation/Aircraft/Airlines	Fuel/Gas/Oil	Sports/Athletics
Banking	Gaming/Gambling/Casino	Taxation/Internal Revenue Code
Bankruptcy	Government Issues	Telecommunications
Beverage Industry	Health Issues	Tobacco
Budget/Appropriations	Housing	Torts
Chemicals/Chemical Industry	Immigration	Trade (Domestic & Foreign)
Civil Rights/Civil Liberties	Indian/Native American Affairs	Transportation
Clean Air & Water (Quality)	Insurance	Travel/Tourism
Commodities (Big Ticket)	Labor Issues/Antitrust/Workplace	Trucking/Shipping
Communications/Broadcasting/Radio/TV	Law Enforcement/Crime/Criminal Justice	Urban Development/Municipalities
Computer Industry	Manufacturing	Unemployment
Consumer Issues/Safety/Protection	Marine/Maritime/Boating/Fisheries	Utilities
Constitution	Media (Information/Publishing)	Veterans
Copyright/Patent/Trademark	Medical/Disease Research/Clinical Labs	Waste (Hazardous/Solid/Interstate/Nuclear)
Defense	Medicare/Medicaid	Welfare
District of Columbia	Minting/Money/Gold Standard	
Disaster Planning/Emergencies	Natural Resources	

Source: Senate's Office of Public Records (SOPR).

Appendix Table 2: List of Firms in Sample

Abbott Laboratories	Caliper Technologies	General Motors Corporation
ADC Telecommunications	Callaway Golf Company	General Signal
Adtran Inc	Caterpillar Inc	Gentex Corporation
Affymetrix Inc	Ciena Corporation	Goodyear Tire and Rubber Company
Agere Systems	Cirrus Logic Inc	Halliburton Company
Agilent Technologies	Cisco Systems Inc	Harman International Industries Inc
Air Products and Chemicals Inc	CNH America	Harris Corporation
Alcoa Inc	Colgate-Palmolive Company	Hill-Rom Services Inc
Align Technology Inc	Conexant Systems Inc	Honeywell International
Allergan Inc	Corning Inc	Hewlett Packard-Compaq
Altera Corporation	Cypress Semiconductor	Hubbell Inc
Advanced Micro Devices	Dana Corporation	Human Genome Sciences Inc
American Express	Deere and Company	IBM Corporation
Amgen Inc	Dell	IGT
Amkor Technology	Delphi Corporation	Illinois Tool Works Inc
Analog Devices Inc	Digimarc Corporation	Imation Corporation
Andrew Corporation	Dow Chemical Company	Incyte
Apple Computer Inc	Du Pont	Integrated Device Technology Inc
Applied Materials Inc	Eastman Chemical Company	Intel Corporation
Arvin Meritor Technology	Eastman Kodak Company	Interdigital Technology Corporation
Advanced Technology Materials	Eaton Corporation	Intersil Americas Inc
Avery Dennison Corporation	Ecolab Inc	International Rectifier Corporation
Baker Hughes Inc	Eli Lilly and Company	Invitrogen Corporation
Baxter International	Emerson Electric Company	Isis Pharmaceuticals
BEA Systems	Exxon Mobil	ITT Manufacturing Enterprises Inc
Becton, Dickinson and Company	Fairchild Semiconductor	Johnson & Johnson
Black and Decker Inc	Federal Mogul Worldwide	JDS Uniphase Corporation
Boeing Company	Finisar Corporation	Kimberly Clark Worldwide Inc
Borg Warner Inc	First Data Corporation	KLA-Tencor Technologies Corporation
Bristol-Myers Squibb Company	Ford Motor Company	Lam Research Corporation
Broadcom Corporation	FormFactor Inc	Lattice Semiconductor Corporation
Brocade Communications Systems	Garmin Limited	Lear Corporation
Brunswick Corporation	Gateway Inc	Lexmark International Inc
Cabot Microelectronics	General Electric Company	Lincoln Global Inc
Cadence Design Systems Inc	Genentech Inc	Lockheed Martin Corporation

Appendix Table 2: List of Firms in Sample, Continued

LSI Logic Corporation	Schlumberger Technology
Masco Corporation	Seagate Technology Inc
Mattel Inc	Semitool Inc
Medtronic Inc	Sepracor Inc
Merck and Company	Shuffle Master Inc
Micron Technology	Silicon Laboratories
Microsoft Corporation	Skyworks Solutions Inc
Millennium Pharmaceuticals	Sonoco
Molex Inc	Sprint-Nextel
Motorola Inc	Steris Inc
National Instruments	St Jude Medical
National Semiconductor	Sun Microsystems Inc
NCR Corporation	Symyx Technologies
Nike Inc	Synopsys Inc
Nordson Corporation	Tektronix Inc
Novellus Systems Inc	Tessera Inc
Nvidia Corporation	Texas Instruments Inc
ON Semiconductor	3Com
Oracle Corporation	3M
Parker-Hannifin	Tyco Electronics Corporation
Pfizer Inc	Unisys Corporation
Altria Group	United Technologies Corporation
Pitney Bowes Inc	United Parcel Service
Playtex Products Inc	Visteon
PPG Industries	Weatherford International
Praxair S T Technology Inc	Western Digital Corporation
Proctor and Gamble Company	Weyerhaeuser Company
Qualcomm Inc	Whirlpool Corporation
Qwest Communications International Inc	Wolverine Worldwide Inc
Rambus Inc	Wyeth
Raytheon Company	Xerox Corporation
Rockwell Automation Technologies	Xilinx Inc
Rohm and Haas Company	Zymogenetics Inc

Appendix Table 3: Determinants of Lobbying Status

	(0,1) Indicator Variable for Lobbying Participation by Firm				
	Baseline: Blundell-Bond (1998) Model (Col. 2, Table 2)	Arellano-Bond (1991) Estimator	Baseline with Control for Firm's Empl. Rank in Industry	Baseline with Industry-Year FE and Other Firm Lobbying Covariate	Baseline Excl. Mining, Utilities, Information, and Finance Industries
	(1)	(2)	(3)	(4)	(5)
(0,1) Lobbied Last Year	0.8848 (0.0432)	0.5245 (0.1816)	0.8837 (0.0438)	0.8749 (0.0416)	0.8823 (0.0488)
Log Sales	0.0046 (0.0021)	0.0026 (0.0045)	0.0037 (0.0019)	0.0035 (0.0021)	0.0046 (0.0026)
Log Employment	-0.0042 (0.0038)	-0.0098 (0.0168)	-0.0027 (0.0035)	-0.0012 (0.0039)	-0.0076 (0.0049)
Log R&D Expenditure	0.0004 (0.0009)	-0.0030 (0.0094)	0.0004 (0.0008)	-0.0012 (0.0014)	0.0021 (0.0013)
Log Industry Imports	0.0002 (0.0003)	-0.0018 (0.0032)	0.0005 (0.0005)	-0.0018 (0.0013)	-0.0005 (0.0006)
Within-Industry Employment Rank (*100)			-0.0014 (0.0028)		
Log Lobbying by Other Firms in Industry				0.0079 (0.0038)	

Notes: See Table 2.