

Ex Post Lobbying

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Nearly half of all lobbying activity targeting specific bills between 1998 and 2012 happened after the Congress passed legislation, yet existing theories of lobbying generally fail to account for lobbying that occurs after a bill is passed. I argue that ex post lobbying aims to influence the distribution of particularistic benefits that will arise from legislation by targeting regulatory rule-making processes. I develop a model that describes lobbying as a collective action problem among interest groups, who must trade off between spending money to lobby for a bill's passage and spending money to lobby over the details of its implementation. The implications of the model suggest that bills with high proportions of particularistic provisions draw more ex post lobbying and that trade associations and larger firms bear a disproportionately large share of the ex ante lobbying burden. Empirical analysis of lobbying reports is consistent with these predictions.

Understanding the law-making process and the forces that influence the nature of policies is crucial to assessing the quality of representation in democratic governments. Since James Madison's famous words in *The Federalist Papers*, the debate over the extent to which special interest groups should be free versus constrained in their attempts to influence elected representatives has been at the center of this discussion. Scholars have spent copious amounts of time trying to understand the different tools that interest groups employ to influence public policy and the effectiveness of those tools (Baumgartner et al. 2009; Verba, Schlozman, and Brady 1995). Campaign contributions, issue advocacy, and grassroots-level mobilization are all ways that interest groups attempt to influence the policy process (Hall and Wayman 1990; Schlozman, Verba, and Brady 2012; Wright 1985).

At the heart of American interest group politics is lobbying. Interest groups lobby intensively to influence policy, and total spending on lobbying easily outpaces campaign contributions. During the 2009–10 election cycle, total political action committee (PAC) contributions to candidates amounted to \$433 million, while spending on lobbying activities during the same period amounted to \$7 billion. The total federal lobbying spending for 2012 alone was \$3.3 billion, and the total number of registered federal lobbyists was over 12,000.¹ Ansolabehere, Snyder, and Tripathi

(2002) find that, for firms engaging in campaign contributions as well as lobbying, the ratio of their lobbying expenditures to PAC contributions is about 10 to 1. Extensive evidence shows that lobbying is the most important interest group activity that influences government policies (Baron 2006; Baumgartner et al. 2009; de Figueiredo and Richter 2014; Drutman 2015; Gais and Walker 1991; Milyo 2002).

In this article, I focus on an important but rarely studied aspect of lobbying: timing. Understanding special interest groups' decision making regarding when to lobby is important because it sheds light on how interest groups allocate their resources across different stages of the policy-making process (Grossmann and Pyle 2013; Holyoke 2003). Interest groups face decisions at every stage, from a bill's introduction to its implementation, regarding whether and whom to lobby (Austen-Smith and Wright 1994; Baumgartner and Leech 1996; Boehmke, Gailmard, and Patty 2006; Denzau and Munger 1986; Hall and Wayman 1990; Hojnacki and Kimball 1998; Kollman 1997). Despite their differing explanations for why interest groups engage in lobbying, existing theories of lobbying commonly assume that the majority of lobbying activities occur before Congress votes on a bill (Austen-Smith 1993, 1995; Austen-Smith and Wright 1992; Dekel, Jackson, and Wolinsky 2009; Groseclose and Snyder 1996; Hall and Deardorff 2006; Hansen 1991; Lohmann 1995), and theoretical models of lobbying often assume that pay-

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1. These statistics are from Center for Responsive Politics (<http://www.OpenSecrets.org>).

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offs for interest groups are fully realized immediately or nearly immediately after congressional voting.

My analysis of over 600,000 lobbying disclosure reports filed from 1998 through 2012 shows that these theories fail to explain a significant amount of lobbying activity. When I set the threshold date at the final vote by Congress (i.e., a vote on a conference report), 40% of lobbying activity that targets bills signed into law occurs after the bills' passage and over 50% of ex post lobbying targeted members of Congress. The significant amount of ex post lobbying implies that interest groups allocate substantial resources to lobbying Congress to influence the implementation stages of the policy-making process. This finding is starkly different from the description of interest groups' lobbying activities in the existing literature. The majority of scholars argue that interest groups are most active and have the strongest influence at the committee stage, as that is when the majority of the bills' contents are being drafted (Austen-Smith 1993; Hall and Wayman 1990; Hojnacki and Kimball 1998; Kollman 1997; Wright 1990).

Alternatively, some studies have explored interest groups' activities in the rule-making process by targeting federal agencies directly (Boehmke, Gailmard, and Patty 2006, 2013; Carpenter 2002; Haeder and Yackee 2015; Kerwin and Furlong 2008; McKay and Yackee 2007; Yackee and Yackee 2006). In contrast, I demonstrate that a substantial amount of resources are devoted to influencing implementation of bills and that almost half of the targets at the ex post lobbying stage are legislators. These findings raise interesting questions regarding how interest groups design their lobbying strategies and influence congressional oversight on agencies during the rule-making process (Hall and Miler 2008).

In my explanation of incidences of ex post lobbying, I begin by positing that each piece of legislation can be characterized by its degree of collective versus particularistic goods (Mayhew 1974; Volden and Wiseman 2007). The collective/particularistic dimension determines whether an industry as a whole enjoys benefits from legislation it supports or bears the costs of legislation it opposes. Some legislation, such as national security-related bills, is inherently more collective because benefits from those bills tend to be public goods. Other legislation provides more opportunities for individuals and groups to benefit from particularistic goods due to their inherent natures, such as industry-specific tax breaks and import quotas, and to the amount of discretion that Congress leaves for federal agencies and bureaucracies to complete the details of legislation (Gordon and Hafer 2007; Noll 1983).

Many pieces of legislation provide opportunities to enjoy particularistic benefits by providing only a general framework

and not specifying details. For example, even the 2,300-page Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank, hereafter) left most of the significant decision making to the Securities and Exchange Commission (SEC) and other agencies by including more than 300 rule-making requirements. Therefore, groups exert ex post lobbying effort to claim rents on bills' particularistic provisions when the bills contain a higher proportion of uncertainty about actual implementation.²

The significant amount of ex post lobbying implies that there is a classic collective action problem among interest groups. Although ex ante lobbying is crucial to secure an interest group's desired result at the bill passage stage, there are incentives for groups that support the bill to sit back at the ex ante stage and enjoy the collective benefits that bill passage generates without bearing any costs. Ex post lobbying provides a chance for those who are inactive in the ex ante lobbying stage to claim a share of the particularistic benefits from government policies once the bill becomes law. I develop a theoretical model to study these trade-offs. The analyzed results of the model imply that bills with relatively high proportions of particularistic provisions will draw a higher proportion of ex post lobbying, while interest groups with more resources within the sector are most likely to engage in ex ante lobbying. Analysis of the lobbying reports data set yields empirical patterns that are consistent with these predictions.

This article makes three notable contributions to the extant literature on lobbying and special interest groups. First, it sheds light on the importance of the timing of lobbying activity, which is crucial to understanding interest groups' motivations and strategies. Second, it adds important nuances to the scholarly debate over ways to determine the proverbial "winners" and "losers" from lobbying—the simple passage of a bill may not reveal much information about which interest groups will gain and which will lose from particular legislation (Fiorina 1985; Noll 1983). Finally, it calls into question the literature's emphasis on the power of committee stage activities by interest groups. The committee stage is important because it is where issue priority is decided, and scholars have argued that committees hold life-or-death power over legislation (Deering and Smith 1997; Volden and Wiseman 2014). Interest group scholars argue that lobbying efforts by groups are likely to matter most in congressional committees. By revealing that very few groups lobby at the committee stage and many interest groups do

2. This is consistent with the argument that government activities keep interest groups engaged (Baumgartner, Gray, and Lowery 2009; Gray and Lowery 1996; Leech et al. 2005).

not even begin to lobby until all congressional voting is complete for bills that were signed into law, I present a possibility that the significance of the committee stage for interest groups may be less salient than what scholars have assumed.

EVIDENCE OF EX POST LOBBYING

To understand the nature of lobbying, scholars have developed three major theories: they view lobbying as an exchange, a transmission of information, or a legislative subsidy. Scholars subscribing to exchange theories argue that lobbying buys votes and thus is a quid pro quo process (Dekel et al. 2009; Groseclose and Snyder 1996). The second perspective sees information transmission at the heart of the lobbyist-legislator relationship. Interest groups who have private information on the state of an industry or issue strategically transmit their information to persuade legislators of their positions (Austen-Smith 1993, 1995; Austen-Smith and Wright 1992; Hansen 1991; Lohmann 1995). The third perspective sees lobbying as a legislative subsidy. The objective of lobbying under this strategy is to assist natural allies in Congress by providing labor to draft legislation (Hall and Deadorff 2006). Despite these stark differences of opinion about why interest groups lobby, the three theories share a key assumption: the majority of lobbying activities will occur before Congress votes on a bill. Moreover, many argue that interest groups are most active and exert their strongest influence at the committee stage because most of the contents of legislation are drafted at that point (Austen-Smith 1993; Grier and Munger 1986; Hall and Wayman 1990; Kingdon 1981; Schlozman and Tierney 1986; Wright 1990).

Are these claims accurate? Does the majority of lobbying actually take place before Congress votes on legislation? To identify how well the existing theories explain actual lobbying data, I draw on lobbying reports filed under the Lobbying Disclosure Act (LDA).³ The LDA, which was enacted in 1995 and reformed in 2007, requires that interest groups give specific information about their lobbying activities when filing their lobbying reports.⁴ A lobbying report includes in-

formation on the client who paid for lobbying services, the registrant who provided lobbying services, expenditures, and the time period of the lobbying activity. A quarterly lobbying report should specify the issue areas targeted and, if applicable, the specific bills lobbied for under each issue area.⁵ Therefore, it is possible to match every lobbying report to the bills on which a group declared it lobbied.

To match lobbying data with congressional activities, I collected information on all bills that became public laws between the 107th through the 111th Congresses.⁶ Among the 2,208 bills that finally became law, 1,086 bills were not targeted by any lobbying activities, and 1,122 bills were mentioned in at least one lobbying report.⁷ This constitutes a main sample of the data. For each bill, I match lobbying reports that were filed from 1998 through 2012. Sometimes there were bills related to the 1,122 bills that became law.⁸ I collect lobbying activities that targeted these related bills and match those lobbying activities with the final bill in the main sample.⁹

Some concern may remain that I underestimate ex ante lobbying by focusing on lobbying reports associated with bill numbers. It is possible, for example, that interest groups lobby on the issues before a bill is introduced, and such lobbying activities might bias my results because groups in this case will not specify the (forthcoming) bill number in their lobbying reports. To mitigate this possibility, I used the specific issue descriptions in the submitted lobbying reports to find the lobbying reports that did not mention specific bill numbers, but mentioned bills, such as FY 2009

5. For more information on the nature of a lobbying report, see appendix E.

6. Although I use lobbying report data from 1998 and 2012, I focus on bills originating in the 107th through 111th Congresses to allow for the possibility of ex ante or ex post lobbying activities across Congresses. For example, there may be lobbying activities in the 112th Congress for a bill that was passed in the 111th Congress. Setting a wider timespan for lobbying activities than for the legislative activities allows inclusion of cross-Congress lobbying activities.

7. Most of the bills that were not mentioned at all in lobbying reports were considered under suspension of the rules to expedite action because these are relatively routine bills, such as rule adoption and noncontroversial measures (Oleszek 2010).

8. For example, there were six bills related to Dodd-Frank (H.R.4173) in the 111th Congress: Consumer Financial Protection Agency Act of 2009 (H.R.3126), Private Fund Investment Advisers Registration Act of 2009 (H.R.3818), Restoring American Financial Stability Act of 2010 (S.3217), and three procedurally related bills (H.Res.956, H.Res.964, H.Res.1490).

9. Information for related bills is from <https://www.govtrack.us> (accessed October 15, 2016). Wilkerson, Smith, and Stramp (2015) show that laws contain many provisions originally advanced in other (failed) bills. Therefore, it is important to include lobbying activities on related legislation.

3. Data are from the Center for Responsible Politics (<http://www.OpenSecrets.org> [accessed October 15, 2016]).

4. After the Jack Abramoff scandal, Congress passed the Honest Leadership and Open Government Act (HLOGA) to strengthen ethical standards in the lobbying process. HLOGA requires lobbyists to file reports more frequently, from biannually to quarterly, disclose campaign contributions, and report bundling of contributions. It also increases both enforcement activities by requiring that the Government Accountability Office audit compliance and civil penalties in cases of violations of the law. Although the reporting requirement and enforcement mechanism have been enhanced since the reform in 2007, the basic structure of lobbying reports, such as requiring disclosure of bills lobbied, has been consistent over time.

Defense Department Authorization or 2002 Farm Bill. After identifying those reports, I matched each report to a bill number.¹⁰ In total, there are 172,655 unique observations of bill lobbying report matches.¹¹

To determine the timing patterns of lobbying activities, I compared the date of the congressional vote and the time period of lobbying activity to the lobbying reports. The LDA requires that “Each registrant must file a quarterly lobbying report on Form LD-2 no later than 20 days after the end of the quarterly period beginning on the first day of January, April, July, and October of each year in which a registrant is registered.” This implies that lobbyists need to file their reports immediately after the quarter in which their lobbying activities took place.¹² I use the date of the final congressional action—usually the vote on the conference report—as a threshold to define ex post lobbying, since that is the last legislative action taken by Congress before the president signs the bill into law.¹³

One limitation in deciding the timing of lobbying activity is that lobbying reports do not specify the exact dates when lobbying occurs. Lobbyists only report on the quarter in which they engage in lobbying activities.¹⁴ The diagram in figure 1 shows how I define the timing of lobbying.

In Case 1, defining ex ante and ex post lobbying is clear. If floor voting takes place in the second quarter of a given year, all lobbying activities before the second quarter of that year are ex ante. If lobbying activity takes place after the vote, starting from the third quarter of that year and years following, it is ex post lobbying. Case 2 shows that determining the precise timing of lobbying can be tricky. If the floor vote and lobbying take place in the same quarter of a given year, lobbying activity could be ex ante or ex post. In this case, I consider them ex ante to eliminate the possibility of overestimating the incidence of ex post lobbying.

Sixty-six percent of lobbying is in the first category of clear cases. Table 1 presents the summary statistics on ex

post lobbying for “clear cases” where ex ante and ex post lobbying activities are clearly identified.¹⁵ Of the clear cases, almost 40% were ex post lobbying, on average, across five sessions of Congress.¹⁶ Variation across Congresses is large and ex post lobbying patterns increased over time.¹⁷

Figure 2 shows lobbying volumes before and after the vote. The dotted line indicates final congressional vote dates, and it shows that lobbying activities intensify before and after final congressional votes. At the same time, there is a significant amount of lobbying activity after final congressional votes, and some lobbying activity targets bills passed more than 20 months prior to the lobbying date. For example, after the Congress passed the Creating Long-Term Energy Alternatives for the Nation Act in 2007, a legislation containing complex tax break rules and regulations of contracts, more than 900 lobbying reports that specifically mentioned the bill were submitted by various corporations and trade associations one year after the bill became law.

As I demonstrate, ex post lobbying constitutes a significant amount of lobbying activities, despite the fact that the existing literature mainly focuses on ex ante lobbying. How should we understand the prevalence of ex post lobbying? As indicated above, most political economy models on the interaction between interest groups and legislators assume that voting on a bill marks the end of legislator and lobbyist

10. For details of the matching process, see appendix C.

11. The total number of unique lobbying reports is 120,353. Some lobbying reports mention multiple bills.

12. According to a report published in 2012 by the Government Accountability Office, “Most lobbyists were able to provide documentation to demonstrate compliance with the disclosure requirements of the LDA.” See “2012 Lobbying Disclosure: Observations on Lobbyists’ Compliance with Disclosure Requirements,” US Government Accountability Office, 2012.

13. If I use the date when the president signed the bill into law, the ex post lobbying ratio is similar, because the timespan between the conference vote and the presidential signature is quite short in most cases.

14. Before 2008, lobbyists submitted reports biannually so we only know whether a report was submitted in the mid-year period (January–June) or the end-year period (July–December).

15. I present the results for “All Cases” in table D1 in appendix D. Since I defined lobbying activity that took place in the same quarter of the final congressional vote as ex ante lobbying to avoid overestimating ex post lobbying, the result with “All Cases” provides the lower boundary for the ratio of ex post lobbying.

16. I also measure ex post lobbying by amount of money spent, and figure D1 in appendix D presents the results. These results are similar to the results when I measure ex post lobbying by frequency of lobbying reports. I checked whether there is a different pattern in ex post lobbying between bills that are annually renewed, such as appropriations bills, and those that are not renewed annually. I also checked whether the timing of bill introduction is significantly related to ex post lobbying. Bills introduced in a later session of Congress do not show a systematically lower ex ante lobbying ratio, and there is a significant level of variation in terms of the ex ante lobbying ratio among bills that are introduced at the same time. Figures D2 and D3 in appendix D present the results.

17. The increase in ex post lobbying in recent Congresses can be related to several factors. First, lobbying report filing requirements changed from biannually to quarterly in 2008, which allows a finer distinction between ex ante and ex post lobbying from the 110th Congress forward. Based on my coding rule, all the lobbying activities took place in the same period (first six months or last six months of the year) with the final voting years before 2008 coded as ex ante lobbying. Second, the Obama administration passed major regulatory policies, such as the Dodd-Frank and the Affordable Care Acts, which involve complex rule-making processes by federal agencies. Third, the growth in the lobbying industry may facilitate lobbying activities during the rule-making process by administrative agencies.

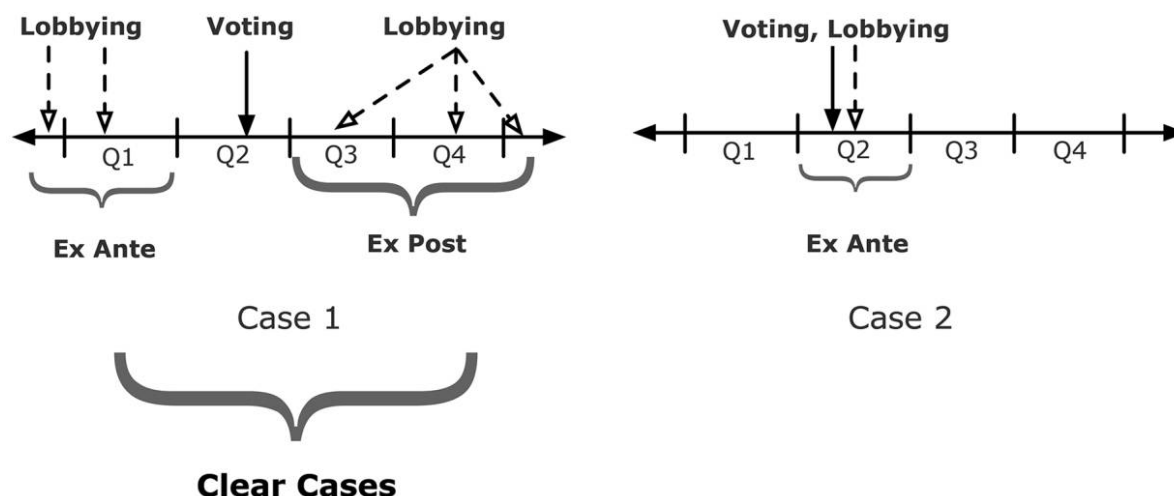


Figure 1. Coding timing of lobbying

communication. The assumption is that, after the vote, payoffs for interested parties are fully realized (Austen-Smith 1993; Grossman and Helpman 1994; Lohmann 1995). In contrast, I argue that the interaction between special interest groups and policy makers is a two-stage game—bill passage and implementation—and that interest groups face different problems at each stage.

Although bill passage is obviously crucial to interest groups for many reasons, some legislation will be very specific about the duties of a regulatory agency, while other legislation will only outline general policy objectives for the federal agency to follow. For example, the Emergency Petroleum Allocation Act and the Energy Policy and Conservation Act of 1973 (Public Law 93–159) included a very specific formula on the price structure for domestic crude oil and, therefore, left minimal discretion to the corre-

sponding agency, the Federal Energy Administration (Viscusi, Vernon, and Harrington 2005). However, many pieces of legislation provide only a general framework and do not specify details. Numerous details in public policy are inserted at the implementation stages, so payoffs are fully realized only when lobbying at these stages is completed. Therefore, during the ex post lobbying stage, interest groups monitor the implementation of the statute and contact members of Congress and federal regulators to influence the details or the speed of the rule-making process.

Even groups that opposed the passage of a bill actively participate in ex post lobbying to influence the implementation stage and maximize their own benefits. For example, two large companies in derivatives trading, the CME Group and Intercontinental Exchange, Inc., strongly opposed the passage of Dodd-Frank. But once the bill passed, they fought against each other on the specific rules regarding placing caps on speculative trading (Protess 2011). These examples vividly illustrate how lobbying before the passage of legislation only explains one piece of the interaction between interest groups and policy makers.

When ex post lobbying is explicitly considered, a collective action problem arises among interest groups, because they can strategically allocate resources between ex ante and ex post lobbying.¹⁸ While passing a bill can provide collective benefits, various particularistic benefits may be obtained after the bill's passage. Hence, one might ask, who bears the burden of collective action at the bill passage stage (i.e., the costs of ex ante lobbying efforts)? How is the timing of

Table 1. Ex Post Lobbying Ratio Based on Report Frequency (Clear Cases)

Congress	Number of Bills ^a	Number of Reports ^b	Ex Post Lobbying (%)
107th	113	1,444	30.2
108th	162	2,666	31.6
109th	277	9,539	33.4
110th	297	38,239	39.0
111th	273	62,212	41.3
Total	1,122	114,100	39.5

Note. Threshold = date of the final congressional vote.

^a Number of bills that became law and that were lobbied in each Congress.

^b Total number of lobbying reports that mentioned the bills that became public laws in each Congress.

18. De Figueiredo and Tiller (2001), Esteban and Ray (2001), Hansen and Mitchell (2000), and Hansen, Mitchell, and Drope (2005) discuss differences between collective incentive as an industry and private incentive as an individual firm in corporate political activity.

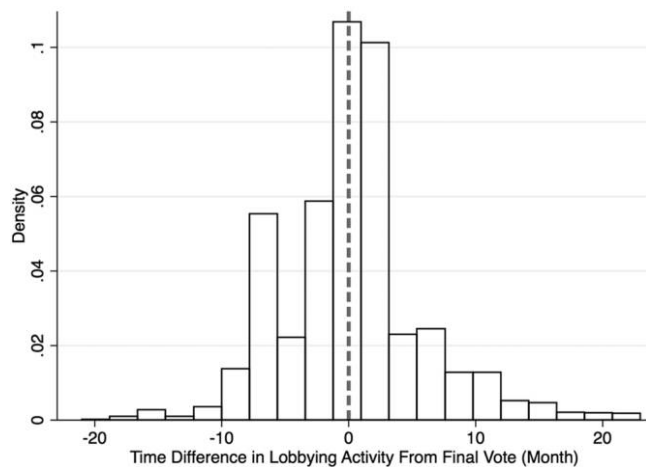


Figure 2. Volume of lobbying activities before and after the final congressional vote. The dashed line centered at zero indicates the date of the final congressional vote.

lobbying affected by different types of bills? In the next section, I develop a model that answers these two questions.

A THEORY OF EX POST LOBBYING

In this section, I present a simple model that helps illustrate the trade-offs that special interests face in deciding whether to lobby ex ante or ex post. The central purpose of the model is to investigate how the opportunity to engage in ex post lobbying affects incentives to exert ex ante lobbying efforts. In this section, I assume that interest groups operate in the same manner as firms. Firms and business associations comprise more than 70% of total lobbying spending, and they are the most numerous and active players in lobbying activities (Schlozman et al. 2015). Additionally, the amount of resources firms hold differs significantly; therefore, it is useful to show how collective action problems unfold under varied resource constraints.

Consider an industry with n firms. Each firm, denoted by j , is characterized by its size in relation to the industry. Let α_j be the size of firm j . Firms in this industry can benefit from lobbying policy makers, since passing legislation generates rents. To enjoy the rents, firms must exert effort. Formally, each firm can exert ex ante effort e_j^A and ex post effort e_j^P . Thus, the total effort of a firm j is measured by $e_j^A + e_j^P$.

Let Π be the rents derived from lobbying the legislature. These benefits are increasing in the total ex ante effort exerted by firms in the industry; thus, $\Pi = f\left(\sum_{j=1}^n e_j^A\right)$, where $f' > 0$ and $f'' < 0$. An exogenous parameter $\beta \in [0, 1]$ indicates the ratio of the collective benefits in each bill.¹⁹ If the

parameter β is close to 1, the bill has a significant portion of collective benefits and is specific about how to implement the legislation, so passing the bill itself guarantees higher collective benefits to groups, and the ways in which rules will be set at the implementation stage are well defined. Little ex post lobbying effort is required to secure particularistic benefits. In contrast, if β is close to 0, the ratio of the particularistic benefits in the bill is higher and the legislation is short on specifics; passing that bill does not automatically guarantee certain benefits to relevant groups. To secure the particularistic benefits that legislation generates, groups have to exert ex post lobbying efforts to influence the specific rule-making process.

I argue that, by exerting ex ante lobbying, all firms in the industry can derive collective benefits from the rents and the size of individual prizes from the collective benefits is proportional to the firm's market size, α_j . Similarly, I assume that, by exerting ex post lobbying, each of the firms can extract a fraction of the particularistic benefits by influencing the bureaucratic implementation process. This fraction increases with both the ex post lobbying effort of the firm and the size of the firm in the industry. The cost of ex ante and ex post efforts are denoted by c_j^A and c_j^P . Also, to engage in lobbying activity, firms must bear an up-front fixed cost, F .

Given these assumptions, let P_j be the fraction that a firm j derives from the particularistic benefits in Π . This fraction depends on both total ex post lobbying and the size of the firms, according to the following expression:

$$P_j(e^P, \alpha) = \frac{e_j^P \alpha_j}{\sum_{j=1}^n e_j^P \alpha_j}, \quad \forall j \in \{1, \dots, n\}. \quad (1)$$

ularistic it might be (e.g., legislation regarding international relations may be more collective-oriented than legislation regarding domestic regulatory policy, on average) or how much discretion it can allow bureaucrats, depending on agency capacity. Second, the purpose of the model is to highlight the collective action problem among firms when they have the opportunity to engage in both ex ante and ex post lobbying. Therefore, to focus on the first-order question, I assume that β is exogenous. That said, in appendix B, I explain how the method of endogenizing β as a function of ex ante lobbying does not change the main comparative statics from the model where I assume that β is exogenous in most cases. More specifically, when I assume that groups exert ex ante lobbying efforts to increase particularistic benefits in legislation, the first comparative static result—that bills with more particularistic provisions draw more ex post lobbying than bills with more collective benefits—holds under any parametric assumptions. The second comparative static result—groups with larger market shares bear disproportionately higher burdens in ex ante lobbying—holds under a variety of assumptions. I specify conditions under which the second comparative statics might not hold in appendix B when I endogenize β .

19. In this model, I assume that β is exogenous. While it is possible to endogenize β , I do not pursue that modeling strategy for several reasons. First, each bill may have a boundary in terms of how collective or partic-

Combined, the net earnings of each firm from lobbying correspond to the following expression:

$$\beta\alpha_j\Pi(e^A) + (1 - \beta)P_j(e^p, \alpha)\Pi(e^A) - c_j^A - c_j^p - F. \quad (2)$$

Each firm chooses its effort according to the following optimization problem:

$$\max_{e_j^p} \beta\alpha_j\Pi(e^A) + (1 - \beta)P_j(e^p(e^A), \alpha)\Pi(e^A) - c_j^A - c_j^p - F, \quad (3)$$

$$\text{s.t. } P_j(e^p(e^A), \alpha) = \frac{e_j^p(e^A)\alpha_j}{\sum_{j=1}^n e_j^p\alpha_j},$$

$$\Pi(e^A) = f\left(\sum_{j=1}^n e_j^A\right),$$

$$e_j^p(e^A) \in \operatorname{argmax}_{e_j^p} \beta\alpha_j\bar{\Pi}(e^A) + (1 - \beta)P_j(e^p(e^A), \alpha)\bar{\Pi}(e^A) - \bar{c}_j^A - c_j^p - F,$$

and

$$\beta\alpha_j\Pi(e^A) + (1 - \beta)P_j(e^p(e^A), \alpha)\Pi(e^A) - c_j^A - c_j^p - F \geq 0.$$

An example

To motivate the analysis, I consider the following simple example that highlights the core mechanism of the collective action problem among firms. Suppose that rent is created if at least one firm is willing to engage in ex ante lobbying. Hence, $\Pi(e^A)$ can be expressed as:

$$\Pi = \begin{cases} 1 & \text{if at least one firm lobbies ex ante,} \\ 0 & \text{otherwise.} \end{cases}$$

Each firm decides whether it exerts ex ante lobbying effort and/or ex post lobbying effort. I also assume that the cost of ex ante and ex post effort is the same across different firms and that these costs are unit costs, c^A and c^B .

Case I: $\beta = 1$

Suppose that a bill provides an entirely collective good. What matters is whether one firm is willing to engage in ex ante lobbying to generate that collective good and the identity of the firm (Olson 1965; Ostrom 1990). In this case, we only need to ensure that ex ante lobbying activity is incentive compatible, since engaging in both ex ante and ex post lobbying activities and engaging in only ex post lobbying ac-

tivity are dominated strategies. Hence, the optimization problem is simplified to:

$$\max_{e_j^A} \alpha_j - c^A - F, \quad (4)$$

$$\text{s.t. } \alpha_j - c^A - F \geq 0.$$

First, in considering the participation constraint, if $\alpha_j < c^A + F$, the firm obtains a negative payoff if it lobbies ex ante and 0 if it does not engage in ex ante lobbying. Therefore, for those $\alpha_j < c^A + F$, no lobbying activity is optimal. Hence, we can establish a cutoff at $\alpha^* = c^A + F$, such that for those $\alpha_j \geq c^A + F$, payoffs are as follows:

$$U_j = \begin{cases} 0 & \text{if no firm lobbies ex ante,} \\ \alpha_j - c^A - F & \text{if firm } j \text{ lobbies ex ante,} \\ (1 - G(\alpha^*))\alpha_j & \text{if firm } j \text{ does not lobby, but another firm lobbies ex ante.} \end{cases}$$

If $(1 - G(\alpha^*))\alpha_j \geq \alpha_j - c^A - F$, firm j does not contribute, which leads to the following condition:

$$G(\alpha^*) \leq \frac{c^A + F}{\alpha_j}. \quad (5)$$

We know that if $\alpha_j = \alpha_n$, equation (5) implies that the biggest firm in the market provides ex ante lobbying and all other firms do not lobby. Under this case, the largest firm, $\alpha_j = \alpha_n$ engages in ex ante lobbying and everyone else, $\alpha_j \neq \alpha_n$, enjoys a free ride.

Case II: $\beta = 0$

If $\beta = 0$, a bill's benefits are entirely particularistic. Hence, to claim a benefit, ex post lobbying is necessary. In this case, we only need to compare the payoffs between lobbying both ex ante and ex post and lobbying only ex post, since lobbying only ex ante is a dominated strategy.

From the participation constraint in equation (4), given that the biggest firm in the industry engages in ex ante lobbying, a firm $j \neq n$ engages in ex post lobbying if $P_j(e^p, \alpha) \geq c^p + F$ is satisfied. Therefore a firm with α_j^* that satisfies the condition that

$$P_j(e^p, \alpha_j^*) = c^p + F \quad (6)$$

is the smallest firm among those that engage in ex post lobbying. Analysis of equation (6) generates the threshold firm size

$$\alpha_j^* = \frac{(c^p + F) \sum_{i \neq j}^n e_i^p \alpha_i}{e_j^p (1 - c^p - F)},$$

such that firms with sizes greater than α_j^* will participate in the ex post lobbying process.

Case III: $0 < \beta < 1$

When $0 < \beta < 1$, legislation includes both collective and particularistic benefits. A firm's optimization problem is the same as presented in equation (4) above. Given that the biggest firm provides ex ante lobbying to generate the collective good, a firm $j \neq n$ participates in ex post lobbying if and only if

$$\beta\alpha_j + (1 - \beta)P_j(e^p, \alpha_j) \geq c^p + F. \quad (7)$$

Assume that a firm with α_j^* satisfying the equation (6) participates. We know $P_j(e^p, \alpha_j^*) = c^p + F$ holds. Then, we compare the value of $\beta\alpha_j + (1 - \beta)P_j(e^p, \alpha_j)$ and $P_j(e^p, \alpha_j)$ when $\alpha_j = \alpha_j^*$. With this exercise, we can identify whether the smallest firm that participates in ex post lobbying when legislation is entirely private ($\beta = 0$) has an incentive to participate in ex post lobbying when the bill includes both collective and private benefits ($0 < \beta < 1$).

The particularistic benefits as a function of ex post lobbying efforts is defined as:

$$P_j(e^p, \alpha_j^*) = \frac{\alpha_j}{\sum_{j \in \{\forall i: e_i^p \neq 0\}} \alpha_j}.$$

Since the denominator is less than 1, $P_j(e^p, \alpha_j^*) > \alpha_j$. Therefore, $\beta\alpha_j^* + (1 - \beta)P_j(e^p, \alpha_j^*) < P_j(e^p, \alpha_j^*) = c^p + F$ holds.

This result implies that the firm with α_j^* , the smallest among those that participate in ex post lobbying when $\beta = 0$, does not have an incentive to participate when $\beta > 0$, since the cost outweighs the benefit. Therefore, the threshold market size α_j^{**} that satisfies the participation constraint when $0 < \beta < 1$ is greater than α_j^* , which represents the market size of the smallest firm that participates in ex post lobbying when $\beta = 0$. Moreover, as β approaches 1, it becomes more difficult to satisfy the participation constraint; therefore, the threshold level of market size, α_j , should increase.

The prediction of firms' lobbying patterns as a function of a market size, α_j , and the collectiveness of a bill, denoted by β , is presented in figure 3. This depicts the situation in which the collective good is provided if at least one firm engages in ex ante lobbying. Under this scenario, the largest firm, whose market share is α_n , always provides the collective good by exerting ex ante lobbying effort. This prediction is consistent with a model that explains why larger members are bearing a disproportionate share of the burden in providing public goods, such as common defense among alliances (Olson and Zeckhauser 1966). Variable α_j^* is the size of the smallest firm that participates in ex post lobbying when a bill's benefit is entirely particularistic ($\beta = 0$). Given a bill's particularistic benefit (β^*), firms whose market sizes satisfy the condition $\alpha_j \geq \alpha_j^{**}$ engage in only ex post lobbying, and firms with

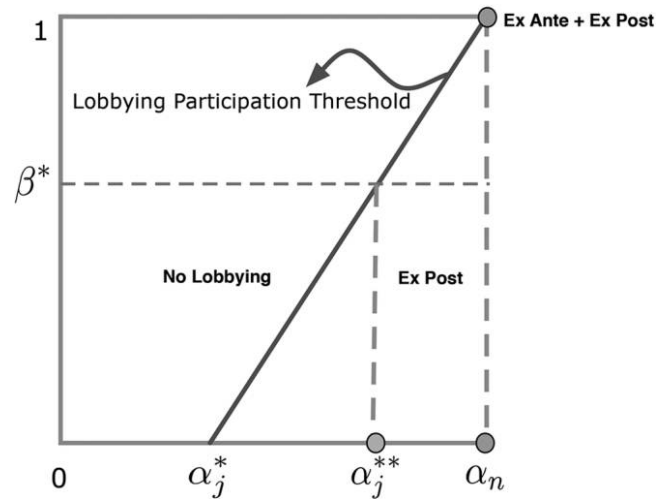


Figure 3. Firm size, bill characteristics, and lobbying type. The lines indicate the minimum size (α) of a firm that joins different lobbying strategies, depending on the proportion of collective benefits (β).

market size $\alpha_j < \alpha_j^*$ do not participate in the lobbying process. As the β , the collectiveness of a bill, increases, the size of the smallest firm that participates in the lobbying process increases.

An analysis with a general framework with two firms generates a similar prediction, and the model is presented in the appendix, available online. From the simple example presented above and the general framework in the appendix, two main testable hypotheses are generated:

- H1.** Bills with more particularistic provisions draw more ex post lobbying than bills with more collective benefits.
- H2.** For a given bill, groups with larger market shares bear disproportionately higher burdens in ex ante lobbying.

EMPIRICAL PATTERNS IN EX POST LOBBYING

In this section, I present patterns in ex post lobbying that are implied by the model. To investigate hypothesis 1, that bills with more particularistic benefits draw more ex post lobbying, I calculate the ex post lobbying ratio for each bill in the sample. The ex post lobbying ratio is defined as the proportion of ex post lobbying out of total lobbying reports submitted that refer to a given bill.²⁰ Figure 4 presents the

20. Although the equilibrium results in the theory section are stated in terms of effort level in ex ante and ex post lobbying, the key comparative statics regarding a market share (α) and the proportion of particularistic

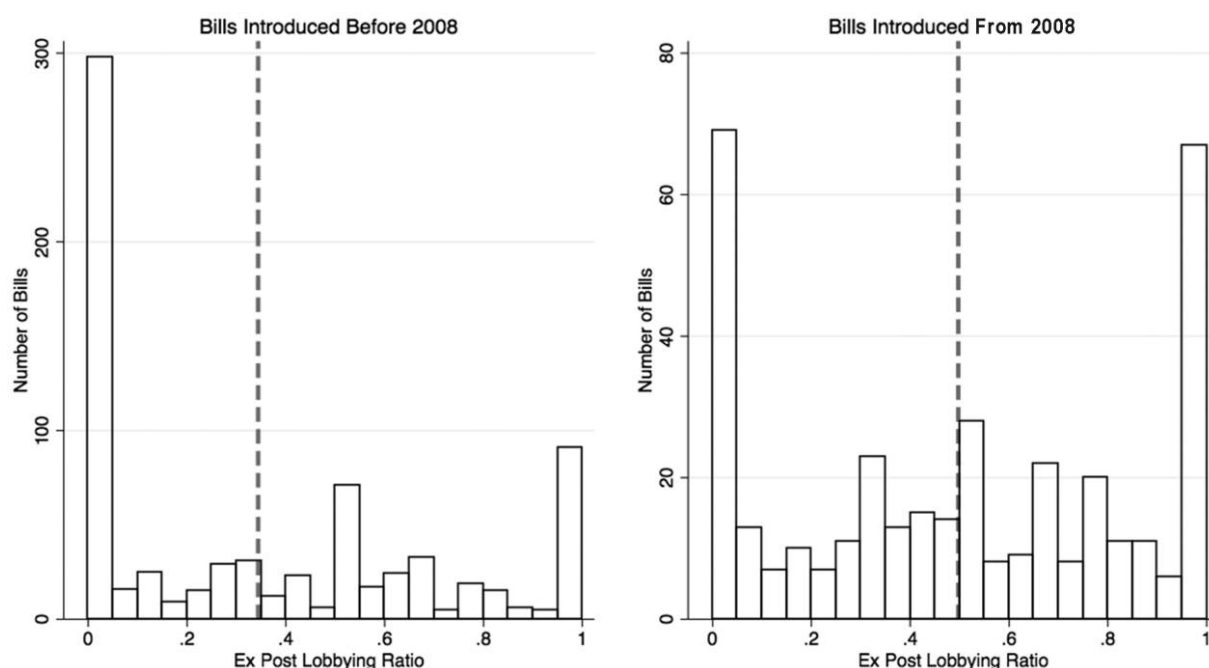


Figure 4. Ex post lobbying ratio at a bill level, pre-2008 and post-2008. The dashed lines indicate the mean ex post lobbying in each period.

distributions of ex post lobbying ratios for bills introduced before 2008 (left) and bills introduced since January 1, 2008 (right).²¹

There is significant variation in ex post lobbying across bills. For example, 25 lobbying reports were submitted that mentioned H.R.5682: United States and India Nuclear Cooperation Promotion Act, which passed in the 109th Congress. All of them were for lobbying performed before the bill's passage. On the other hand, consider 205 lobbying reports that cited lobbying on H.R.4297: Tax Relief Extension Reconciliation Act, which also passed in the 109th Congress. Of these 205 incidences, 34 are ex ante, and 171 are ex post. This is one example of a bill with higher particularistic provisions that illustrates the predictions of the model. Since a tax bill requires much effort after it has been signed into law for affected industries to claim benefits from vague language, it generates significant ex post lobbying effort.

According to the theory presented here, when bills do not require post-bill-passage efforts at the individual level for their benefits to be enjoyed, ex ante lobbying should be more

common. The ideal measure for this test would be a bill-level indicator of β , which captures the collective versus particularistic nature of the bill. Given the lack of data on this measure for every piece of legislation signed into law over time, I draw on the RegData database that quantifies the degree of regulation associated with each bill to proxy the ratio of particularistic benefits in the legislation. More specifically, RegData quantifies regulations based on the actual content of regulatory text, counting the number of binding restraints or "restrictions" words that indicate an obligation to comply, such as "shall" or "must," as well as counting words in rules published in the *Federal Register*.²² RegData provides the levels of regulatory restrictions in each rule made by federal agencies mandated by authorizing statutes (by Public Law number). Therefore, I created a regulatory volume and restrictiveness level for each legislation passed between the 107th through the 111th Congresses.²³

I argue that more rule-making activities and restrictive rules are, in general, associated with more particularistic benefits in a statute. It is well known that regulatory policy has significant distributional consequences (Gordon and Hafer 2005, 2007) and that the wealth effects of regulation are more particularistic than the wealth effects from legislation, be-

benefits in a bill (β) still apply to the ratio of ex ante and ex post lobbying. I also control the number of lobbying reports at the bill level when I run the regression, so the intrinsic difference across bills in terms of lobbying intensity is controlled when I use a ratio as a dependent variable.

21. Since the report submission requirement changed from biannually to quarterly starting in January 1, 2008, due to HLOGA's passage in 2007, I present separate graphs for bills introduced before 2008 and from 2008 onward.

22. Omar Al-Ubaydli and Patrick A. McLaughlin, "RegData: A Numerical Database on Industry-Specific Regulations for All United States Industries and Federal Regulations, 1997–2012," *Regulation and Governance*, December 16, 2015. doi:10.1111/rego.12107.

23. For a detailed explanation of RegData, see appendix D.

cause agencies have discretion to spell out very specific conditions that could benefit or harm particular firms or industries (Noll 1983; Stigler 1971). If bills are mainly about collective aspects of public policy and the statute is quite specific about its implementation, federal agencies usually are not required to promulgate hundreds of specific rules, and even if they promulgate rules, those rules are less restrictive. However, for legislation with more room for particularistic benefits, federal agencies are more likely to promulgate more restrictive regulations because particularistic benefits indicate that only a few individuals or groups can qualify to meet the standard that is specified in the rules.

Among the 1,122 bills signed into law, 486 bills are matched with the regulation restriction levels in RegData.²⁴ These bills represent the most substantially significant pieces of legislation and drew over 91% of lobbying reports in the sample. I examine the relationship between the total restrictiveness of regulation (or the total word count in rules) in each bill and the volume of ex post lobbying, after controlling for the total number of lobbying reports submitted that refer to the bill, and the duration of consideration of the bill—a count of the total month from introduction to the final vote in Congress. Depending on the specifications, I include Congress and committee fixed effects to control inherent differences in ex post lobbying across time and committee-specific characteristics.²⁵ Table 2 presents the results. Columns 1 and 2 present the results when I use regulation restrictiveness indices; columns 3 and 4 present the results when I use the total word count in all related regulations in each bill. Regardless of specifications, the results consistently demonstrate that regulation restrictiveness or the word count in rules, which is a proxy for particularistic benefits in a bill, is significantly associated with ex post lobbying efforts.

To test hypothesis 2, that groups with greater resources are relatively more likely to engage in ex ante lobbying, I calculate the ratio of ex ante and ex post lobbying for each interest group in the data.²⁶ Figure 5 shows the patterns of lobbying at the group level.

Three distinct patterns emerge from the group-level data. First, many groups specialize in either ex ante lobbying or ex post lobbying. While nonprofit advocacy groups and schools

and colleges engage more in ex ante lobbying, the agribusiness and energy/natural resources sectors show higher ex post lobbying ratios, on average.²⁷ Second, groups that have more resources and lobby more frequently show more balanced resource allocations between ex ante and ex post lobbying, although they are biased toward ex ante lobbying. For example, Citigroup Management Corporation submitted 67 different lobbying reports from 1998 through 2012, and its ex post lobbying ratio is 0.44. Lockheed Martin, one of the most active lobbying players in Washington, DC, submitted 114 different lobbying reports, and its ex post lobbying ratio is 0.27.²⁸ Third, trade associations, such as Pharmaceutical Research & Manufacturers of America (PhRMA) and the Biotechnology Industry Organization (BIO), show higher ex ante lobbying ratios compared to individual groups.

To identify a group-specific pattern with more precision, I examine the pattern of groups that lobbied on H.R.4173: Dodd-Frank Wall Street Reform and Consumer Protection Act, which passed in the 111th Congress. As of December 2012, 4,386 lobbying reports submitted by 871 different groups specifically mentioned this bill. Among these groups, I restrict attention to firms and trade associations, since the model is most clear in its predictions for the behavior of these groups.²⁹ There are 526 unique firms and 215 trade associations in the data. Given that many different organizations lobbied on this bill, this case illustrates how dif-

27. I follow the Center for Responsive Politics' categorization of interest groups (<http://www.OpenSecrets.org> [accessed October 15, 2016]). The fact that many nonprofit public interest groups mainly engage in ex ante lobbying is consistent with the theory presented here, given that many of them try to pursue collective goods in contrast to particularistic benefits. Also, the fact that public interest groups want to shape the agenda and bring attention to specific issues is consistent with their focus on the ex ante lobbying stage (Berry 2015).

28. One reason we might see that larger firms are engaged more in ex ante lobbying is because they have more resources and knowledge about the policy-making process. If "learning the system" were the main factor, we might observe that the difference in lobbying behaviors between small and large firms shrinks over time, since firms can become educated about the legislative process. However, as the data suggest, this is not the case. Also, firms' behaviors vary significantly depending on types of legislation, which indicates that the inherent difference in firms' knowledge and resources may not explain significant variation in ex post lobbying. Also, many small and large firms hire professional lobbying firms to lobby the government. Given that there are intermediaries who sell knowledge about the policy-making process, combined with a repeated-game structure, it is less likely that a knowledge gap drives the main empirical pattern.

29. Among the clients that lobbied for Dodd-Frank, there were 130 groups whose sector category belongs to one of labor unions, lawyers and lobbyists, ideology/single issue groups, other, and unknown. In total, these groups submitted 366 lobbying reports that mentioned Dodd-Frank. I dropped them in the analysis.

24. For bills with no regulation data, I impute the regulation-related variables as zero.

25. I also examined how the ex post lobbying is associated with issue areas and word counts in bills. The issue code for each bill comes from the Congressional Bills Project and the Policy Agenda Project. For a more detailed analysis, see table D2 and figure D4 in appendix D.

26. I restrict the analysis to groups whose minimum lobbying report submission is greater than 2.

Table 2. Volume and Restrictiveness in Regulation and Ex Post Lobbying

Dependent Variable = Number of Ex Post Lobbying	(1)	(2)	(3)	(4)
(Ln) Total restrictions	2.942*** (2.78)	3.174** (2.32)		
(Ln) Total word count			1.900*** (2.83)	2.082** (2.33)
Total number of lobbying reports	.279*** (6.66)	.305*** (3.29)	.278*** (6.66)	.305*** (3.28)
Duration of consideration ^a	-.967 (-1.09)	-.280 (-.49)	-.983 (-1.11)	-.312 (-.55)
Congress fixed effects	Yes	Yes	Yes	Yes
Committee fixed effects	No	Yes	No	Yes
N	1,114	1,012	1,114	1,012
Adjusted R ²	.695	.548	.695	.548

Note. Using an issue fixed effect instead of committee fixed effect produces similar results.

^a Duration of time (month) from introduction of a bill to the final vote in Congress. Values in parentheses are *t*-statistics.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

ferent groups devise different lobbying strategies in terms of their goals and resources.

For each firm, I collect revenue and employment data from Orbis, a global company database that contains information on over 175 million companies worldwide. Orbis divides firms into four categories: small (S), medium (M), large (L), and very large (VL). Among 526 firms that lobbied on Dodd-Frank, 419 firms (80%) are considered to be very large firms. In total, firms submitted 2,783 lobbying reports and trade associations submitted 1,237 lobbying reports. To examine the lobbying patterns of different groups, I calculate the ex post lobbying ratios in terms of frequency of lobbying reports filed and lobbying spending for different sizes of firms and trade associations.³⁰

Table 3 summarizes the firms and the associations that lobbied on the Dodd-Frank. Consistent with hypothesis 2, small- and medium-sized firms show higher ex post lobbying ratios, measured in terms of both the frequency of lobbying reports and expenditures on lobbying. Large and very large firms are disproportionately engaged in ex ante lobbying. Trade associations are more likely to engage in

ex ante lobbying compared to small- and medium-sized firms. Given the collective action problems that firms face at the ex ante lobbying stage, this finding is also consistent with what the model predicts.

Finally, I examine whether ex post lobbying disproportionately targets federal agencies. Although not driven from the model, if it is true that ex post lobbying aims to influence the distribution of particularistic benefits during the implementation process, we may expect that ex post lobbying is more likely to target federal agencies rather than legislators. In this section, I examine whether this is the case. The LDA requires that names of federal agencies are listed on line 17 of any issue pages in the lobbying disclosure form. The specified agency can be Congress or any bureaucratic or regulatory agency. Unlike lobbying expenditures, the contacted federal agencies are listed separately under each issue in a report.

However, in some cases, a lobbying report lists multiple bills under the same issue area making it difficult to identify the targeted agencies for each bill. Therefore, I continue to analyze the reports listing only a single bill under each issue area. I divide all targeted agencies into two groups: legislative and administrative. Legislative agencies include the House of Representatives and the Senate; administrative agencies include all other institutions. Table 4 displays the summary statistics of lobbying type by contacted agency for all lobbying reports as well as for all single-bill reports.

Among lobbying activities that take place ex ante, 52.4% target Congress and 47.6% target administrative agencies

30. When a firm files its quarterly lobbying report, it states its total spending per report without delineating the amount spent on each issue. Therefore, it is difficult to determine the amount that firms and trade associations spent to lobby only on Dodd-Frank. To calculate the lobbying spending on Dodd-Frank, I count the number of standardized general issue areas in the lobbying report and divide the total spending by the number of issues, assuming equal spending on all mentioned issues. This gives the average amount of spending per issue.

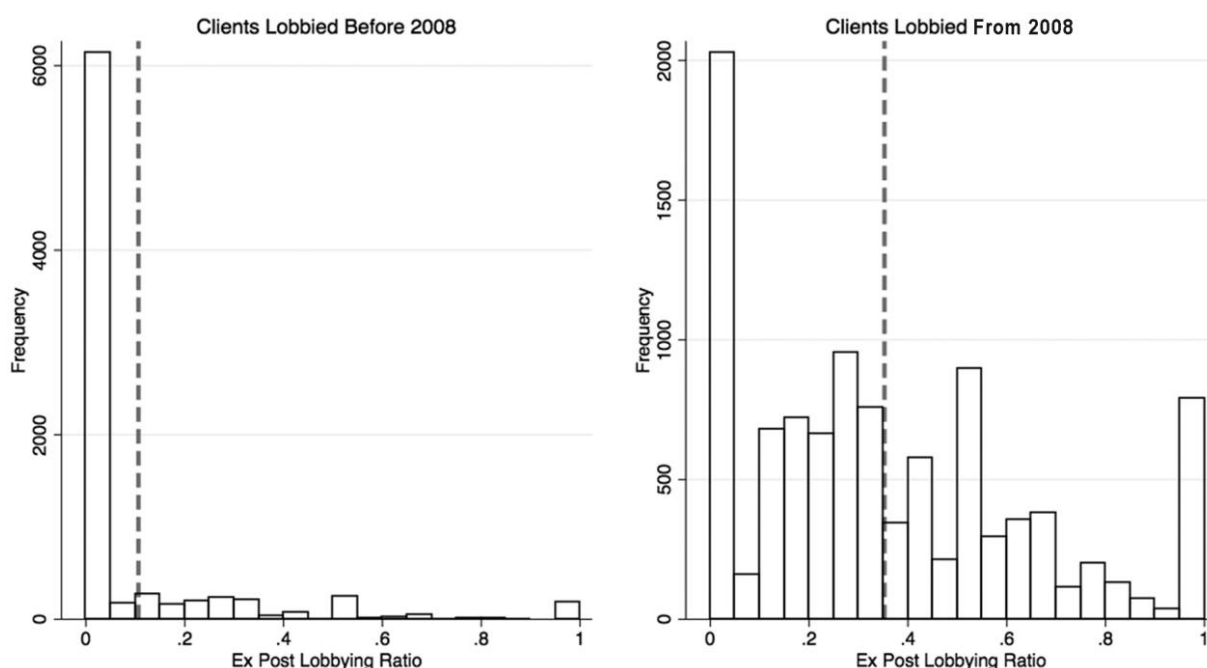


Figure 5. Ex post lobbying ratio at a client level, pre-2008 and post-2008. The dashed lines indicate the average ex post lobbying ratio in each period.

among all reports. During the ex post lobbying period, the percentage of lobbying targeting Congress declines to 49.7%, and the percentage targeting administrative agencies increases to 50.3%. Despite the increase in the ratio of activity targeting administrative agencies in the ex post lobbying stage, the amount of lobbying targeting the legislature is still high. While this may seem to contradict the expectation that we should observe more lobbying activities targeting federal regulators and bureaucrats at the ex post lobbying stage, it

is well known that legislators can influence the decisions of bureaucrats on specific rulings and that special interest groups often call on legislators to influence federal regulators (Arnold 1987; Hall and Miler 2008; McCubbins, Noll, and Weingast 1987).

For example, in June 2014, 58 Democratic House members sent a letter to the SEC to call on the Commission to initiate rule-making on extractive industry transparency—which is mandated by Section 1504 of Dodd-Frank—on a faster, more

Table 3. Summary Statistics on Ex Post Lobbying by Firms and Trade Associations

Type	Reports			Expenditures	
	No. of Firms	No. of Reports	Ex Post (%)	Spending (\$1,000)	Ex Post (%)
Panel A:					
Small firm	37	107	49	2,811	42
Medium firm	32	133	53	5,225	51
Large firm	38	177	38	8,360	33
Very large firm	419	2,366	42	180,484	38
Trade associations	215	1,237	43	85,020	42
Panel B (aggregate):					
Small + medium	69	240	51	8,037	48
Large + very large	457	2,543	42	188,845	38
Trade associations	215	1,237	43	85,020	42
Total	741	4,020	43	281,902	39

Note. The difference in ex post lobbying ratios between small/medium size firms and large/very large firms is statistically significant at the 1% level.

Table 4. Lobbying Type by Targeted Agency

Type	All Reports		Single Bill Reports	
	Legislative (%)	Administrative (%)	Legislative (%)	Administrative (%)
Ex ante	52.4	47.6	65.1	39.9
Ex post	49.7	50.3	58.1	41.9
Total	51.2	48.7	59.2	40.8

Note. The difference in the ratio of targeting Congress vs. federal agencies between ex ante and ex post is statistically significant at the 1% level.

definite timeline. Among the 4,152 comments submitted to the SEC on Dodd-Frank rule making, 6% were submitted by senators and members of the House of Representatives.³¹ These are just some of the many instances of groups lobbying Congress to put pressure on federal agencies and bureaucracies regarding the rule-making and implementation processes. Therefore, empirical evidence showing that interest groups still heavily lobby legislative bodies at the ex post stage is not surprising.³²

CONCLUSION

Current theories on lobbying primarily focus on bills' pre-vote stages, thereby leaving a significant amount of lobbying unexplained. By presenting that nearly half of all lobbying activity targeting specific bills between 1998 and 2012 occurred after the Congress passed legislation, and more than half of ex post lobbying targeted members of Congress to influence the implementation of legislation, this paper provides a more comprehensive understanding of resource allocations by interest groups to influence public policy.

This article also provides a theory that suggests why special interest groups have an incentive to lobby after bill passage. While some pieces of legislation include higher proportions of collective goods provisions and are very specific about the duties of regulatory agencies, many provide only a general framework, and this increases uncertainties about how pro-

visions of particularistic benefits will be divided. I argue that ex post lobbying aims to extract those particularistic benefits from legislation.

Identifying ex post lobbying illustrates a heretofore unexplored collective action problem among special interest groups, which provides a chance for those who are inactive in ex ante lobbying to claim shares from government policies. If special interest groups face trade-offs in exerting their efforts between ex ante and ex post stages, one might ask who bears the cost of obtaining a desirable outcome at the bill-passage stage. The model presented here demonstrates that groups with larger market shares bear a disproportionately high share of the cost at the ex ante lobbying stage and that firms with smaller market shares and limited resources are more likely to engage in ex post lobbying if the particularistic benefits from the legislation are substantial. Empirical evidence from the data about lobbying activities on the Dodd-Frank legislation supports this prediction from the model.

While there was a significant amount of ex post lobbying on bills that became law, and those legislations were usually targeted by interest groups, it should be noted that more than half of the lobbying reports do not mention specific legislation, many introduced bills fail to pass Congress, and only a small fraction of bills are signed into law. Therefore, although this article provides a more comprehensive analysis of ex post lobbying for bills that became law, it does not undermine the fact that interest groups could be active in bills' agenda-setting stages.

Bringing the aspect of timing to decisions about allocation of resources will enable exploration of other important topics in future studies of interest groups. For example, examining how targeting different types of policies, such as distributive versus regulatory policy, will shed light on the interaction between policy types and lobbying activities. Understanding how preference similarities and differences within an industry (or within a sector) affect lobbying strategies would be another fruitful extension of this research.

31. "Public Comments on SEC Regulatory Initiatives Under the Dodd-Frank Act," US Securities and Exchange Commission (<https://www.sec.gov/spotlight/regreformcomments.shtml> [accessed October 15, 2016]).

32. It is also noteworthy that interest groups actively lobby federal agencies during the ex ante stage. Over 40% of all contacts made during the ex ante lobbying stage targeted federal agencies, which indicates that groups actively reach out to bureaucrats even before the passage of legislation. Groups may collect information on the prospects for rule-making decisions if the legislation passes, among other issues. Analysis of contact patterns of agencies shows that interest groups often do not employ a bifurcated strategy of lobbying Congress before a bill's passage and lobbying bureaucracies afterward.

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A Appendix: A Model with a General Framework

In this section, I investigate how the opportunity to engage in ex post lobbying affects the level of ex ante lobbying in a general setting with two firms, $j \in \{1, 2\}$, under two scenarios. The first game is a static situation where each firm only considers lobbying in the current period. In other words, firms are myopic and decide on their optimal level of ex ante lobbying without considering ex post lobbying.¹ The results from this model serve as a useful benchmark for considering the second game: A dynamic situation where firms make decisions on ex ante lobbying by taking ex post lobbying into consideration. Exerting more ex ante effort increases the size of rents but, at the same time, it generates more competition during ex post lobbying to claim particularistic benefits. Therefore, there are tradeoffs in exerting ex ante lobbying efforts, which is a novel feature of the model. The analysis allows us to compare the optimal levels of ex ante lobbying efforts between the static and dynamic games, and identify how the opportunity for ex post lobbying affects incentives to engage in ex ante lobbying.

Beginning with the static game, firms solve two independent problems as decisions on ex ante and ex post lobbying are not dependent. Hence, firms first solve the problem with respect to e_j^A . Here we assume each firm's share of the particularistic benefits derived from ex post lobbying is fixed (\bar{P}_j). I assume \bar{P}_j is proportional to the firm's market share, α_j , in the static setting. For simplicity, I assume a cost function takes a quadratic form such as $c_j = \frac{c}{2} \cdot (e_j^A)^2$. The size of rents is a function of the sum of ex ante lobbying efforts by the firms and it is defined as $\Pi(e_j^A) = f(\sum_{j=1}^n e_j^A)$. For simplicity, I assume $f(\sum_{j=1}^n e_j^A) = \sum_{j=1}^n e_j^A$.

Proposition 1. *The equilibrium set of ex ante and ex post effort levels, (e_j^{*AB}, e_j^{*PB}) , in the benchmark static game satisfies the following conditions:*

$$\begin{aligned} e_1^{*A} &= \frac{\beta\alpha_1 + (1-\beta)\bar{P}_1}{c^A(e_1^A)}, & e_1^{*P} &= \sqrt{\frac{\alpha_1\alpha_2(1-\beta)\bar{\Pi}(e^A)}{c^P(e_1^P)}} \\ e_2^{*A} &= \frac{\beta\alpha_2 + (1-\beta)\bar{P}_2}{c^A(e_2^A)}, & e_2^{*P} &= \sqrt{\frac{\alpha_1\alpha_2(1-\beta)\bar{\Pi}(e^A)}{c^P(e_2^P)}} \end{aligned}$$

Proposition 1 Proof:

¹Here I assume that the portion of the particularistic benefits P_j that is determined in the ex post lobbying stage is given and ex ante lobbying by special interests does not affect the ex post lobbying efforts and therefore has no impact on the fraction.

The first order condition of (3) with the respect to e_1^A is

$$\begin{aligned} \alpha_1 \beta \frac{\partial \Pi(e^A)}{\partial e_1^A} + \bar{P}_1(e^p, \alpha)(1 - \beta) \frac{\partial \Pi(e^A)}{\partial e_1^A} - \frac{\partial c_1^A}{\partial e_1^A} &= 0 \\ \rightarrow e_1^{*A} &= \frac{\alpha_1 \beta + \bar{P}_1(1 - \beta)}{c^A(e_1^A)} \end{aligned} \quad (8)$$

With the same logic, I derive $e_2^{*A} = \frac{\alpha_2 \beta + \bar{P}_2(1 - \beta)}{c^A(e_2^A)}$. Given (e_1^{*A}, e_2^{*A}) , I solve the optimization problem with respect to e_j^P . The first order condition of the equation (3) with respect to e_1^P is

$$\frac{\partial P_1(e^P, \alpha)}{\partial e_1^P} (1 - \beta) \bar{\Pi}(e^A) - \frac{\partial c_1^P}{\partial e_1^P} = 0 \quad (9)$$

The derivative of P_1 with respect to e_1^P is as follows:

$$\frac{\partial P_1(e^P, \alpha)}{\partial e_1^P} = \frac{\alpha_1 \alpha_2 e_2^P}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \quad (10)$$

Substituting (10) into (9) results in

$$\frac{\alpha_1 \alpha_2 e_2^P}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} (1 - \beta) \bar{\Pi}(e^A) - c e_1^P = 0 \quad (11)$$

With the same logic, firm 2's optimization problem solves

$$\frac{\alpha_1 \alpha_2 e_1^P}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} (1 - \beta) \bar{\Pi}(e^A) - c e_2^P = 0 \quad (12)$$

Solving the pair of equations (11) and (12) yields

$$e_1^{*P} = e_2^{*P} = \sqrt{\frac{\alpha_1 \alpha_2 (1 - \beta) \bar{\Pi}(e^A)}{c}}$$

The intuition behind Proposition 1 is simple. Each firm exerts more ex ante efforts as its market size increases. As the ratio of collective benefits in the bill increases ($\beta \uparrow$), a firm j whose market size is greater than the exogenously given share of the particularistic benefits in the ex post stage, \bar{P}_j , will increase its ex ante lobbying efforts and a firm i whose market

size is smaller than \bar{P}_i will decrease its ex ante lobbying efforts.² Given ex ante efforts and the size of rents are determined, it is the market structure that determines firms' ex post efforts. As the market share becomes more equal, the level of ex post effort increases since competition is more intense.

In the sequential game, firms take into account the consequences of ex ante lobbying on the ex post lobbying stage when they make a decision on their level of ex ante efforts. Hence, solving the sequential game by backward induction, I begin by solving the ex post-stage game. In the ex post lobbying stage, the sequential game is exactly the same as the static game. Therefore, the equilibrium levels of ex post lobbying effort for firm 1 and 2, e_1^{*P} and e_2^{*P} , are

$$e_1^{*P} = \sqrt{\frac{\alpha_1 \alpha_2 (1 - \beta) \bar{\Pi}(e^A)}{c(e_1^P)}}, \quad e_2^{*P} = \sqrt{\frac{\alpha_1 \alpha_2 (1 - \beta) \bar{\Pi}(e^A)}{c(e_2^P)}} \quad (13)$$

The possible difference in ex post lobbying effort between the static and sequential games comes from the possibly different levels of ex ante lobbying effort and its consequences for the size of rents. If the size of rents varies, it affects the incentive of other players and therefore the competition on rents could be different. Denote the ex post lobbying effort e_j^{*P} that satisfies equation (13) as \bar{e}_j^P . Given \bar{e}_1^P , we now move backward to the first stage to find the equilibrium ex ante lobbying effort, e_1^{*A} .

Proposition 2. *The equilibrium set of ex ante and ex post effort levels, (e_j^{*AS}, e_j^{*PS}) , in the sequential game satisfies the following conditions:*

$$\begin{aligned} e_1^{*A} &= \frac{\alpha_1 \beta + (1 - \beta) P_1(e^P, \alpha)}{c(e_1^A)} + \frac{1 - \beta}{c(e_1^A)} \left[\frac{\alpha_1 \alpha_2 (e_1^{P'} e_2^P - e_1^P e_2^{P'})}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \Pi(e^A) - c(e_1^A) \frac{\partial e_1^P}{\partial e_1^A} \right] \\ e_1^{*P} &= \sqrt{\frac{\alpha_1 \alpha_2 (1 - \beta) \bar{\Pi}(e^A)}{c(e_1^P)}} \\ , \text{where } e_1^{P'} &= \frac{\partial e_1^P}{\partial e_1^A} \text{ and } e_2^{P'} = \frac{\partial e_2^P}{\partial e_1^A}. \end{aligned}$$

Proposition 2 Proof:

²This is derived from $\frac{\partial e_j^A}{\partial \beta}$. Assume a government decides how much particularistic benefits are distributed among firms in the ex post stage. If a firm j receives a fraction of particularistic benefits more than its market share, it has an incentive to exert more ex ante effort as the particularistic portion of the bill increases. However, if the particularistic provision of the bill decreases, the ex post stage's influence on the firm's payoff declines and market share that affects the payoff from the collective benefit becomes more important. Therefore, a firm whose market share is greater than what the government promises to give in an ex post stage will increase its ex ante effort.

Given $P_1(\bar{e}^P, \alpha_j)$ is defined as

$$P_1(\bar{e}^P, \alpha) = \frac{e_1^P(e^A)\alpha_1}{e_1^P(e^A)\alpha_1 + e_2^P(e^A)\alpha_2} \quad (14)$$

And its derivative with the respect to e_1^A is

$$\frac{\partial P_1}{\partial e_1^A} = \frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2} \quad (15)$$

, where $e_1^{P'} = \frac{\partial e_1^P}{\partial e_1^A}$ and $e_2^{P'} = \frac{\partial e_2^P}{\partial e_1^A}$. I take the first order condition of (3) with respect to e_1^A :

$$\alpha_1\beta\frac{\partial\Pi(e^A)}{\partial e_1^A} + \frac{\partial P_1(\bar{e}^P(e^A), \alpha)}{\partial e_1^A}(1-\beta)\Pi(e^A) + P_1(\bar{e}^P, \alpha)(1-\beta)\frac{\partial\Pi(e^A)}{\partial e^A} - c(e_1^A)\left\{\frac{\partial e_1^P}{\partial e_1^A} + e_1^A\right\} = 0 \quad (16)$$

Plug (14) and (15) into (28) and we get:

$$\alpha_1\beta\frac{\partial\Pi(e^A)}{\partial e_1^A} + \frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2}(1-\beta)\Pi(e^A) + P_1(e^P, \alpha)(1-\beta)\frac{\partial\Pi(e^A)}{\partial e_1^A} - c(e_1^A)\left[\frac{\partial e_1^P}{\partial e_1^A} + e_1^A\right] = 0 \quad (17)$$

Given $\Pi(e^A) = e_1^A + e_2^A$, equation (17) is further simplified as

$$\alpha_1\beta + (1-\beta)\left[\frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2}\Pi(e^A) + P_1(e^P, \alpha)\right] - c(e_1^A)\left[\frac{\partial e_1^P}{\partial e_1^A} + e_1^A\right] = 0 \quad (18)$$

Denote the ex ante lobbying effort that satisfies equation (18) as e_j^{*A} and it is derived as

$$e_1^{*A} = \frac{\alpha_1\beta + (1-\beta)P_1(e^P, \alpha)}{c(e_1^A)} + \frac{1-\beta}{c(e_1^A)}\left[\frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2}\Pi(e^A) - c(e_1^A)\frac{\partial e_1^P}{\partial e_1^A}\right] \quad (19)$$

How does the ex post lobbying opportunity affect the level of ex ante lobbying activity? If we compare the ex ante effort in the sequential game to the ex ante effort in the static game, there are two new components added in the sequential game equilibrium. The first component, $\left[\frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2}\Pi(e^A)\right]$, refers to how the ex ante lobbying effort of firm 1 affects the ex post lobbying efforts of itself and the other firm. This can be separated into two parts:

$$\left[\frac{\alpha_1 \alpha_2 (e_1^{P'} e_2^P - e_1^P e_2^{P'})}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \right] \Pi(e^A) = \underbrace{\left[\frac{\alpha_1 \alpha_2 (e_1^{P'} e_2^P)}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \right] \Pi(e^A)}_{\text{Part I}} + \underbrace{\left[\frac{-\alpha_1 \alpha_2 (e_1^P e_2^{P'})}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \right] \Pi(e^A)}_{\text{Part II}} \quad (20)$$

Part I in the equation (20) indicates that more ex ante lobbying effort by firm 1 increases the size of rents and leads to more ex post lobbying for firm 1 itself. Part II computes the relationship between firm 1's ex ante lobbying effort and its effect on firm 2's incentive for ex post lobbying. If firm 1 puts more effort into ex ante lobbying, it increases the size of the rents and therefore firm 2 has more incentive to exert ex post lobbying.

The second new component regarding the difference between the static and sequential games, $-c(e_1^A) \frac{\partial e_1^P}{\partial e_1^A}$, comes from additional cost. Firm 1 must pay the additional cost if exerting more ex ante lobbying effort.

Combined, we have extra benefits and extra costs in the sequential game compared to the static game. The extra benefits are as follows:

$$\frac{1 - \beta}{c(e_1^A)} \left\{ \frac{\alpha_1 \alpha_2 (e_1^{P'} e_2^P)}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \right\} \Pi(e^A) > 0 \quad (21)$$

This implies that as firm 1 exerts more effort ex ante, it increases the size of the rents and therefore induces more ex post lobbying to claim additional particularistic benefits. But at the same time, there are extra costs that firm 1 must pay from inducing firm 2 to engage more in ex post lobbying as well as its own costs of engaging in ex post lobbying:

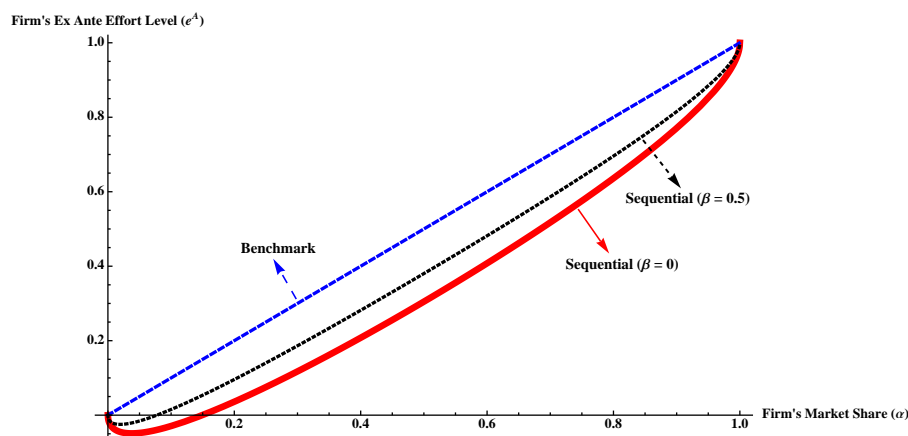
$$\frac{1 - \beta}{c(e_1^A)} \left\{ \frac{-\alpha_1 \alpha_2 (e_1^P e_2^{P'})}{(e_1^P \alpha_1 + e_2^P \alpha_2)^2} \Pi(e^A) - c(e_1^A) \frac{\partial e_1^P}{\partial e_1^A} \right\} < 0 \quad (22)$$

Therefore, the degree of ex ante lobbying effort in the sequential game compared to the static game depends on the size of the extra benefits and extra costs of exerting ex ante lobbying effort. Figure A1 illustrates how the size of collective benefits in bills (β) and the market structure (α) affect ex ante lobbying efforts in the sequential game.³ First, as market share increases a firm increases its ex ante lobbying effort in both the static and sequential games. Given that the level of ex post lobbying effort will be the same for two firms, this implies that firms with larger market shares engage in relatively more ex ante lobbying (i.e., they have a higher ex ante lobbying ratio). Second, except in the case of a monopoly ($\alpha = 0$ or 1), the ex ante lobbying effort in the sequential game is always smaller than its counterpart in the static setting. Ex post lobbying opportunities lead to a lower level of ex ante lobbying

³To compare ex ante lobbying effort in the static and the sequential games, I set the parameters such that $c = 1$, $\beta = 0.5$ to illustrate the case when $0 < \beta < 1$.

effort compared to the situation where only ex ante lobbying opportunity exists. There are some small firms that would exert ex ante lobbying in the static game but would not exert it in the sequential game. This is consistent with the extant models that show when benefits are more particularistic, there is more severe under-provision of the public goods problem (Hansen and Mitchell (2000); de Figueiredo and Tiller (2001); Esteban and Ray (2001); Hansen, Mitchell, and Drope (2005)). Third, the gap in levels of ex ante effort between the static and the dynamic situation becomes larger as the market becomes more competitive (i.e., when market shares are similar). This result is similar to the predictions of the alliance formation model that argues that more asymmetry in power leads to fewer problems in the public goods provision (Olson and Zeckhauser 1966).

Figure A1: Comparison of Ex Ante Efforts between the Static and Sequential Games as a function of Market Size (α) and the Ratio of Collective Benefits (β).



Notes: The dashed line centered at 0 indicates the date of the final congressional vote.

B Endogenizing β

Particularistic benefits could take two forms. First, particularistic benefits to firms can be inserted in legislation if a statute is very specific about implementation of legislation and allocation of resources. If interest groups could make a bill include very particularistic benefits for their own gain, ex post lobbying would be irrelevant and the main comparative statics that I derive from the model where β is assumed exogenous would not hold. Second, firms can receive particularistic benefits during the rulemaking process if a statute is vague and leaves bureaucrats considerable discretion to implement the statute. The model and the circumstances that I detail in the paper are more applicable to the second case.

In the current model configuration, I assume that ex ante lobbying efforts decide the total amount of benefit ($\Pi(e^A)$) that firms receive from passed legislation and that this benefit is composed of the collective benefit ($\beta\Pi(e^A)$) and the particularistic benefit ($((1 - \beta)\Pi(e^A))$). I assume that the collective benefit is divided by each firm's market share α and that the particularistic benefit is divided by the ex post lobbying effort (e^P). Each firm chooses its effort according to the following optimization problem:

$$\begin{aligned} \max_{e_j^A} \quad & \beta\alpha_j\Pi(e^A) + (1 - \beta)P_j(e^P(e^A), \alpha)\Pi(e^A) - c_j^A - c_j^P - F \\ \text{s.t.} \quad & P_j(e^P(e^A), \alpha) = \frac{e_j^P(e^A)\alpha_j}{\sum_{j=1}^n e_j^P\alpha_j} \\ & \Pi(e^A) = f\left(\sum_{j=1}^n e_j^A\right) \end{aligned} \tag{23}$$

To endogenize β , I assume that the ex ante lobbying effort (e^A) affects β and this determines how much of the benefit is allocated between the ex ante and ex post stages. Ex ante lobbying efforts could increase or decrease the collective benefits in the bill (β), but it is more realistic and interesting to assume that firms exert ex ante lobbying efforts to decrease the collective benefits in the bill (or increase the private benefits in the bill). Therefore, I consider the case where $\frac{\partial\beta(e^A)}{\partial e^A} < 0$. Given that the allocation of private benefits should happen at the ex post lobbying stage, this implies that firms exert ex ante lobbying to increase the proportion of rents that are allocated in the ex post instead of the ex ante lobbying stage. For example, during consideration of Dodd-Frank, some financial firms lobbied to make the legislation less specific. Therefore, passage of the legislation itself would not fully determine their benefits and they would be able to influence the rulemaking process to extract some private gains. Under this scenario, a firm's optimization would be:

$$\begin{aligned}
\max_{e_j^A} \quad & \beta(e^A)\alpha_j\Pi(e^A) + (1 - \beta(e^A))P_j(e^P(e^A), \alpha)\Pi(e^A) - c_j^A - c_j^P - F \\
s.t. \quad & P_j(e^P(e^A), \alpha) = \frac{e_j^p(e^A)\alpha_j}{\sum_{j=1}^n e_j^p\alpha_j} \\
& \Pi(e^A) = f\left(\sum_{j=1}^n e_j^A\right)
\end{aligned} \tag{24}$$

The difference between equations (23) and (24) is that β is a function of e^A in equation (24). There are two main comparative statics from the model with an exogenous β . The first result is that bills with more private provisions (lower β) draw more ex post lobbying ($\frac{\partial e^P}{\partial \beta} < 0$). From the assumption that $\frac{\partial \beta(e^A)}{\partial e^A} < 0$, it is easy to verify that the first comparative static will hold in a model with an endogenous β . From Proposition 2 on page A3 in Appendix A, we know the equilibrium ex post lobbying effort under the assumption of exogenous β is

$$e_1^{*P} = \sqrt{\frac{\alpha_1\alpha_2(1 - \beta)\bar{\Pi}(e^A)}{c(e_1^P)}} \tag{25}$$

Under the assumption of an endogenous β , the equilibrium ex post lobbying effort will be:

$$e_1^{*P} = \sqrt{\frac{\alpha_1\alpha_2(1 - \beta(e^A))\bar{\Pi}(e^A)}{c(e_1^P)}} \tag{26}$$

From this formula, we know that $\frac{\partial e_1^{*P}}{\partial \beta} < 0$ still holds. Since exerting more ex ante effort will increase the size of rents ($\bar{\Pi}(e^A)$) but reduce $\beta(e^A)$, firms will exert more ex post lobbying efforts under the endogenous β scenario than the exogenous β scenario. This result makes sense intuitively. Firms exert ex ante lobbying efforts to make more allocation of benefits occur at the ex post stage (by lowering β). Therefore, firms have stronger incentives to exert more ex post lobbying efforts when their ex ante lobbying efforts reduce the size of β .

The second comparative static that emerges from analysis of the model is that for a given bill, groups with larger market shares bear disproportionately higher burdens in ex

ante lobbying. Given that the level of ex post lobbying effort will be the same for two firms, comparing the equilibrium ex ante lobbying efforts in each scenario (one with an exogenous β and the other with an endogenous β) allows me to identify whether the prediction between market share and the ratio of ex ante and ex post lobbying efforts holds, even if we endogenize β .

From the equation (19) on page A4 in Appendix A, we know that the equilibrium ex ante lobbying effort under the exogenous β assumption is:

$$e_1^{*A} = \frac{\alpha_1\beta + (1-\beta)P_1(e^P, \alpha)}{c(e_1^A)} + \frac{1-\beta}{c(e_1^A)} \left[\frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2} \Pi(e^A) - c(e_1^A) \frac{\partial e_1^P}{\partial e_1^A} \right] \quad (27)$$

If we assume that β is a function of e_1^A , the first order condition of (24) with respect to e_1^A will be:

$$\begin{aligned} & \alpha_1\beta'(e^A)\Pi(e^A) + \alpha\beta(e^A)\Pi'(e^A) - \beta'(e^A)P(e^P)\Pi(e^A) \\ & + (1-\beta(e^A))P'(e^P)\Pi(e^A) + (1-\beta(e^A))P(e^P)\Pi'(e^A) - c(e_1^A) \left\{ \frac{\partial e_1^P}{\partial e_1^A} + e_1^A \right\} = 0 \end{aligned}$$

Therefore, the equilibrium ex ante lobbying effort under an endogenous β will be:

$$\begin{aligned} e_1^{*A} = & \underbrace{\frac{\alpha_1\beta + (1-\beta)P_1(e^P, \alpha)}{c(e_1^A)} + \frac{1-\beta}{c(e_1^A)} \left[\frac{\alpha_1\alpha_2(e_1^{P'}e_2^P - e_1^Pe_2^{P'})}{(e_1^P\alpha_1 + e_2^P\alpha_2)^2} \Pi(e^A) - c(e_1^A) \frac{\partial e_1^P}{\partial e_1^A} \right]}_{\text{Same as under exogenous } \beta} \quad (28) \\ & + \underbrace{\frac{1}{c(e_1^A)} \left[\alpha_1\beta'(e^A)\Pi(e^A) - \beta'(e^A)P_1(e^P)\Pi(e^A) \right]}_{\text{Newly Added Part}} \end{aligned}$$

From Figure A1 on page A6 in Appendix A, we know $\frac{\partial e_1^{*A}}{\partial \alpha_1} > 0$ for the “Same as under exogenous β ” part of (28). Therefore, the “Newly Added Part” in (28) will determine the overall relationship between a firm’s size and the ex ante lobbying effort under the endogenous β scenario. If $\beta'(e^A)$ is negligibly small, which means that firms cannot change the ratio of collective to particularistic benefits in the bill via ex ante lobbying efforts, the magnitude of the “Newly Added Part” would be small. Therefore, the comparative statics regarding the firm’s size and the ratio of ex ante/ex post lobbying efforts would still hold.

If $\beta'(e^A)$ is substantially large, however, the comparative statics result between a firm’s size and the ex ante/ex post lobbying effort ratio will depend on parameters in the model.

Specifically, it will depend on the size of $\frac{\partial \alpha_1}{\partial \alpha_1}$ and $\frac{\partial P_1(e^p)}{\partial \alpha_1}$ (the fraction that firm 1 derives from the particularistic benefits during the ex post stage). Given that $\beta'(e^A) < 0$, if $\frac{\partial \alpha_1}{\partial \alpha_1} = 1 < \frac{\partial P_1(e^p)}{\partial \alpha_1}$, the sign of $\frac{\partial(\text{Newly Added Part})}{\partial \alpha_1}$ will always be positive; hence, the sign of $\frac{\partial e_1^{*A}}{\partial \alpha_1}$ is always positive under the endogenous β scenario.⁴ Given that the level of ex post lobbying effort will be symmetric for firms, this result guarantees that firms with larger market shares bear disproportionately higher burdens in ex ante lobbying even when we endogenize β as a function of the ex ante lobbying effort.

If $\frac{\partial \alpha_1}{\partial \alpha_1} = 1 > \frac{\partial P_1(e^p)}{\partial \alpha_1}$, the sign of $\frac{\partial(\text{Newly Added Part})}{\partial \alpha_1}$ becomes negative; and therefore, it is not clear whether the sign of $\frac{\partial e_1^{*A}}{\partial \alpha_1}$ will be positive.⁵ If $\frac{\partial(\text{Newly Added Part})}{\partial \alpha_1}$ is substantially large and negative, which is possible if $\beta'(e^A)$ is large and $\frac{\partial P_1(e^p)}{\partial \alpha_1} < 1$, it is possible that larger firms exert less ex ante effort than smaller firms. In other words, when ex ante lobbying could increase the ratio of particularistic benefits in legislation that will be divided in the ex post lobbying stage, but firm 1 knows that its share from particularistic benefits at the ex post stage will be smaller than its market share, it is less likely to exert ex ante lobbying efforts as its market size gets larger. In this case, bigger firms do not necessarily exert more ex ante lobbying efforts and, therefore, the second comparative static from the original model would not hold. But this scenario is empirically less plausible. Previous studies suggest that larger corporations with more resources tend to dominate lobbying in federal agencies' rulemaking processes (Yackee and Yackee 2006; Haeder and Yackee 2015). Therefore, it is less likely that larger firms receive a share of particularistic benefits that is smaller than their market share at the ex post lobbying stage. Therefore, under varieties of assumptions, the second comparative static from the model with an exogenous β would hold even if I endogenize β .

⁴Substantively, $\frac{\partial \alpha_1}{\partial \alpha_1} = 1 < \frac{\partial P_1(e^p)}{\partial \alpha_1}$ means that the fraction that ex post lobbying brings to firm 1 from the particularistic part of legislation will be greater than firm 1's market share.

⁵Substantively, $\frac{\partial \alpha_1}{\partial \alpha_1} = 1 > \frac{\partial P_1(e^p)}{\partial \alpha_1}$ means that the fraction that ex post lobbying brings to a firm will be less than its market share.

C Appendix: A Description of Bill Selection and the Process of Matching Lobbying Reports

In this study, I select bills that became public law between the 107th through 111th Congresses. Among the 2,208 bills that became public law, 1,122 were mentioned in at least one lobbying report. Of those bills, there were numerous activities in both the House and the Senate – mainly the amendment process – before final passage voting. In these cases, I focus on the vote date for the final passage. For bills that passed both chambers, I record the conference vote date to use it as a threshold of the final congressional action. This voting date divides the lobbying activities into the bill-passage stage and the implementation stage.

For each bill lobbied by interest groups, I match the lobbying reports. There are two types of lobbying reports: (1) those that mention specific bill numbers and (2) those that do not mention a specific bill number. I start with the first group; even though these reports contain bill numbers, matching them to specific bills is not entirely straightforward. Some lobbying reports mention multiple bills in a given quarter. In this case, I treat each match between a report and a bill as a separate entry. Other lobbying reports mention a bill multiple times under different issue areas. For example, a company called *1-800 Contacts* submitted a lobbying report through the lobbying firm Crowell & Moring in the second quarter of 2010. Their report mentioned that it lobbied for bill H.R.3590: Patient Protection and Affordable Care Act both under the issue of Taxation/Internal Revenue Code (TAX) and Health Issues (HCR). Raw data from *opensecrets.org* records this as a separate entry but I consider this as a single attempt to influence H.R. 3590 because it comes from the same lobbying report filed by the same registrant in a given quarter. If a different registrant (lobbying firm or in-house lobbyist) filed a report at the same time and it mentioned the same bill either under the same issue or a different issue, I treat them separately because the lobbying activities are performed by different lobbying firms. In total, there are 107,705 bill-lobbying report matches under this type.

Second, there are lobbying reports that did not mention specific bill numbers but mentioned bills, such as FY 2010 Agriculture Appropriations. I used the descriptions in the specific issue sections in the lobbying report to find terms like **appropriation**, **authorization**, **FY (fiscal year)**, **bill**, **legislation** to identify those cases. If the issue description clearly referred to a certain bill, such as 2007 Farm Bill, I matched the report with the 2007 Farm Bill. However, if the issue description was vague, such as the term **appropriation**, I used the year of lobbying, the general issue areas on which interest groups lobbied, and the interest group name to match it with a specific type of *forthcoming* appropriations bill. I did not match to bills that Congress had already passed to minimize the possibility of

over-estimating the ex post lobbying ratio. For example, if Monsanto, Inc. lobbied on “Appropriations” under the issue area of agriculture in 2006, I matched it with the Agriculture Appropriations Bill in 2007, instead of the Agriculture Appropriations Bill in 2006. Through this process, I found 64,950 lobbying report-bill matches and I added them to the main dataset. In total, there are 172,655 unique lobbying report-bill matches in the final data.

D Tables and Figures

D.1 Ex Post Lobbying Ratio for All Cases

Table D1: Ex Post Lobbying Ratio Based on Report Frequency (All cases)

Congress	No. Bill ^a	No. Reports ^b	Ex Post Lobbying(%)
107th	113	2,448	17.8
108th	162	4,670	18.1
109th	277	19,177	16.6
110th	297	57,536	35.4
111th	273	88,824	38.0
Total	1,122	172,655	33.9

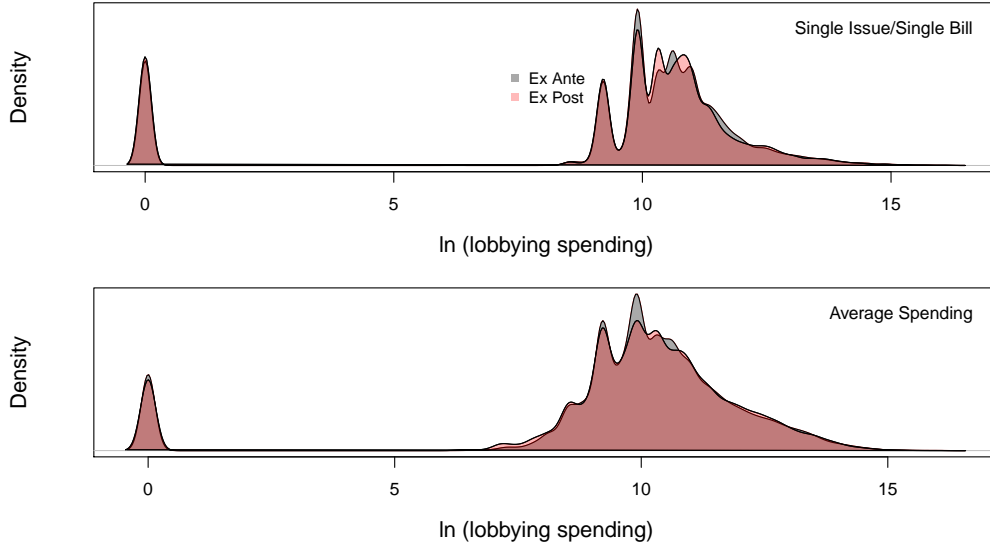
Notes: Threshold = date of the final congressional vote. a: number of bills that became law and were lobbied in each Congress. b: total number of lobbying reports that mentioned bills that became public laws in each Congress.

D.2 Ex Post Lobbying Ratio Measured by Lobbying Expenditures

In this section, I present ex post lobbying ratios when I measure lobbying activity by the amount of money spent rather than the number of lobbying reports. One difficulty in analyzing lobbying spending is that quarterly lobbying reports filed by special interest groups only show total spending per report without delineating the amount spent on each issue. To overcome this limitation, I present two measures of lobbying expenditures. First, I take a sub-sample of lobbying reports that only mentioned a single issue and a single bill: 28,059 observations out of 107,797 cases. The second measure of the amount spent on lobbying assumes equal spending on all mentioned issues in a single disclosure report. After counting the number of issues, I divided the total spending by the number of issues in the report, yielding a rough measure of average spending per issue.

Figure D1 shows the distribution of lobbying spending through both measures. There is no discernible difference in spending between ex ante and ex post lobbying activities. Both measures of lobbying spending confirm that special interest groups spend significant amounts of money on ex post lobbying.

Figure D1: Distribution of Lobbying Spending between Ex Ante and Ex Post Lobbying

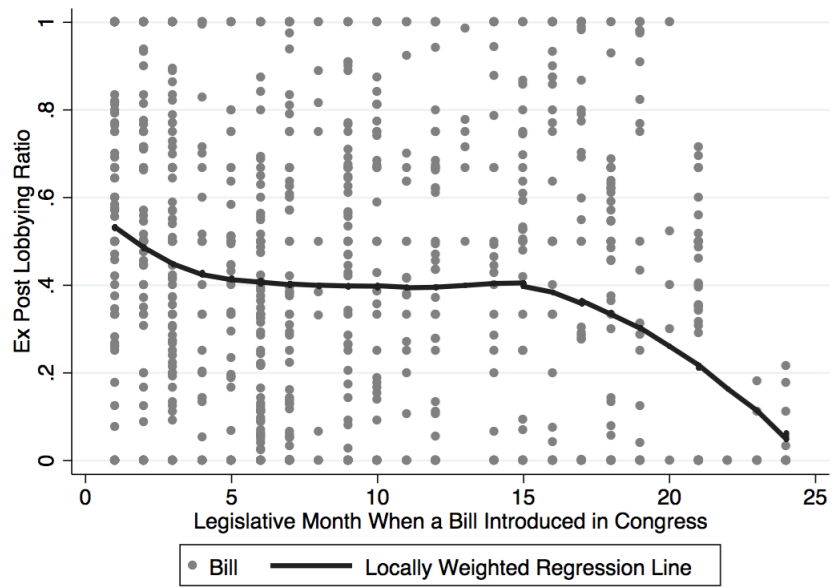


D.3 Robustness Checks: Bill Introduction Timing, Annually Renewed Legislation, and Ex Post Lobbying Ratios

Figure D2 presents the relationship between the timing of bill introduction to Congress and the ex post lobbying ratio for 1,122 bills that became law. Bill-level variations in ex post lobbying may be purely driven by the timing effect: Bills that are introduced later in the congressional session will have less time for ex post lobbying compared to bills introduced earlier in the session. Although bills introduced very late in the session (after the 20th month of the legislative session) show a lower amount of ex post lobbying, there is significant variation in the ratio of ex post lobbying for the bills that were introduced at the same time in the legislative session. This suggests that a pure ‘time-to-lobby’ effect cannot explain the variation.

It is also possible that ex post lobbying is, in fact, ex ante lobbying for future legislation (particularly for bills that are renewed annually, such as appropriations bills). That is, despite specifying the previous year’s bill in their lobbying reports, special interest groups may lobby on the contents of a future appropriations bill rather than lobbying for particularistic benefits of the passed legislation. Also, some of the lobbying reports mentioned the Appropriations or Authorizations Act but did not specify the bill number because the number had not been assigned yet. In this case, there is a possibility that I under-estimated the volume of ex ante lobbying. I identified lobbying reports that mentioned legislation but did not mention bill

Figure D2: Timing of Bill Introduction and Ex Post Lobbying Ratio

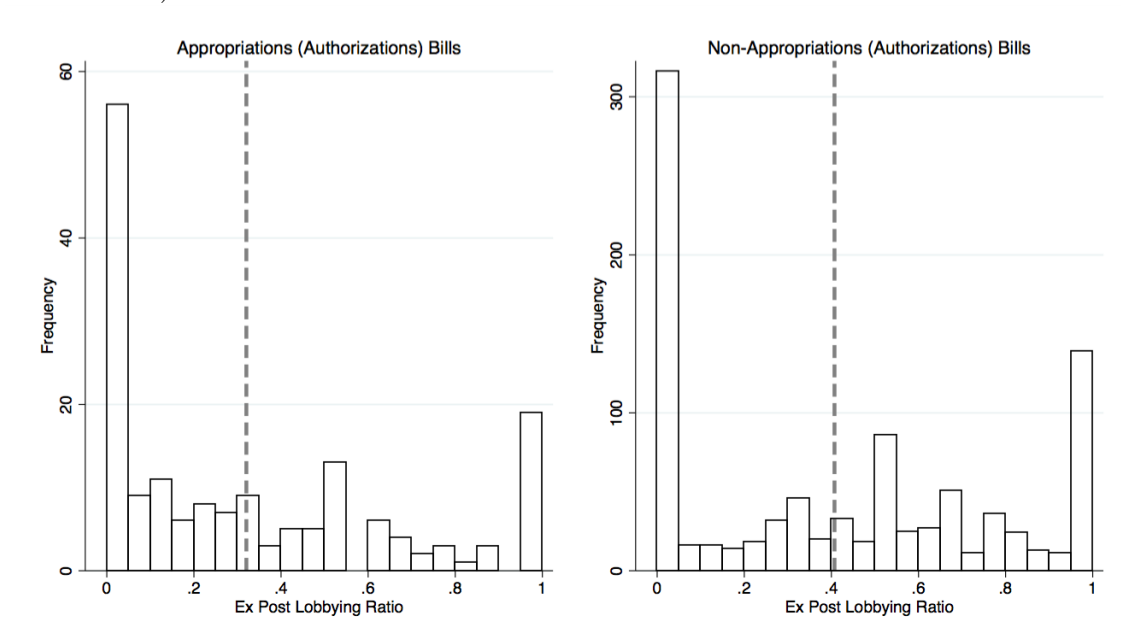


numbers because the bill numbers were not assigned yet. Almost all of those cases concerned appropriation or authorization legislation since they are annually renewed and interest groups can lobby on them even when bill numbers are yet to be assigned. Therefore, variations in ex post lobbying could be solely driven by bills that are annually renewed. While it is possible, the data does not seem to support this argument. Figure D3 divides the bills into two groups: appropriations (authorizations) bills that are generally annually renewed, and non-appropriations (authorizations) bills that have long time horizons or that do not need to be renewed at all. Patterns on the timing of lobbying for appropriations (authorizations) and non-appropriations (authorizations) bills do not seem distinctive. Also, a significant amount of ex post lobbying for non-appropriations (authorizations) bills indicates that concerns about future renewal are not a major driving force of ex post lobbying.

D.4 Matching RegData with Lobbying Data

The aim of RegData (regdata.org) is to quantify federal regulations. The most recent version of the data (RegData 2.2) includes restrictions counts; word counts; regulator attribution; and industry classification at the 2-, 3-, and 4-digit level from 1975 to 2014. RegData 2.2 also contains the authorizing statutes for each part of the *Code of Federal Regulations* (CFR), the codification of the general and permanent rules and regulations published in the *Federal Register* by federal agencies from 1980 to 2014. For each rule, RegData 2.2 provides regulation attributions of year-title-parts to their authorizing statutes, by Public

Figure D3: Ex Post Lobbying in Appropriations (Authorizations) and Non-Appropriations (Authorizations) Bills



Notes: Dashed lines indicate the mean ex post lobbying ratio in each type of bill.

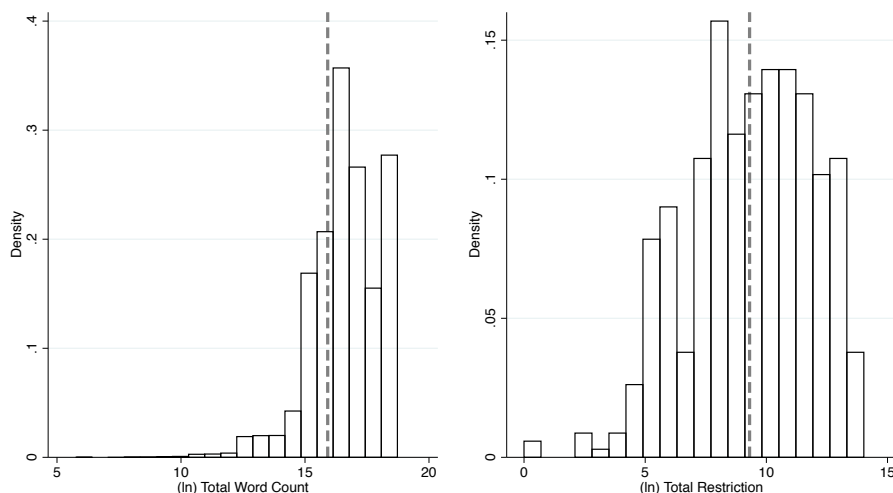
Law numbers. When the US Code is cited as authorization for a CFR part, all laws that affect the relevant portion of the Code are considered an authorizing statute. Some bills that became law did not require specific rulemaking by federal agencies; other legislation, such as Dodd-Frank, required hundreds of different rules by several agencies to implement legislation.

For each rule published in the *Federal Register*, RegData provides the name of the federal agency that promulgated the rule, the Public Law number and specific parts of the law that mandated the rule, a measure of restrictions (an occurrence of one of the following strings: “shall,” “must,” “may not,” “prohibited,” and “required”) and a word count. One caveat is that, especially for statutes passed in recent Congresses, federal agencies are still making rules and therefore the restriction index may be incomplete. However, this is not a significant problem in the analysis for the relationship between restrictiveness and the ex post lobbying ratio because I include a Congress fixed effect so it controls the time trend.

There are 157,149 unique rules promulgated for 491 bills passed between the 107th through 111th Congresses. At the rule level, the average number of restrictions and the word count are 280 and 33,451, respectively. The average number of rules per statute is 320 (median is 60) and it ranges from 1 to 5,162. To create a bill-level restriction and word count index, I calculated the bill-level total restrictiveness index and the total word count. The average restriction at the bill level is 89,632 and it ranges from 0 to 1,230,306. The total word count

of all the regulations related to the bill ranges from 320 to 135,747,472. Figure D4 presents the distribution of total word count (left) and total restrictiveness (right) at the bill level. I match this bill-level total word count and restrictiveness index with the lobbying data.

Figure D4: Distribution of Total Word Count and Total Restrictions Index in Regulation at Bill Level



Notes: Dashed lines indicate the mean total word count and the restrictiveness index of the regulations.

D.5 Measuring Particularistic Benefits using Issue Code and Word Counts

To proxy the nature of bills' particularistic benefits, I used the regulation restriction index in the main text. In this section, I present the results when I used an issue code from the Congressional Bills Project as a proxy for the particularistic benefit in the bill.⁶ The Congressional Bills Project coded the major and minor issues of each legislation using the topic coding system of the Policy Agendas Project.⁷ There are 31 major issue codes from Macroeconomics to Churches and Religion; under each major issue, there are more detailed minor issue codes. I acknowledge that bills under the same issue area could be different in terms of their particularistic nature. Although not perfect, I used types of issues as a proxy to measure a bill's collective and particularistic natures. For example, bills on foreign policy

⁶E. Scott Adler and John Wilkerson, Congressional Bills Project: (2016), NSF 00880066 and 00880061. The views expressed are those of the authors and not the National Science Foundation.

⁷The Policy Agendas Project data were originally collected by Frank R. Baumgartner and Bryan D. Jones, with the support of National Science Foundation (NSF) grant numbers SBR 9320922 and 0111611, and were distributed through the Department of Government at the University of Texas at Austin. Neither NSF nor the original collectors of the data bear any responsibility for the analysis reported here.

issues could be more collective in nature, while legislation on government procurement may include more particularistic benefits.

For each major issue code, I calculated the average ex post lobbying ratio of bills under each category. The sample in the data includes 19 major issue codes and 167 minor issue codes. Table D2 presents the ex post lobbying for 19 major issue codes. Bills with issues such as Education; Space, Science and Technology; Macroeconomics; Banking, Finance, and Domestic Commerce; and Energy tend to have higher ex post lobbying ratios than bills with issues like Civil Rights, Minority Issues, and Civil Liberties; Community Development and Housing Issues; and International Affairs and Foreign Aid. Although there is substantial variation in terms of ex post lobbying within each major issue area, this pattern is largely consistent with the expectation that legislation with more collective features shows lower ex post lobbying ratios.

Table D2: Ex Post Lobbying Ratio Based on Issue Codes

Rank	Issue	No. Bill ^a	Ex Post (%)
1	Education	41	49.7
2	Space, Science and Technology	39	47.4
3	Macroeconomics	29	46.1
4	Banking, Finance and Domestic Commerce	103	45.8
5	Energy	13	45.8
6	Law, Crime, and Family Issue	84	43.3
7	Agriculture	25	42.8
8	Government Operation	196	40.4
9	Health	96	38.4
10	Transportation	55	38.6
11	Foreign Trade	25	36.3
12	Environment	39	36.1
13	Defense	112	36.0
14	Social Welfare	20	35.9
15	Public Lands and Water Management	109	35.6
16	Civil Rights, Minority Issues and Civil Liberties	15	33.0
17	Labor, Employment and Immigration	27	32.0
17	Community Development and Housing Issues	14	32.5
18	International Affairs and Foreign Aid	41	31.7

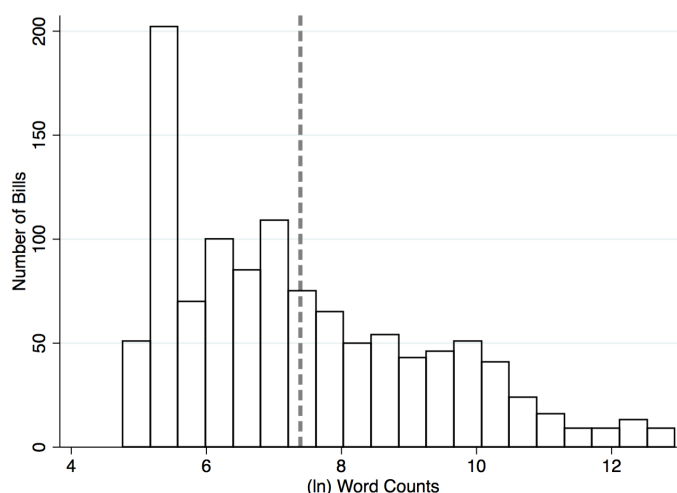
Notes: a. Number of bills in each category. Bills with categories of “Null” or 99 (Other, Miscellaneous, and Human Interests) are excluded.

Scholars have also suggested that word counts may be used to measure the level of discretion granted to bureaucracies (Huber, Shipan, and Pfahler 2001). More lengthy legislation is considered to be more specific, and therefore, less discretion is given to bureaucrats. Although legislation such as Dodd-Frank or the Affordable Health Care Act, which were passed

during this study's sample time period, do not seem to support the idea that the length of legislation is highly correlated with the degree of discretion given to federal agencies, especially when we compare bills across different issue areas. I follow the tradition and examine the relationship between word count in each piece of legislation and the ex post lobbying ratio.

For 1,122 bills, I measured the word count (including numbers) and Figure D5 presents the distribution of (log) word counts in bills. The mean count is 12,940 and it ranges from 116 to 416,168 (Affordable Care Act).

Figure D5: Distribution of Word Counts in Bills



Notes: Dashed lines indicate the mean (ln) word count.

Table D3 presents the regression results. When I control the duration of consideration and the total number of lobbying reports but do not control time trend and the issues, there is a statistically significant relationship between the word count in a bill and the ex post lobbying. As the legislation becomes lengthier, ex post lobbying tends to decrease (Columns (1) and (3)). However, once I control time trend (Congress FE) and issues (Issue FE), the relationship becomes weaker, although there is still a negative relationship.

D.6 Ex Post Lobbying for Bills that Reached the House Floor

In the main text, I present the evidence of ex post lobbying on bills that became public law. Although those bills are the most significant to and have the most influence on public policy, focusing on bills that passed Congress might not representatively show the general patterns of interest group lobbying activities. It is well known that only about 5% of the bills and resolutions introduced to Congress are signed into law.

Table D3: Bill's Word Count and Ex Post Lobbying

	All Bills		Bills with Roll Call Vote	
	(1)	(2)	(3)	(4)
(ln) Word Count of Bill	-0.0179*** (-3.29)	-0.00632 (-1.14)	-0.0276*** (-3.92)	-0.0133* (-1.93)
Duration of Consideration ^a	Y	Y	Y	Y
Congress FE	N	Y	N	Y
Issue FE	N	Y	N	Y
<i>N</i>	1120	1086	391	379
adj. <i>R</i> ²	0.117	0.225	0.135	0.331

Notes: a. months from introduction of a bill to the final vote in Congress. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To address the issue of whether bills that became public law drew different types of lobbying activities than bills that did not pass the Congress, I collect information on bills that originated in the House and are considered on the House floor from the 107th through the 111th Congresses. There are 3,202 different bills that originated in the House and reached the House floor throughout five different Congresses. Among them, 2,170 bills were mentioned at least once in a lobbying report. The total number of lobbying reports for those 2,170 bills that reached the House floor is 270,334.

Since some bills do not require the president to sign them into law and some failed to pass the Senate, the only common criteria across different types of bills that reach the floor is the date of the first House floor vote. Therefore, I use this date as a threshold to determine ex ante and ex post lobbying patterns for bills that became public law and bills that were not signed into law. Table D4 presents the results. If I set the threshold at the first House voting date, on average 67.5% of lobbying activities that targeted bills that passed the House but were not signed into law took place after the House passed the bill. For bills that became public law, 73% of lobbying activities targeting them took place after they passed the House floor. This suggests that the volume of lobbying activities that targeted specific legislation during the early stage of the legislative process, such as the committee stage, is smaller than what we usually assumed.

Table D4: Ex Post Lobbying Ratio Based on House Floor Vote Date (All cases)

Congress	Bills that Did Not Become Law			Bills that Became Law		
	No. Bill ^a	No. Reports ^b	Ex Post (%)	No. Bill	No. Reports	Ex Post (%)
107th	108	1,270	44.6	105	2,448	41.3
108th	128	2,382	40.9	152	4,670	40.7
109th	190	12,993	56.1	263	19,177	54.6
110th	371	44,483	62.6	266	57,536	70.2
111th	339	36,551	79.9	248	88,824	81.6
Total	1,253	97,679	67.5	1,034	172,655	73.1

Notes: Threshold = date of the first House floor vote. a: number of bills under the category in each Congress. b: number of lobbying reports in each category.

E Appendix: Examples of Lobbying Reports

Figure E1: Apple's 2014 First Quarter Lobbying Report (Page 1)

Clerk of the House of Representatives Legislative Resource Center B-106 Cannon Building Washington, DC 20515 http://lobbyingdisclosure.house.gov	Secretary of the Senate Office of Public Records 232 Hart Building Washington, DC 20510 http://www.senate.gov/lobby	<h1 style="margin: 0;">LOBBYING REPORT</h1>
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Lobbying Disclosure Act of 1995 (Section 5) - All Filers Are Required to Complete This Page

1. Registrant Name <input checked="" type="checkbox"/> Organization/Lobbying Firm <input type="checkbox"/> Self Employed Individual APPLE INC.			
2. Address Address1 901 15th STREET NW Address2 SUITE 1000 City WASHINGTON State DC Zip Code 20005 Country USA			
3. Principal place of business (if different than line 2) City Cupertino State CA Zip Code 95014 Country USA			
4a. Contact Name Mr. Timothy Powderly	b. Telephone Number 2027729500	c. E-mail glewis@apple.com	5. Senate ID# 4152-12
7. Client Name <input checked="" type="checkbox"/> Self <input type="checkbox"/> Check if client is a state or local government or instrumentality APPLE INC.			6. House ID# 314500000

TYPE OF REPORT 8. Year 2014 Q1 (1/1 - 3/31) ☒ Q2 (4/1 - 6/30) ☐ Q3 (7/1 - 9/30) ☐ Q4 (10/1 - 12/31) ☐

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 Issue Activity ☐

INCOME OR EXPENSES - YOU MUST complete either Line 12 or Line 13	
12. Lobbying INCOME relating to lobbying activities for this reporting period was: Less than \$5,000 <input type="checkbox"/> \$5,000 or more <input type="checkbox"/> \$ _____ Provide a good faith estimate, rounded to the nearest \$10,000, 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).	13. Organizations EXPENSE relating to lobbying activities for this reporting period were: Less than \$5,000 <input type="checkbox"/> \$5,000 or more <input checked="" type="checkbox"/> \$ 1,070,000.00 14. REPORTING Check box to indicate expense accounting method. See instructions for description of options. <input checked="" type="checkbox"/> Method A. Reporting amounts using LDA definitions only <input type="checkbox"/> Method B. Reporting amounts under section 6033(b)(8) of the Internal Revenue Code <input type="checkbox"/> Method C. Reporting amounts under section 162(e) of the Internal Revenue Code

Figure E2: Apple's 2014 First Quarter Lobbying Report (Page 2)

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. Add additional page(s) as needed.

15. General issue area code CPT

16. Specific lobbying issues

S. 1013, the Patent Abuse Reduction Act of 2013 S. 866, the Patent Quality Improvement Act of 2013 General Patent Reform, Standard Essential Patents (SEP) Issues ITC Litigation Reform Issues General Copyright Issues, IP Infringement, Piracy
--

17. House(s) of Congress and Federal agencies ☐ Check if None

U.S. SENATE, U.S. HOUSE OF REPRESENTATIVES, Federal Trade Commission (FTC), Justice - Dept of (DOJ)

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

First Name	Last Name	Suffix	Covered Official Position (if applicable)	New
Timothy	Powderly			<input type="checkbox"/>
Joseph	Fortson			<input type="checkbox"/>
Nick	Ammann			<input type="checkbox"/>
Walt	Kuhn			<input type="checkbox"/>
Alexis	Marks Mosher			<input type="checkbox"/>

19. Interest of each foreign entity in the specific issues listed on line 16 above ☒ Check if None

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