The Effects of Firms' Lobbying on Resource Misallocation*

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Abstract

We study the effect of firms' lobbying activities on the misallocation of resources in the U.S. through the distortion of firm size. To quantify the macroeconomic consequences of corporate political influence, we develop a multi-sector heterogeneous firm model with endogenous lobbying. We estimate our model using a novel firm-level lobbying dataset, while leveraging the variation in the returns to lobbying expenditures through changes in the value of firms' connections to politicians. Finally, we structurally estimate the model and show that eliminating lobbying increases aggregate productivity in the U.S. by 6 percent.

Keywords: Firm-level lobbying, misallocation, aggregate productivity
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Distortions in the allocation of resources across firms can reduce aggregate productivity in an economy (Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009). Firms' decision-making can influence this misallocation in a number of ways. For instance, by charging prices above marginal costs, firms can produce less than efficiently (Baqaee and Farhi, 2020); by saving and thus accumulating capital, firms can avoid financial constraints (Moll, 2014); and by choosing different buyers, firms can influence the techniques other firms use to produce (Boehm and Oberfield, 2020). Yet, an important dimension of firms' decision-making that is often overlooked in studying misallocation is their capacity to influence policy-making directly by lobbying. Politically active firms may obtain policy benefits at the expense of other firms (Khwaja and Mian, 2005; Kang, 2015), which could allow them to survive and grow more than they would have in a perfectly efficient economy.

In this paper, we study the effect of corporate lobbying activities on the misallocation of resources by examining firms' influence on policies that affect firm size. The main goal is to quantify the aggregate productivity effect of economic distortions that are influenced by firm-level lobbying activity. To achieve this goal, we develop a model that characterizes the microfoundations as well as the macroeconomic implications of corporate political influence. Our framework features standard ingredients from firm-level models, including heterogeneity in productivity, selection into production, and endogenous entry. It also features endogenous lobbying activity: Firms self-select into lobbying by paying a fixed cost, an idea motivated by Hopenhayn (1992) and Melitz (2003). Given this selection, firms then choose how much to lobby in order to gain policy benefits that provide revenue gains. Finally, we provide a microfoundation for this self-selection process through a simple game between a policymaker and firms, in the spirit of Grossman and Helpman (1994).

Our model identifies the mechanisms through which lobbying may affect misallocation. Importantly, these effects do not all point in the same direction. On the one hand, policy benefits create losses in aggregate productivity since they induce some firms to be too big relative to their size under optimal allocation. On the other hand, firms also face exogenous distortions when they lobby. This means they operate in a second-best world, making the effects of lobbying on aggregate productivity ambiguous *a priori* since lobbying might undo some of those exogenous distortions. The key parameters that discipline these forces are the correlations among the dimensions of firm heterogeneity, such as productivity in producing, productivity of lobbying, and exogenous distortions.

To resolve this uncertainty, we estimate our model to empirically evaluate the quantitative effects of lobbying on aggregate productivity. To estimate the parameters of our model, we construct a comprehensive dataset of firm-level lobbying covering all lobbying activities in the U.S. from 1999 to 2018 and establish a direct link between lobbying clients (i.e., firms) and the population of public firms. This dataset includes firms' lobbying expenses as well as which congressional committees the lobbying activity targeted. We do this by analyzing the textual descriptions from more than one million lobbying report filings since the 106th Congress to identify which bills were lobbied, and then we connect these bill to their originating committees.

Our modeling choices are then guided by key patterns that we identify from our firm-level lobbying dataset. First, we observe there is a strong selection into lobbying. Only around 12 percent of public firms lobby and these firms are significantly bigger than non-lobbying firms. Second, lobbying exhibits significant persistence in terms of the likelihood of entry into lobbying and exit from lobbying (i.e., the extensive margin) and also in terms of how much expenditure firms spend on lobbying (i.e., the intensive margin). Third, lobbying behavior seems to be more consistent with the hypothesis that returns to lobbying accrue to the specific firms that lobby and not to other firms in the same sector. Specifically, business organizations account for only a small fraction of total lobbying expenses while firms spend significantly larger amounts. Furthermore, the mean number of actors that lobby on any given bill in the last 20 years is just two. This suggests that concerns about free-riding and collective action are minimal. Finally, we find that firms tend to lobby congressional bills that are concerned with very narrow policy issues that directly affect them (e.g., a policy toward a specific product).

As noted, our model focuses on the extent to which lobbying affects misallocation by distorting firms' size. Therefore, we carefully estimate the parameter that captures the relationship between lobbying expenditure and firm size. Specifically, we build an instrumental variable (IV) to address the endogeneity between lobbying expenditure and firm size that is predicted by the model. Building upon Bertrand et al. (2020), we exploit exogenous variation in the value of firms' connections with politicians by tracing the assignment of those politicians to different congressional committees over time.[1] This variation will affect the returns to lobbying as firms are heterogeneously exposed to the jurisdictions of committees according to firms' characteristics, such as which products they

[1] As we show below, over 30% of legislators change their committee memberships across congressional sessions.

produce. The identification assumption is that individual firms cannot influence committee membership. Thus, we follow the strategy of a standard *shift-share* design, in which the share is the importance of a committee for a firm, and the identification comes from the shift in committee membership of politicians who are connected to those firms. We measure a connection between a firm and a politician as the geographic proximity between the firm's headquarter location and politicians' electoral districts. We find that a 10 percent increase in lobbying expenditure contributes up to a 1.3 percent gain in firms' value-added. Furthermore, our IV estimates are an order of magnitude larger in absolute value than the OLS ones, highlighting the importance of addressing the endogeneity in the relationship between lobbying expenses and firms' value-added. Furthermore, this bias can be rationalized through the lens of the model with the correlation between lobbying expenditure and lobbying productivity.

Finally, we perform counterfactual analyses to quantify the macroeconomic consequences of firms' lobbying activities. Specifically, we estimate the model with a simulated method of moments using the moments from firms' size distribution, firms' lobbying activities, and the estimates from the aforementioned instrumental variable analysis. We show that firms' lobbying expenses reduce aggregate productivity by 6 percent relative to an economy where the return to lobbying is set to zero. This reduction comes mainly from two sources. The first is that reducing lobbying leads to a decline in the dispersion of firms' marginal revenue product of inputs, which reflects an improved allocation of resources. The second is that, through a general equilibrium effect, wages decline so that entry becomes cheaper, increasing the number of firms in the economy. This indirect effect accounts for around 31 percent of the total effect, highlighting the importance of the model for understanding the general equilibrium and composition of the aggregate effect of firms' lobbying activities.

We contribute to two distinct literatures. First, we connect to the literature on the misallocation of resources across firms pioneered by Restuccia and Rogerson (2008) and Hsieh and Klenow (2009). This literature has studied different margins of firms' decision-making that influence the misallocation of resources, such as pricing decisions in output markets (Baqaee and Farhi, 2020), financial frictions in capital markets (Midrigan and Xu, 2014), contract enforcement in intermediate input markets (Boehm and Oberfield, 2020), and selection into production (Yang, 2020), to name a few. Nevertheless, this literature has missed an important dimension of firms'

decision-making, namely, their influence on policy through lobbying activity. An exception to this is Arayavechkit, Saffie and Shin (2018), who consider the effect of lobbying on capital misallocation, focusing specifically on the effect of lobbying on corporate taxation and distortion of capital intensity (which, in turn, can affect firm size). In contrast, we evaluate the overall macroeconomic consequences of lobbying through the distortion of firm size by developing a general equilibrium firm model that features endogenous lobbying.[2] To the best of our knowledge, our study provides the first quantitative evaluation of the overall aggregate effect of firms' lobbying activities on the misallocation of resources through firm size.

Next, we contribute to the political economy literature on corporate lobbying (Hansen and Mitchell, 2000; Ansolabehere, Jr and Tripathi, 2002). Specifically, our study explains why firms get bigger as a result of lobbying. This approach contrasts with the conventional focus on the opposite causal direction, whereby researchers investigate how firms of different sizes tend to have different propensities to engage in individual lobbying activities (Bombardini, 2008; Bombardini and Trebbi, 2012; Kim, 2017). To this literature, we make three contributions. First, we quantify not only the firm-level effects of lobbying but also its macroeconomic effects. We find significant private returns to lobbying, corroborating Richter, Samphantharak and Timmons (2009) and Kang (2015), while also documenting how politically connected firms may be responsible for inefficiencies in the U.S. economy.[3] Second, the model contributes to our understanding of the long-standing empirical puzzle of "why there is so little money in U.S. politics" (Ansolabehere, de Figueiredo and Snyder Jr, 2003). In particular, our model underscores the importance of the fixed cost of lobbying as well as firms' lobbying productivity in determining both the extensive and the intensive margins of lobbying. That is, there exists significant frictions in the political marketplace, as firms have to make significant investments to actively participate in lobbying (Kang, 2015). Finally, we build a novel dataset that contributes to the rapidly growing empirical literature that examines interest group lobbying (De Figueiredo and Richter, 2014; Bombardini and Trebbi, 2020). Our dataset covers the universe of lobbying activities since 1999 and is matched to activities of other political actors, including firms and politicians across various sectors and committees. We find that

[2]Note that, using our identification strategy, we do not find evidence for the effect of lobbying on the distortion of capital intensity.

[3]Callander, Foarta and Sugaya (2021) provide theoretical accounts of the relationship between market competition and political influence.

firm-level lobbying expenditures are significantly larger than those by sectoral-organizations.

The remainder of the paper is organized as follows. The next section describes the data and documents a set of stylized facts about firms' lobbying behavior. Section II presents the model, which is guided by the patterns identified from the data. Section III quantifies the effects of lobbying on misallocation based on the estimation of the model and counterfactual analysis. Section IV concludes.

I Data and Facts

We construct a novel database that connects firm-level economic activities with firm-level political behavior for all publicly traded firms in the U.S. from 1999 to 2018. The Lobbying Disclosure Act (LDA) of 1995 requires lobbyists to disclose their "lobbying activities"[4] on behalf of their clients.[5] We parse more than one million original filings available from the Senate Office of Public Records (SOPR) and the House of Representatives Legislative Resource Center (LRC). Each report contains information on the firm paying for the lobbying, the total amount the firm spent on lobbying in the period covered by the report, a list of issues lobbied, whether lobbying activity was in-house or not, and lobbied legislative bills.[6]

Note that compliance with the LDA is closely monitored and enforced. Although the contents of lobbying reports as well as the incurred expenses are based on good-faith descriptions and estimates by lobbyists, the reports are audited annually by the Government Accountability Office (GAO). According to the 2014 audit report, 90% of lobbyists filed lobbying reports as required, and 93% could provide documentation related to the expenses.[7] As of 2015, any lobbyist who fails to comply with the legal reporting requirements may be subject to a $200,000 fine, up to 5 years of imprisonment, or both. Furthermore, lobbyists must immediately file an amendment to their original filing if they are notified of any error or they omitted any relevant information. Indeed, lobbying information in the LDA reports has become a reliable source for studying lobbying (e.g.,

[4] "Lobbying activities" are defined as "any oral or written communication (including an electronic communication) to a covered executive branch official or a covered legislative branch official that is made." The full list of the covered federal agency names is available from the Office of the Clerk, U.S. House of Representatives.

[5] If a firm has its own in-house lobbying department, it should register and file lobbying reports indicating that it is "self" filing. In our sample, about 85% of lobbying is outsourced.

[6] The LDA mandates that lobbyists disclose any congressional bill number, title, and section associated with the lobbying.

[7] The 2014 GAO report on lobbyists' compliance with disclosure requirements is available at http://www.gao.gov/products/GAO-15-310

Ansolabehere, Jr and Tripathi, 2002; Bombardini and Trebbi, 2012; Bertrand, Bombardini and Trebbi, 2014).

Our dataset is unique in two dimensions. First, we establish a direct link between lobbying clients (i.e., firms who hire lobbyists) and all public firms in the U.S., which means we can connect firms that lobby with a battery of economic information, such as firm size and profit in order to quantify the aggregate economic distortions due to firm-level lobbying activity. Indeed, the lack of standard company identifiers in the lobbying reports has been a major constraint for conducting firm-level analysis of political activities and their economic consequences. To the best of our knowledge, researchers have either studied firms and trade associations at the level of sectors (up to 4-digit Standard Industrial Classification) or focused primarily on a limited set of Fortune 500 and S&P 500 corporations (e.g., Bombardini and Trebbi, 2012; Bertrand et al., 2020).[8] We overcome this limitation and study political behavior of all publicly traded firms from 1999 to 2018. Specifically, we utilize natural language processing, name entity matching algorithms, and manual matching to link 67,842 unique lobbying client names to the list of public firm names and their standardized company identifiers available from COMPUSTAT. Appendix I describes the details of this procedure. The lobbying database as well as the firm identifiers (GVKEY) are made publicly available at http://www.LobbyView.org.

Second, we measure the importance of each congressional committee for each individual firm i in year t by analyzing the complete list of bills that have been lobbied by the firm up to $t-k$. Specifically, we first identify the complete list of bills that have been lobbied by firm i. We then identify the committee c to which each bill is assigned, which gives us a comprehensive list of the committees with jurisdiction over bills of interest to firm i. Because we know how many bills that the firm lobbied were assigned to each committee, we also have a measure of the *degree of importance* of each committee to each firm across time, w_{ict}. Our approach differs from Bertrand, Bombardini and Trebbi (2014), who assign lobby issues[9] to each congressional committee *a priori*. For example, they link the Senate Finance committee to the following lobbying

[8] See Kim (2017) for an exception based on which we make further improvements disambiguating more firm names covering the period up to 2018.

[9] Section 15 of each LDA report specifies the general issue areas of lobbying, such as TAX (`Taxation/Internal Revenue Code`) and TRD (`Trade (Domestic & Foreign`). The full list of 79 issue codes is available from the Office of the Clerk, U.S. House of Representatives.

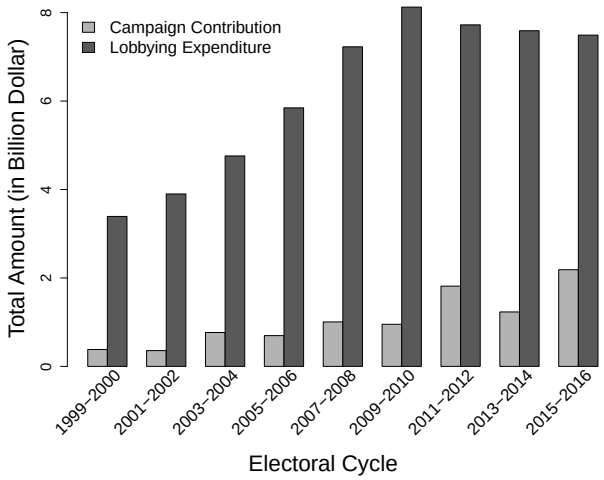


Figure 1: **Campaign Contributions vs. Lobbying Expenditures.** This figure compares total campaign contributions to total lobbying expenditures in each election cycle (from September in one year to August the next). We used data from the Federal Election Committee (available from http://classic.fec.gov/finance/disclosure/ftpdet.shtml) to calculate campaign contributions, which is the sum of "contribution or independent expenditure made by a PAC, party committee, candidate committee, or other federal committee to a candidate during the two-year election cycle." Note that we exclude individual contributions to facilitate the comparison with the lobbying expenditure.

issues: Unemployment, Trade, Taxation, Welfare, Retirement, and Medicare/Medicaid.[10] Note that issues may be mapped to multiple committees with equal weights. They then consider the "issue overlap" between firms and politicians based on lobbied issues and committee memberships. We improve upon this approach by exploiting the *direct* link between bills that are actually lobbied by individual firms and the committees with jurisdiction over those bills. We also have a measure of the degree of importance of each committee for each firm by incorporating the frequency with which the firm lobbies bills assigned to each committee. We provide further details about this measure in Section III.

A Stylized Facts

In this section, we document seven facts from our data about the relationship between firm economic characteristics and their lobbying activities. Although some of these facts have been documented in earlier studies (e.g., Kerr, Lincoln and Mishra, 2014; Arayavechkit, Saffie and Shin,

[10]For the complete list of mappings between congressional committees and issue codes used by Bertrand, Bombardini and Trebbi (2014), see https://assets.aeaweb.org/assets/production/articles-attachments/aer/app/10412/20121147_app.pdf

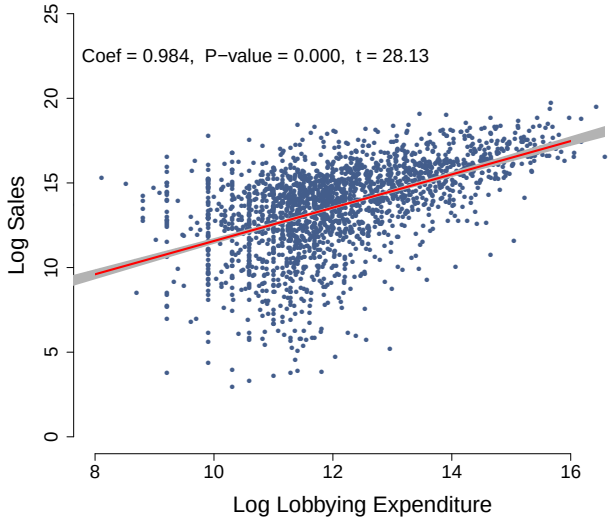
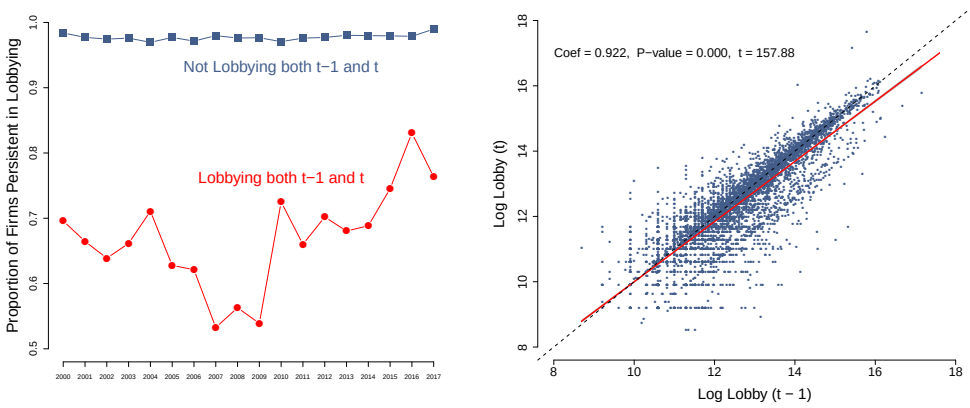


Figure 2: **Sales and Lobbying Expenditure.** This figure plots firm size, measured by a firm's sales, against lobbying expenses for the subset of public firms that engage in lobbying.

2018), we highlight that, to the best of our knowledge, no previous work has provided the following stylized facts at this scale encompassing lobbying and campaign donations by public and private firms, legislative activities, and federal government agencies between 1999 and 2018.

Fact 1 *Firm lobbying is relatively rare.* Lobbying Congress is a relatively rare firm activity. Of the 7,646 public firms operating in the United States in 2017, only 766 firms engaged in lobbying. In the period from 1999 to 2018, on average just 11.8 percent of public firms lobbied Congress. Table IV.1 in Appendix IV illustrates this point by looking at lobbing activity across two-digit NAICS sectors. We consistently find that lobbying is relatively rare. For example, only about 5 percent of firms in the Finance and Insurance sector (NAICS code 52) have reported that they engaged in lobbying on any policy issues. The most active sector appears to be Education Services (NAICS code 61), in which almost a quarter of firms lobbied—meaning a full three-quarters did not. The percent of firms with their own in-house lobbying department is even smaller, ranging from 0.8% (real estate, rental, and leasing) to 15.3% (utilities).

Fact 2 *More money is spent on lobbying than on campaign contributions.* Tullock (1972) famously asked, "Why is there so little money in U.S. politics?" The so-called "Tullock's Puzzle" is based on the observation that campaign contributions in the 1970s came to only about $200 million, an amount significantly smaller than the hundreds of billions of dollars in public expenditures



(a) Extensive Margin (b) Intensive Margin

Figure 3: **Persistence of Lobbying in the Extensive and Intensive Margins.** We find that firm-level lobbying activities are persistent both at the extensive margin (lobbying or not) and intensive margin (expenditure amount conditional on lobbying).

at the time. Researchers still find that campaign contributions are smaller than public spending by the government (Ansolabehere, de Figueiredo and Snyder Jr, 2003). In contrast, we find that lobbying expenditures are significantly larger than campaign contributions. To be sure, money spent on lobbying is still significantly smaller than the federal budget of about $4 trillion (as of 2016). However, as Figure 1 shows, we find that lobbying involves more money than campaign contributions made by all PACs (political action committees), party committees, candidate committees, and other federal committees combined. (Firms cannot themselves make contributions to candidates, meaning the two types of contributions are not entirely comparable, but firms can make contributions to PACs.)

Fact 3 *Firms' revenues and lobbying activity are positively and robustly correlated. This holds both in the extensive and intensive margin.* As observed in the literature, firms that engage in lobbying tend to be larger than politically inactive firms in the extensive margin (Kim and Osgood, 2019). Figure 2 shows that the positive correlation between firm size (measured by sales) and lobbying expenditure holds for the intensive margin as well. That is, conditional on lobbying, larger firms tend to spend more money on lobbying than smaller firms (which is consistent with Bombardini and Trebbi (2012)).

Fact 4 *Lobbying behavior is highly persistent. This holds both in the extensive and intensive*

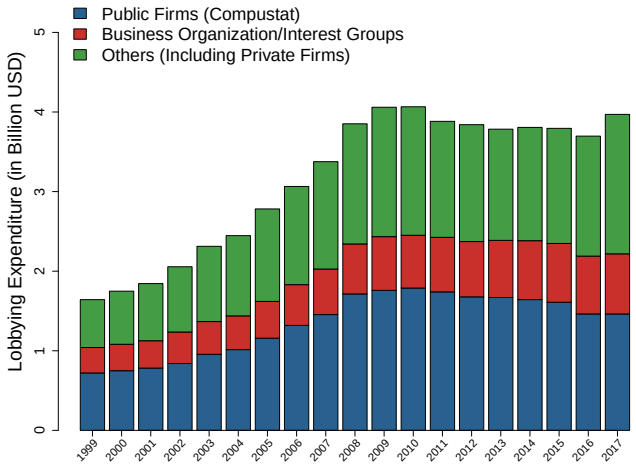


Figure 4: **Firm vs Sector Level Lobbying Expenditures.** This figure compares the total lobbying expenses by firms and sectoral organizations. We first identify all public firms from the COMPUSTAT database (blue). To identify sectoral organizations (red), we included all lobbying clients with NAICS code 813910 ("Business Associations") along with other entities whose legal name includes "associations" or "ASSN." All other entities, such as private firms and universities, are grouped as "Others" (green). We find that firm-level lobbying is significantly larger than sector-level lobbying.

margin. Over time, lobbying activities are highly persistent (as documented in Kerr, Lincoln and Mishra (2014)). We examine this by tracking the lobbying activities of all public firms in two consecutive years. The left panel of Figure 3 shows that almost all firms that did not lobby in the previous year tend not to lobby in the next year. On the other hand, firms that engaged in lobbying continue their political activities. For example, more than 80% of firms that lobbied in 2016 continued lobbying in 2017. Note that this is a conservative measure of the persistence of lobbying as we focus exclusively on two consecutive years. In fact, we observe a significant drop in the sticky behavior during the financial crisis of 2007–2009, but the overall persistence becomes much higher as we allow for a wider window over time. The right panel shows that on the intensive margin, there exists a positive and robust correlation between a firm's lobbying expenses in year $t-1$ and year t conditional on lobbying in both years. Moreover, we find that the amounts firms spend on lobbying are also persistent in absolute value (indicated by the dotted 45 degree line). This is an important empirical fact that motivates our identification in Section III as we rely on the exogenous increases in the *value* of lobbying through political connections rather than a strategic response in the amount of lobbying expenses at the firm level when we evaluate the economic

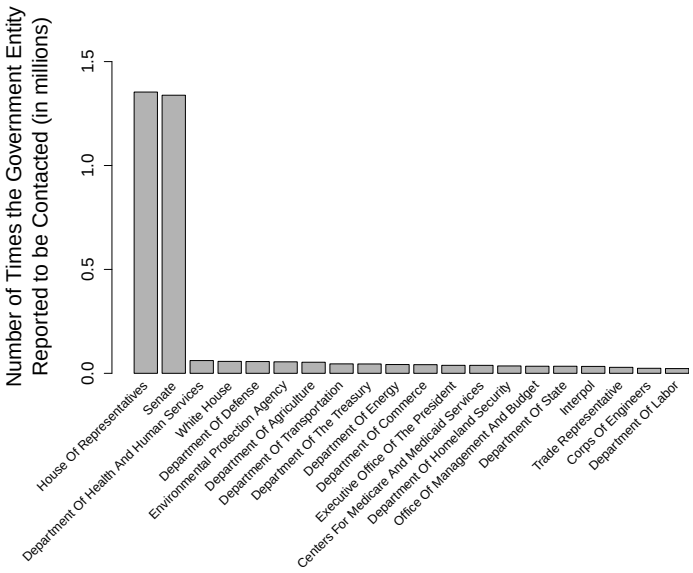


Figure 5: **Top 20 Contacted Government Entities.** This figure shows that the House of Representatives and the Senate are more likely to be contacted by lobbyists than other federal government agencies.

effect of their lobbying activities.

Fact 5 *Firm-level lobbying activities account for a significant portion of federal lobbying.* To date, empirical studies of special interest group politics have focused primarily on sector-level political spending (Goldberg and Maggi, 1999; Gawande and Bandyopadhyay, 2000). Although lobbying through sectoral associations is certainly important, we find that firms' individual lobbying activities are at least as prevalent as those by sectoral organizations. Figure 4 shows that firm-level lobbying expenses (blue) are in fact much larger than those by sectoral and business organizations combined (red). If lobbying expenses by all private firms (green) are added to those of public firms, the difference between firm and sectoral lobbying becomes even larger.

Fact 6 *Most lobbying activities target the Congress*. Lobbyists must disclose "the Houses of Congress and Federal agencies" they contacted during the reporting period for each lobbied issue. We identified 227 unique government entities that have been contacted across all lobbying reports after disambiguating their names (e.g., USTR and US Trade Representative). We find that most lobbying efforts target the House of Representatives and the Senate rather than federal government agencies. Indeed, 96.58% of reports that identify at least one contacted government entity reported contacting the House or Senate. Figure 5 displays the top 20 contacted government entities in terms of the number of times they were reported as a contacted entity in each issue, further highlighting

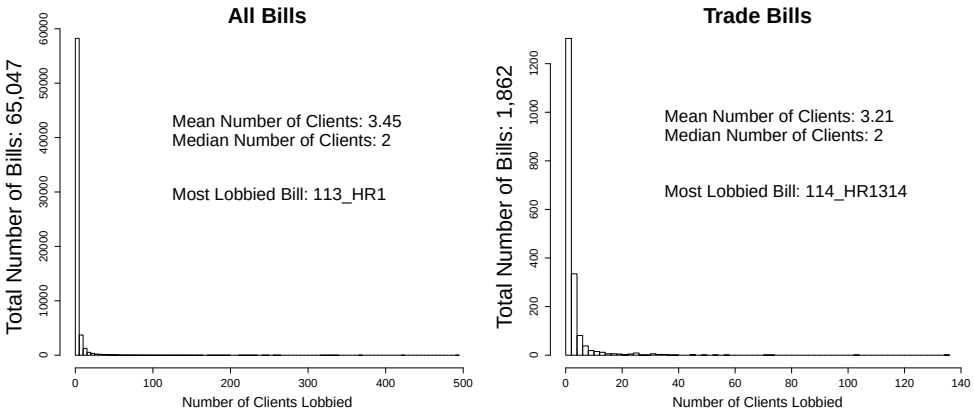


Figure 6: **Distribution of the Number of Lobbyists per Bill (106th–115th Congress).** This figure depicts the distribution of the number of lobbying clients that lobby each congressional bill. The left panel shows that the median number of clients that lobby on any given Senate or House bill is two (total number of bills: 65,047). The right panel shows a similar pattern for trade bills specifically (total number of bills: 1,862).

the significance of the Congress compared to other agencies when it comes to lobbying.[11]

Fact 7 *Most congressional bills are lobbied by only one or two interest groups.* According to the Lobbying Disclosure Act of 1995, interest groups are legally required to report any congressional bills that they have lobbied. For example, Bose Inc. reported that it lobbied Senate bill "A bill to reduce temporarily the duty on certain audio headphones achieving full-spectrum noise reduction" (S.2325) in the 109th Congress. This is a bill that reflects the highly specialized interests of a particular firm, and in fact Bose Inc. was the only firm that reported lobbying on the bill. Figure 6 shows that lobbying activities reflect narrow interests of political actors who tend to lobby individually. Specifically, we find a highly skewed distribution of the number of interest groups that lobby on any given bill, with a median of two. We find similar patterns across specific policy areas, such as trade bills, as shown by the right panel. Appendix IV shows the distribution across all 79 lobbying issues.

We now turn to our theoretical model which incorporates the significance of firm-level lobbying targeting narrow policy benefits. Guided by the aforementioned facts, the model includes key ingredients related to selection into lobbying (Fact 1), relationship between firm size and lobbying (Fact 3), lobbying Congress (and thus influencing bills) rather than lobbying other government agencies (Fact 6) and focusing in lobbying on firm-specific policies (Fact 7). Finally, we do not

[11] Note that there can be multiple lobbied issues per report.

model (a) the dynamics since lobbying is highly persistent (Fact 4), (b) alternative political channels such as campaign contributions due to the dominance of lobbying (Fact 2), and (c) industry-level strategic interactions (and thus ignoring issues such as free-riding) given the prevalence of firm-level lobbying (Facts 5).

II A Theory of Firm-Level Lobbying

In this section, we develop a heterogeneous firm model with endogenous lobbying decisions to investigate the misallocation of resources across firms through the creation of distortions. We introduce a model that generalizes Hsieh and Klenow's (2009) framework along the lines of Hopenhayn (1992) and Melitz (2003) but for lobbying rather than international trade. Specifically, we incorporate a firm's decision about whether to lobby or not (the extensive margin) and how much to spend on lobbying activity (the intensive margin). In the baseline version of the model, the mapping between lobbying effort and distortions is taken as given, which facilitates our exposition of the misallocation of resources among firms. Appendix II presents a potential microfoundation for the mapping assumed in the baseline model. We accomplish this by incorporating a simplified version of Grossman and Helpman (1994)'s lobbying model.

Overview of the Model The model includes a firm's decision on whether to lobby as well as how much to spend on lobbying. Lobbying activity entails benefits and costs. The benefits are distortions that increase the firms' revenues beyond what they otherwise would get. The costs are the expenditures the firms make on lobbying, which include a variable and a fixed component. The fixed component of lobbying costs implies selection into lobbying since only a subset of firms will have enough profits to cover these costs. Firms that lobby will obtain benefits through distortions at the cost of directly spending resources in lobbying and also indirectly through changes in aggregate misallocation and price changes through general equilibrium. This is the main mechanism the model explores. Besides firms' lobbying decisions, the model has other standard ingredients such as selection into production and firm entry as in Melitz (2003).

Setup The economy is populated by a representative household and a mass M of firms, distributed across sectors indexed by s. Each firm produces a unique variety ω of a differentiated good. Firms are different in idiosyncratic states in production, lobbying, and exogenous distor-

tions. These states are denoted by $\phi = (\phi^P, \phi^L, \phi^D)$, where ϕ^P, ϕ^L and ϕ^D is a Hicks-neutral productivity term, a lobbying productivity term, and an exogenous distortion term, respectively.[12] Given the setup of the model, firms are characterized by ϕ in the sense that all firms that produce varieties with the same ϕ behave in the same way. There is an exogenous probability function over firm states denoted by G, with density g, over $\phi^P \in (0, \infty)$, $\phi^L \in (0, \infty)$ and $\phi^D \in (0, \infty)$. Similarly, there is an endogenous probability function over firm states after firm selection into production, denoted by $\hat{G}_s$, with density $\hat{g}_s$.[13]

Household The household inelastically supplies N units of labor while receiving firms' profits and revenues from government policies. It has nested preferences first over different sectors and second over firms' differentiated varieties within sectors:

$$Y = \prod_{s=1}^{S} Y_s^{\theta_s}, \quad \text{with} \quad \sum_{s=1}^{S} \theta_s = 1 \tag{1}$$

$$Y_s = \left[\int_{\omega \in \Omega_s} c_s(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}}, \tag{2}$$

where S is the number of sectors, $\{\theta_s\}_{s=1}^{S}$ are the Cobb-Douglas shares, Ω_s is the endogenous set of varieties in s, and $c_s(\omega)$ is consumption of variety ω of sector s. Y_s is the aggregate demand for sector s with a constant elasticity of substitution (CES) across varieties ω within sector s, and M_s is the endogenous mass of firms in sector s. Sectors have a common elasticity of substitution, $\sigma > 1$. Households maximize their utility subject to their budget constraint.

Technology Each firm produces output of a differentiated variety with a linear technology in labor:

$$y_s(\phi) = \phi^P n_s(\phi), \tag{3}$$

where $y_s(\phi)$ and $n_s(\phi)$ are value-added and employment of firm ϕ in sector s, respectively.[14] In order to produce, firms in each sector s have to spend f_s^P units of labor.

[12] We do not include a quality demand shifter because it is standard to show that in this class of models, and with the available data, one cannot separately identify the demand shifter from the Hicks-neutral productivity term.

[13] Note that while the exogenous probability is the same across sectors, the endogenous probability function over firm states varies across sectors because selection into production is heterogeneous across sectors.

[14] The model can be easily extended to include demand shifters and decreasing returns to scale in production. This might be important given the caveats of Hsieh and Klenow (2009)'s framework described in Haltiwanger, Kulick and Syverson (2018).

Market Structure The market structure of this economy is monopolistic competition. This is a standard assumption in the literature that implies that firms charge a constant markup over marginal costs.[15]

Distortions Firms face output distortions $\tau_s(\cdot) \in (0, \infty)$.[16] These distortions can be thought of subsidies if $\tau_s(\phi) > 1$ or taxes if $\tau_s(\phi) < 1$, and they can come from regulations, such as sales taxes. For the purpose of this paper, we need not take a stand on the specific source for these distortions. We assume these distortions are collected as revenue by the government and rebated back to the household via a lump-sum transfer, T, thus keeping a balanced budget. The distortions are defined by:

$$\tau_s(\phi) = \begin{cases} \tau^{NL}(\phi) = \phi^D, \ if \ l_s(\phi) = 0 \\ \tau_s^L(\phi) = (\phi^L l_s(\phi))^{\delta} (\phi^D)^{1-\delta}, \ if \ l_s(\phi) > 0 \end{cases} \tag{4}$$

where $l_s(\phi)$ are the resources allocated towards lobbying activity (which could be zero), δ is a parameter that governs the returns to lobbying on distortions, and ϕ^D is the exogenous distortion. Thus, there are two sources of distortions in this economy: An endogenous one that comes from lobbying activity and an exogenous one. We include an exogenous distortion to account for other possible sources of misallocation and thus not attribute all misallocation in the economy to lobbying activity. This is important because this allows lobbying to potentially be beneficial in terms of misallocation. Without the exogenous distortion, lobbying would necessarily be bad for misallocation, whereas in this model, it could be good as it could undo the exogenous distortions. In Appendix II we provide a microfoundation for this mapping between lobbying effort and distortions. We develop a game between the government and firms, which is a simple version of Grossman and Helpman (1994).

Lobbying Decision Firms can decide whether to spend resources on lobbying. In order to lobby, a firm ϕ in sector s has to spend f_s^L units of labor as the fixed lobbying cost. This governs the extensive margin of lobbying activity. Conditional on lobbying, ϕ has to choose how much to

[15] Note that, we allow for heterogeneous markups between sectors, because the elasticity of substitution in demand varies across sectors.

[16] The fact that $\tau_s(\cdot) \in (0, \infty)$ comes from the assumption that $\phi^L \in (0, \infty)$, $\phi^D \in (0, \infty)$ and $l_s(\cdot) > 0$. In Hsieh and Klenow (2009), $\tau_s(\cdot)$ are called wedges instead of distortions. We ignore distortions between labor and capital because empirically we find that lobbying does not seem to distort that margin, as described in Section III.

spend on lobbying activity, $l_s(\phi)$. When making this decision, the firm compares the benefits from lobbying, which are given by the additional revenue provided by the distortion, to the variable cost of spending $l_s(\phi)$ resources on lobbying.

Market Clearing Conditions Market clearing conditions in this economy are characterized by firms' output, labor, and a government balanced budget constraint:

$$y_s(\phi) \geq c_s(\phi), \ \forall s, \ \forall \phi \tag{5}$$

$$N \geq \sum_{s=1}^{S} M_s^E f_s^E + \sum_{s=1}^{S} \left(\int \left(n_s(\phi) + f_s^P + \mathbb{1}^L(\phi) \left(l_s(\phi) + f_s^L \right) \right) d\hat{G}_s(\phi) \right) \tag{6}$$

$$T = \sum_{s=1}^{S} \int \left(\tau_s(\phi) - 1 \right) r_s(\phi) d\hat{G}_s(\phi), \tag{7}$$

where $\mathbb{1}^L(\phi)$ is an indicator function set to one if firm ϕ chooses to lobby, M_s^E is the mass of firms entering sector s, f_s^E the labor cost to enter sector s, and $r_s(\phi)$ is firm ϕ's revenue.

Zero-Profit Conditions Given the fixed production and lobbying costs, firms' production and lobbying extensive margin decisions are characterized by the following zero-profit conditions (ZPC):

$$\text{(ZPC-PRODUCTION)} \quad \pi_s^{NL}(\phi_s^*) = 0 \tag{8}$$

$$\text{(ZPC-LOBBYING)} \quad \pi_s^{L}(\phi_s^{**}) = \pi_s^{NL}(\phi_s^{**}), \tag{9}$$

where $\pi_s^{NL}(\cdot)$ and $\pi_s^{L}(\cdot)$ are the profit functions if the firm does not lobby and does lobby, respectively. Equations (8) and (9) define the productivity cutoff functions $\phi_s^{P*}(\phi^D)$ and $\phi_s^{P**}(\phi^D, \phi^L)$, which identify the levels of productivity above which firms produce and lobby, respectively. Note that the production cutoff depends on the distortion ϕ^D and the lobbying cutoff depends on (ϕ^D, ϕ^L). This implies that firms that have different distortions $\tau_s(\phi)$, given by either ϕ^D or ϕ^L, will need a different productivity cutoff to select into either production and lobbying.

The zero-profit conditions imply that if a firm in sector s has $\phi^P = \phi_s^{P*}(\phi^D)$, then it will not lobby and its net profits from producing will be zero. Thus, since $\pi_s^{NL}(\cdot)$ is increasing in its arguments, firms with $\phi^P < \phi_s^{P*}(\phi^D)$ do not find it profitable to produce. Conversely, firms

with $\phi^P \geq \phi_s^{P*}(\phi^D)$ do find it profitable to produce, but maybe not to lobby. Similarly, firms with $\phi^P = \phi_s^{P**}(\phi^D, \phi^L)$ choose to both produce and lobby, but they gain zero net profits. Firms with $\phi_s^{P*}(\phi^D) \leq \phi^P < \phi_s^{P**}(\phi^D, \phi^L)$ choose to produce but not lobby whereas those with $\phi^P \geq \phi_s^{P**}(\phi^D, \phi^L)$ choose to lobby. Thus, these ZPC imply productivity cutoffs in firms' states that characterize firms' extensive margin decisions about production and lobbying activity.

The following proposition summarizes the forces in the model that interact in the selection into producing and lobbying.

Proposition 1. *The zero-profit conditions from Equations* (8) *and* (9) *imply the following selection rule into producing and lobbying:*

$$\phi_s^{P*}\left(\phi^D\right) = \left(\frac{1}{\phi^D}\right)^{\frac{\sigma}{\sigma-1}} \left(\frac{\sigma w f_s^P}{D}\right)^{\frac{1}{\sigma-1}} \mu w, \tag{10}$$

$$\frac{\phi_s^{P**}(\phi^D, \phi^L)}{\phi_s^{P*}(\phi^D)} = \left[\frac{1}{(1-\sigma\delta)\gamma\left(\phi^L(\phi^D\phi_s^{P**})^{\sigma-1}\right)^{\frac{\delta\sigma}{1-\delta\sigma}} - 1}\right]^{\frac{1}{\sigma-1}} \left(\frac{f_s^L}{f_s^P}\right)^{\frac{1}{\sigma-1}} \tag{11}$$

where D is the aggregate demand shifter. Equation (11) *delivers an implicit function of $\phi_s^{P**}(\phi^D, \phi^L)$. We can show the following comparative statics*

$$\frac{\partial \frac{\phi_s^{P**}(\phi_s^D, \phi^L)}{\phi_s^{P*}(\phi^D)}}{\partial \phi^L} < 0 \tag{12}$$

$$\frac{\partial \frac{\phi_s^{P**}(\phi_s^D, \phi^L)}{\phi_s^{P*}(\phi^D)}}{\partial \phi^D} < 0 \tag{13}$$

Proof. All proofs are in Appendix II. ■

Equation (10) shows that selection into production is weaker the larger exogenous distortions a firm faces. Firms with larger exogenous distortion can have a lower productivity and still select into production since the distortions acts as a subsidy to their productivity. Equation (11) shows that productivity cutoff into lobbying is larger than the one into production, i.e., $\phi_s^{P**}(\phi^D, \phi^L) > \phi_s^{P*}(\phi^D)$, if either of three things happen. First, the fixed cost of lobbying is larger than the fixed cost of producing ($f_s^L > f_s^P$). If this is true, then the firm needs a higher productivity in order to select into lobbying. Second, as with selection into production, ϕ^D is lower, because it works as a subsidy to productivity. Thus, firms with a lower subsidy need a higher productivity to cover the lobbying fixed cost. Finally, following a similar intuition, ϕ^L is lower, because it implies a less

favorable policy. These insights will be useful when evaluating the implications of the model in Section III.

Free Entry Firms have to pay an entry cost of f_s^E units of labor in order to have the option to take a draw of their state ϕ. The free entry (FE) condition is characterized by the following:

$$\text{(FE)} \quad V_s^E = 0, \tag{14}$$

where $V_s^E = \mathbb{E}\left[\bar{V}_s - w f_s^E\right]$ and $\bar{V}_s$ are the expected net and gross value of entry in sector s, respectively.[17] More details about the full solution of the model can be found in Appendix II.

Lobbying and Revenues Given the setup of the model, Proposition 2 summarizes the relationship between lobbying expenditures and the value of lobbying.

Proposition 2. *Using the first order conditions, the relationship between lobbying expenditure and firms' output, for firms with $\phi^P > \phi_s^{P**}(\phi^D, \phi^L)$, is the following:*

$$\log r_s(\phi) = \gamma_0 + (1-\delta)\log l_s(\phi) - \left(\delta \log \phi^L + (1-\delta)\log \phi^D\right). \tag{15}$$

The result comes from the first-order condition of firms' intensive margin decision on lobbying. It says that the relationship between lobbying expenditure and value-added is log linear, with a return of $1-\delta$. The residual of this relationship is a log-linear combination of firms' lobbying productivity, ϕ^L, and firms' exogenous distortion, ϕ^D. Importantly, this proposition shows why running a simple ordinary least squares (OLS) between lobbying expenditure and firms' value-added would induce a biased estimate of $1-\delta$, since potentially $corr(\log l_s(\phi), \log \phi^L) \neq 0$ and $corr(\log l_s(\phi), \log \phi^D) \neq 0$. The sign of these two correlations will determine the direction of the bias. For instance, one conjecture is that firms that are more productive in producing are also more productive in lobbying. Under this conjecture, the OLS estimate would underestimate the true effect of lobbying on firm size. We revisit this issue in Section III, but for now we highlight that the model provides a clear interpretation of the positive relationship between firm size and lobbying, while revealing the limitations of the naive inference based on the correlation between these two observable characteristics.

[17] $\bar{V}_s = \sum_{t=0}^{\infty}(1-\eta)^t \bar{\pi}_{s,t}$, where η is the exogenous death rate of firms and $\bar{\pi}_{s,t}$ is the average profit of firms in sector s at time t.

Lobbying and Misallocation We now show how the relationship between lobbying, distortions, and firm outcomes influences aggregate productivity. Proposition 3 directly characterizes the connection, extending the aggregation result from Hsieh and Klenow (2009).

Proposition 3. *Aggregate output and sectoral productivity in this economy is given by the following:*

$$Y = \prod_{s=1}^{S} \left(\Phi_s^P N_s\right)^{\theta_s} \tag{16}$$

$$\Phi_s^P = \underbrace{\left(\frac{M_s}{\mu}\right)^{\frac{1}{\sigma-1}}}_{Entry} \underbrace{\frac{N_s^P}{N_s}}_{Productive\ Labor} \underbrace{\left[\int \left(\phi_s^P \frac{\overline{TFPR}_s}{TFPR_s(\phi)}\right)^{\sigma-1} d\hat{G}_s(\phi)\right]^{\frac{1}{\sigma-1}}}_{Aggregation\ of\ Firms'\ Productivity}, \tag{17}$$

where Φ_s^P is aggregate productivity in sector s, N_s^P is total labor used directly in production as opposed to paying for fixed costs, $\hat{G}_s(\cdot)$ is the equilibrium cumulative distribution function of firms that produce in the economy, $TFPR_s(\phi) = p_s(\phi)\phi^P$ is the revenue-productivity of firm ϕ in sector s, i.e., the market value of firms' productivities, and $\overline{TFPR}_s$ is the average revenue-productivity across firms within sector s. Equation (17) shows that aggregate productivity in this economy is determined by three forces: (1) firm entry, (2) the use of fixed costs in the economy, and (3) how firms' productivity is aggregated. It is in this last term that one can see the direct influence of distortions on aggregate productivity, as the distortions affect how much each firm is weighted in this aggregation.[18] Intuitively, in the absence of distortions, $TFPR_s(\phi) = \overline{TFPR}_s$, and thus firms are aggregated according to the weights given by $\hat{G}_s(\cdot)$. In the presence of distortions, this is no longer the case. Firms that have a higher output distortion, $\tau_s(\phi)$, say because they lobby more, will have lower marginal revenue products, and thus a lower revenue-productivity, $TFPR_s(\phi)$, than the average firm from their sector. This implies that the productivity of firms with higher output distortions will influence aggregate productivity more than they would in the absence of distortions. This is the mechanism we explore quantitatively in Section III.

[18] This is only a partial equilibrium analysis because changes in the distortions might also affect how resources are used in fixed costs and how many firms enter. The general equilibrium effects of changes in lobbying and distortions are postponed until the quantitative analysis in Section III.

III Empirical and Quantitative Analysis

This section presents the main empirical and quantitative findings. First, we describe the instrumental variable (IV) approach we employ to estimate the key relationship identified in the model (see Proposition 2). Second, we take moments from the data and use them to estimate the parameters of the model. Finally, using these estimates, we present the main quantitative findings based on a series of counterfactual analyses to investigate how lobbying affects the misallocation of resources and aggregate productivity.

A Evidence of Lobbying Expenditures' Impact on Firm Size

Lobbying Instrument The relationship between lobbying expenditures and firm size is subject to endogeneity, which is shown explicitly in Proposition 2. The effect of lobbying expenditure on value-added needs to account for the potential confounding due to the productivity of lobbying. That is, for identification, one needs variation in lobbying expenditure that is exogenous to variation in firms' lobbying productivity, as lobbying is chosen as a function of its productivity. To address this, we propose an instrument that captures changes in the profitability of lobbying, holding constant firms' primitives. The instrument measures changes in the marginal value of firms' lobbying expenditures by exploiting (a) changes in politicians' committee membership in the U.S. Congress, (b) heterogeneity in firms' exposure to committee activity, and (c) firms' political connections. It follows a standard shift-share design. To begin, we follow Bertrand, Bombardini and Trebbi (2014) to measure shifts in the value of lobbying based on politicians' changes in committee membership in Congress, which affects firms heterogeneously because firms vary in their connections to politicians and in their exposure to different committees' activities. Formally, the instrument is defined as follows:

$$z_{it} = \sum_{j \in \Omega_i} \sum_c \underbrace{w_{ict-k}}_{Share} \underbrace{d_{jct}}_{Shift} \tag{18}$$

where i and t denote firms and years, Ω_i is the set of politicians in firm i's network, w_{ict-k} is the weight that firm i gives to committee c in period $t-k$, and d_{jct} is a dummy variable equal to one if politician j is assigned to committee c in period t. Thus, the instrument exploits three ingredients and their interactions: Ω_i, w_{ict-k}, and d_{jct}. We describe each in turn.

First, firm i's political connections, Ω_i, are defined by the co-location of i's headquarter and the politicians representing that district. Politicians who represent the state where i's headquarter is located belong to i's connections.[19] Second, committee weights, w_{ict-k}, represent how important a committee is for a firm by measuring how often the firm has lobbied bills assigned to that committee. Formally, the weights are defined as follows:

$$w_{ict-k} = \frac{b_{ict-k}}{\sum_h b_{iht-k}} \tag{19}$$

where b_{ict-k} is the number of bills assigned to committee c in year $t-k$ that i lobbied. Thus, w_{ict-k} measures the share of bills that firm i lobbied that are under the jurisdiction of committee c relative to all the bills lobbied by i considered in all committees. In order to calculate this, we searched all our entire lobbying reports to identify the bills that have been lobbied by each firm and the committee to which each bill was assigned.

Anecdotally, it does appear that firms target politicians in their network to lobby for narrow, firm-specific policy benefits. For example, Orasure Technologies, a medical device company located in Pennsylvania (PA) that produces a home HIV testing kit, lobbied S.1966, "HIV/AIDS Assistance Reauthorization Act of 2007," which was introduced in the 110th Congress. This bill was assigned to the Senate Committee on Foreign Relations. Senator Bob Casey (D-PA) joined the committee in the 110th Congress; he was the first senator from Pennsylvania to serve on the committee in more than 10 years. Although it is notoriously difficult to document direct ties between a firm and a politician, politicians tend to favor policy outcomes that benefit firms in their districts, holding other factors constant. In fact, Senator Casey called for appropriating funding to deal with Zika virus when he visited Orasure Technologies (see the interview available here). The firm was later awarded $16.6 million in funding from the U.S. Department of Health and Human Services (HHS) to advance rapid Zika virus test. As another example, consider ConocoPhillips, an multinational energy firm located in Texas. John Cornyn, Republican senator from Texas, joined the Senate Committee on Finance in the 111th Congress. This committee has jurisdiction over bills relating to taxes. Compared to earlier congressional sessions, we observe about a five-fold increase

[19] We confirm that firms tend to make significantly larger and more frequent campaign donations to the politicians representing the state where their headquarters are located. While it is possible to accommodate an alternative way of defining Ω_i, we will leave the challenge of measuring political connections more directly for future research.

in lobbying expenditures by ConocoPhillips on tax-related issues during the 111th Congress. Interestingly, the former Deputy Regional Director of Senator John Cornyn's office currently works at ConocoPhillips as a Directory of Public Policy.

To be sure, we do not claim that these examples provide direct proof of political connections and policy benefits tied to certain firms. However, our identification strategy allows us to exploit such variations from many cases to empirically examine whether potential increases in the value of lobbying lead to an increase in firm size consistent with the theory we developed in Section II.

Finally, d_{jct} measures how politicians move between committees.[20] This movement, or "shift," provides the identification for the instrument.[21] The key identifying assumption is that the movement of politicians between committees is exogenous to firms' characteristics and influence.[22]

We discuss three potential challenges to the identification strategy, each one related to an ingredient of the instrument. The first issue is whether firms can directly influence the assignment of politicians into committees. We confirm that this is not the case because those decisions are determined by various factors exogenous to firms, including electoral outcomes, inter-party negotiations, parties' independent committees (e.g., Democrats' Steering and Outreach Committee), and seniority.[23]

Admittedly, firms may still indirectly influence committee assignments. That is, committee membership changes might be endogenous to firm characteristics and influence as politicians may select into certain committees in order to deliver targeted benefits to their politically connected firms. Although it is certainly true that a politician's committee "wish list," which reflects the interests of his/her constituents, plays an important role in the committee assignment process, we emphasize that our identification comes from *changes* in the lobbying value of committee assignments over time. For example, Montana senators have consistently served on the Committee on Agriculture, Nutrition, and Forestry, which might be endogenous to the importance of the agri-

[20] The committee assignment data is from Stewart and Woon (2011).

[21] Our approach contrasts with that of Goldsmith-Pinkham, Sorkin and Swift (2020), in which the *share* provides the identification in their shift-share design.

[22] Figure IV.1 in Appendix IV shows that politicians frequently change committees over time. Quantitatively, the probability that a senator will join at least one new committee in a new congressional term is around 30 percent. This number is relatively constant across Congresses, as Figure IV.3 in Appendix IV shows.

[23] See Schneider (2006) for further details about committee assignment process

cultural sector for the state. However, in this case, such observations will not contribute to our estimation because there will be no variation in our instrument across time. Furthermore, firms cannot anticipate the *timing* of committee membership changes. In fact, politicians often have to represent heterogeneous interests of their constituencies, and therefore the churning of memberships that we presented in Figure IV.1 in Appendix IV cannot be perfectly predicted by interest groups, which makes it difficult for our firm- and time-specific instrument to be determined endogenously by specific firm's interests and politician's self-selection mechanism.

Second, the locational choices by firms and politicians could be endogenous to their political connections. If it were easy for either one to change locations, therefore, this would threaten the identification. For example, if firms can freely move to a different state whose representatives serve on committees that are relevant to them, then changes in committee membership would directly influence firms' location as well as their political connections, undermining the identification. This is highly unlikely, however, because firms' locations are usually fixed before the changes in committee membership that we exploit. Moreover, we do not see changes in firms' headquarter locations over time in our dataset. Similarly, the likelihood of a politician changing his/her district is less than 1 percent.

A final potential challenge to identification is that committee weights could reflect anticipated changes in committee membership. In particular, if firms anticipate changes in committee membership, then the timing of those changes will not be well identified. We test this by evaluating the cross-section correlation between weights in $t-k$ and changes in committee membership in t. We find a correlation near zero. We present further supporting facts for our identification strategy in Appendix IV.

Results Table 1 presents the empirical findings guided by the IV approach. Columns 1 and 3 show the simple OLS results on the effect of lobbying expenditure on firms' size (proxied by sales and value-added, respectively). As suggested by Figure 2, the correlation is statistically significant and robust with the inclusion of a set of firm, year, state-year, and sector-year fixed effects. Next, Columns 2 and 4 show the findings based on the IV in the second stage. As expected, the relationship is positive and substantively larger than the OLS estimates given the endogeneity issue we identified in Proposition 2. Looking at Column 4, which is our preferred estimate, it shows that a 10 percent increase in lobbying expenditures translates to a 1.3 percent increase in value-

	Log Sales		Log VA		Log Profits		Log Capital-Payroll Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Lobby	0.0484	0.216	0.0197	0.127	0.0401	0.201	0.0116	0.0434
	(0.0128)	(0.0459)	(0.0079)	(0.0457)	(0.0127)	(0.0607)	(0.0079)	(0.0362)
N	9180	9180	5851	5851	6284	6284	7572	7572
Firm and Year FE	✓	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector-Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Model	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Sample	Post 2007	Post 2007	Post 2007	Post 2007	Post 2007	Post 2007	Post 2007	Post 2007
Weight Lag		nBills, t-1		nBills, t-1		nBills, t-1		nBills, t-1
Mean DV	7.74	7.74	6.99	6.99	6.15	6.15	0.19	0.19
SD DV	2.27	2.27	1.87	1.87	1.91	1.91	1.65	1.65
SD IV	2.03	2.03	2.04	2.04	2.02	2.02	2.04	2.04

Table 1: **Firm Sales, Value Added, Profits, Capital-Payroll Ratio, and Lobbying:** This table presents the OLS and IV estimates of the effects of lobbying expenditures on firms' sales, value added, profits, and capital-payroll ratio. Profits are defined as sales minus wage bills, capital expenditures and intermediate input expenditures. All regressions have firm, year, sector-year and state-year fixed effects. The weights of the instrument are defined using the number of bills that a firm lobbied on committees at $t-1$. Standard errors are double clustered at firm and year level.

added.[24] To put this estimate into perspective, the median annual lobbying expenditure by a public firm is about $200,000 and the median size of a firm in terms of valued-added is $49 million. Thus, spending an extra $2,000 adds $63,700 to the firm's value. Our finding is robust to using firms' profits as an outcome measure, which takes into account factor expenditures such as labor, capital, and intermediate inputs, as shown in Columns 5 and 6. Finally, Table 1 shows that our results do not hold when the outcome is capital-payroll ratio. This suggests that lobbying activity does not influence the composition of factors of production.[25] In Appendix V, we conduct robustness checks of our findings with respect to using campaign donations as an alternative way of defining political connections, different timing for computing the weights, and alternative measurements of lobbying activities. Given the strong causal relationship between lobbying expenditure and value-

[24]Table V.4 in Appendix V shows the details of the first stage, including the fact that the first stage is sufficiently strong as shown by the F-statistic.

[25]This finding is different from the one in Arayavechkit, Saffie and Shin (2018), in which lobbying distorts capital-labor ratios. Note however that they examine this question using a different identification strategy and a specific policy, such as corporate taxes.

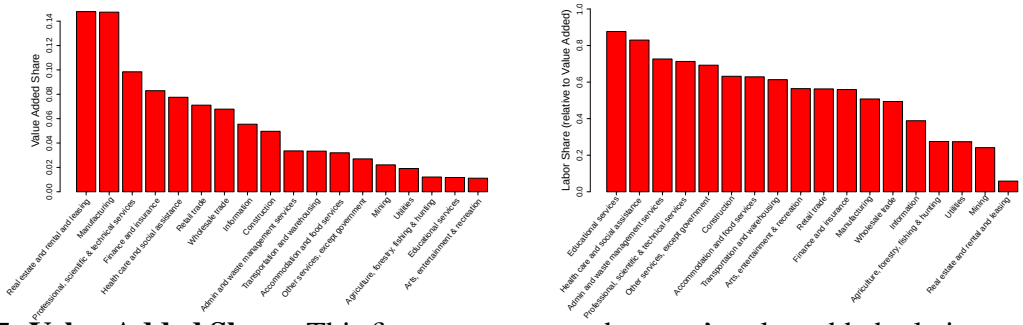


Figure 7: **Value Added Share**: This figure presents each sector's value added relative to total value added (left) and labor expenditures (right), averaged across the period 2000–2017. Own calculations using data from the BEA, corresponding to $\{\theta_s\}_{s=1}^S$ and $\{\alpha_s^N\}_{s=1}^S$ in the model, respectively.

added, we proceed to the structural estimation to evaluate how important this relationship is for the misallocation of resources and aggregate productivity.

B Structural Estimation

In this section, we present our main quantitative findings by structurally estimating the model that we developed in Section II. The estimation proceeds in three steps. First, we define a set of parameters exogenously. A second set of parameters are calibrated directly to analytical solutions of the model. Finally, the remaining parameters are estimated via a simulated method of moments (SMM) procedure. We describe each step in turn.

Exogenous Parameter Restrictions We exogenously set the values of several parameters in the model . First, because we do not have enough power to estimate heterogeneous values of δ_s, we set $\delta_s = \delta$ for all s. Second, we do not have sufficiently good data to estimate σ, so we use estimates from the trade literature. Third, it is standard in this literature that, given the free entry condition, the entry costs can be normalized to one. Fourth, the death rate is taken from the literature and set to $\eta = 0.025$ (Bernard, Redding and Schott, 2007). Finally, we assume a joint log-normal distribution for G. For simplicity, we assume that this distribution is the same for all sectors. It is straightforward to extend this to heterogeneous distributions across sectors.

Calibrated Parameters A set of parameters can be obtained directly from analytical solutions of the model. First, θ_s is the value added of sector s relative to total gross domestic product (GDP). Second, α_s^N is labor input costs relative to value-added. Finally, given the assumption of CRS, we have $\alpha_s^K = 1 - \alpha_s^N$. These moments can be directly extracted from the data using information

from the Bureau of Economic Analysis (BEA). Both the data and the results of this calibration are standard in the literature (Hsieh and Klenow, 2009; Caliendo et al., 2018). The moments for the value-added shares of sectors and the Cobb-Douglas weights are shown in Figure 7.

Next, given the implications of the model, we can back out δ. From Equation (15) and the reduced-form results from Table 1, we can infer that $\delta = 0.87$. Note that Equation (15) has an omitted variable problem. As is standard in such situations, the bias between the consistent estimator and the bias is given by the correlation between the endogenous variable and the omitted one, $cov(\log l_s(\phi), \log \phi^L)$. Given the IV and OLS result from Table 1, we can thus infer that $cov(\log l_s(\phi), \log \phi^L) = 0.1$ In addition, we can back out firms' primitives using the following relationships from the model:

$$\phi^P \propto \frac{r_s(\phi)^{\frac{\sigma}{\sigma-1}}}{n_s(\phi)^{\alpha_s^N} k_s(\phi)^{\alpha_s^K}} \tag{20}$$

$$\tau_s(\phi) \propto \frac{w n_s(\phi)}{\alpha_s^N r_s(\phi)} \tag{21}$$

$$\phi^L \propto \left(\frac{r_s(\phi)}{l_s(\phi)^{1-\delta}} \right)^{\frac{1}{\delta}}. \tag{22}$$

The intuition behind these expressions is straightforward. Equation (20) shows that productivity ϕ^P captures the gap between output and inputs. Since we do not observe prices, we use the structure of the model and the assumption of monopolistic competition in order to transform value-added into output. Equation (21) shows that distortions are measured as the gap between the observed wage bill and the efficient wage bill predicted by the model. Thus, if the firm is spending more in the wage bill it must be because there are distortions benefiting the firm. Finally, Equation (22) shows that lobbying productivity measures the gap between the benefits and the costs of lobbying.

Given values for $\{\sigma, \delta, \alpha_s^N, \alpha_s^K\}$ and observables $r_s(\cdot)$, $n_s(\cdot)$, $k_s(\cdot)$ and $l_s(\cdot)$, we can calculate firms' primitives from Equations (20)-(22). Figure VI.1 in Appendix VI shows that these primitives have log-normal marginal distributions. Thus, we assume that primitives follow a joint log-normal distribution with covariance matrix Ω^G. With the estimates of firms' primitives, we directly compute $\hat{\Omega}^G$ and obtain the following:

$$\hat{\Omega}^G = \begin{pmatrix} var(\phi^P) = 2.0 & & \\ cov(\phi^P, \phi^D) = -0.9 & var(\phi^D) = 0.9 & \\ cov(\phi^P, \phi^L) = -2.6 & cov(\phi^D, \phi^L) = 1.0 & var(\phi^L) = 5.8 \end{pmatrix} \tag{23}$$

Four relevant patterns emerge from this estimation. First, the dispersion in lobbying productivity is significantly larger than in production or residual distortion. Second, firms that are productive at producing have lower exogenous distortions. This highlights the second-best world in which lobbying operates. Distortions are highest in low-productivity firms. Third, there is a negative correlation between production and lobbying productivity. This means that firms that are efficient at lobbying are less efficient at producing. Finally, firms that have high exogenous distortions are also productive at lobbying. These two last features suggests that lobbying might reduce misallocation because it complements other distortions (rather than reducing other distortions) and because less productive firms are the best ones at lobbying.

Simulated Method of Moments Given the parameters set exogenously and calibrated from analytical relationships in the model, the remaining parameters are estimated via a simulated method of moments (SMM). We use this method because the model does not have an analytical solution for some parameters as a function of the data, specifically the fixed costs of producing and lobbying, $\{f_s^P, f_s^L\}$. Thus, we estimate the following vector of parameters:

$$\Theta = \{f_s^P, f_s^L\}.$$

We follow a standard procedure to implement the SMM. The details are described in Appendix VI.

Moments Used and Related Parameters Two sets of moments are targeted in the data to estimate the parameters of the model. Although the SMM procedure estimates all parameters in Θ jointly, when presenting each set of moments we discuss the intuition for how each moment used is related to the estimated parameters. The first set involves the share of firms that lobby in each industry. These moments are related to the fixed cost of lobbying. The second set involves the distribution of the number of firms and firm size across sectors. These moments are related to the fixed cost of production. Both of these moments are reported in Table IV.1 in Appendix IV.

Estimation Result Appendix VI shows that the share of firms across sectors and the share of firms within sectors that lobby are well approximated by the estimated model.

Furthermore, the model provides a rationalization for the observation that there appears to be *little money in politics*—that is, the empirical regularity that the amount of money spent in the political marketplace is relatively small despite potentially high returns to lobbying in terms of

economic gains (Ansolabehere, de Figueiredo and Snyder Jr, 2003). Our model replicates the empirical fact that relatively few firms choose to lobby. As shown in Proposition 1, the model has two forces that deter firms from lobbying, even though lobbying is profitable and does not involve a collective-action problem: First, lobbying entails a fixed cost; and second, there is dispersion in lobbying productivity and distortions. That is, firms with low levels of lobbying productivity or high levels of distortions will not find it profitable to pay the fixed cost of lobbying. Our study shows that both of these forces are central to understanding why only a small number of firms select into lobbying.

Counterfactual with No Lobbying Finally, we evaluate quantitatively how aggregate productivity changes with lobbying activity. To understand the effect of lobbying activity, we consider a counterfactual where $\delta = 0$, i.e., firms choose endogenously not to lobby. In this counterfactual, we find that aggregate productivity would be 6 percent higher than it is when firms obtain the return to lobbying that we estimate from the data.[26] There are two main forces behind the loss of productivity caused by lobbying activity. As Proposition 3 shows, the first mechanism is that lobbying directly affects firms' distortions, which affect the dispersion of TFPR and thus how firms' productivity is aggregated. This is the traditional channel studied in Hsieh and Klenow (2009). Of the total effect of 6 percent, this traditional channel represents around 61 percent. The second channel is that by changing the allocation of resources, demand for labor may change, which in turn changes factor prices and thus entry of firms. Changes in entry affect aggregate productivity since the household gets utility from variety. Of the aforementioned 6 percent loss, around 31 percent is due to changes in entry. This highlights that the effect of lobbying on changes in entry is an important margin to consider when evaluating its aggregate impact. The remaining 8 percent is accounted for by the resources used in paying for fixed costs (rather than used for production directly).

IV Conclusions

This paper examines whether firms' lobbying activity in the U.S. affects aggregate productivity by making some firms too big and thus misallocate resources across firms. To explore this impor-

[26] Note that, as is standard in this literature, we focus on aggregate productivity instead of aggregate output since our theory does not have anything relevant to say on the accumulation of physical or human capital.

tant question, we developed a heterogeneous firm model with endogenous lobbying. One of the main contributions of this paper is that we estimate the model with unique data and quantify the macroeconomic implications of corporate political influence. We conduct the structural estimation with a simulated method of moments using the moments from firms' size distribution, firms' lobbying activity, and the estimates from the instrumental variable analysis, which accounts for the endogenous relationship between lobbying expenditures and firm size. We show that firms' lobbying activity decreases aggregate productivity by 6 percent relative to an economy without lobbying activity. The main mechanism behind this effect is changes to the distribution of the size of firms: because lobbying creates private benefits to the firms that lobby, some firms get bigger than they would otherwise. To the best of our knowledge, we are the first to evaluate quantitatively how lobbying activity affects the aggregate misallocation of resources by distorting firms' size.

The empirical evidence that we present in this paper has important normative implications. Our findings suggest that corporate political influence may introduce significant negative externalities. To be sure, our model does not explicitly account for positive externalities of lobbying that have been identified in the literature, such as efficient information gathering (Potters and Van Winden, 1992) and legislative subsidies for politicians, who are constrained by legislative resources (Hall and Deardorff, 2006). Our framework does allow lobbying to have positive efficiency effects given that it occurs in a second-best world, due to the exogenous distortions. What we do not allow for is the possibility that the distortions induced by lobbying endogenously influence (and maybe solve) other distortions, such as imperfect information in policymaking. These issues are left for future research. Nonetheless, our findings that only a few firms select into lobbying and that lobbying is concentrated on highly narrow policies in Congress do raise concerns about political representation and public goods provision in the legislative process.

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