Protection by Covariance[*]

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Abstract

Trade policy is the prototypical case of lobbying influence. Despite evidence to the contrary, most analyses of lobbying on trade assume a quid pro quo model of influence. We examine the implications of the legislative subsidy theory of lobbying for trade policy. We develop a model in which lobbying increases the weight legislators receive in the policymaking process. Industries seeking protection lobby legislators whose districts contain greater industry employment. Consequently, legislators whose districts contain large industries prone to lobby exert more influence on policy. In equilibrium, industries that co-locate with other large and lobbying-prone industries receive higher tariffs. We test these predictions using data on US trade policy from 1989 to 2016, exploiting redistricting-induced shocks to industry co-location. Within-district spillover effects help explain why existing studies estimate small effects of lobbying on trade policy. Lobbying advantages not only large and organized industries, but also weaker industries that share their locations.

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1 INTRODUCTION

Trade policy is the canonical setting for studying the influence of lobbying on public policy in the United States (Schattschneider 1935; Bauer, Pool, and Dexter 1964; Grossman and Helpman 1994; Kim 2017). Yet despite the centrality of lobbying to theories of trade politics, most accounts either leave the lobbying process unspecified or adopt the "protection for sale" framework of Grossman and Helpman (1994), in which lobbying operates through quid pro quo exchanges between organized interests and policymakers.

The quid pro quo framework, however, sits at odds with a large body of evidence on how lobbying operates in practice. As an alternative, Hall and Deardorff (2006) propose a legislative subsidy theory of lobbying, in which interest groups provide resources to legislators who already share their preferences, thereby increasing those legislators' capacity to advance favorable policies. Consistent with this perspective, empirical studies of lobbying repeatedly find that interest groups tend to lobby allies rather than opposed legislators (Bauer, Pool, and Dexter 1964; Hojnacki and Kimball 1998; Serlin and You 2025). This pattern is inconsistent with quid pro quo theories, which predict interest groups only target opposed legislators who must be compensated for changing their positions.

This research tradition also produces an empirical puzzle. Although organized industries generally receive higher levels of protection, structural estimates of protection-for-sale models imply that policymakers place over seventy times more weight on aggregate social welfare than on interest-group contributions when making trade policy (Goldberg and Maggi 1999; Gawande and Bandyopadhyay 2000). Given lobbying is widely understood to play a central role in US trade policy, why are its estimated effects so small?

This paper explores the implications of legislative subsidy lobbying for trade policy. We develop a formal model in which the implemented policy is a weighted average of the policies that maximize the welfare of legislative districts and in which lobbying a legislator increases the weight that legislator's district receives in the policymaking process. Lobbying provides information and resources that enhance legislators' capacity to develop and advance policy. Industries therefore seek out legislative champions: legislators whose districts would benefit from protecting the industry. Each industry lobbies legislators representing districts with greater industry employment. As a result, legislators whose districts contain more employment in large and lobbying-prone industries are lobbied more and exert greater influence over policy.

Because industries cannot directly purchase policies but instead shape which legislators become influential, lobbying generates cross-industry spillover effects. Legislators who are lobbied more intensively can influence policy not only on behalf of the industries that lobby them, but also on behalf of other industries located in their districts. An industry therefore receives higher tariffs if it locates in districts represented by influential legislators, regardless of whether those legislators are influential because of the industry's own lobbying or because of lobbying by other industries with employment in the same districts.

The key prediction of the model is that the tariff an industry receives increases with its *Location Covariance*: the sum, across industries, of its spatial covariance with other industries, weighted by each industry's size and import penetration. We test this prediction by constructing measures of Location Covariance for 4-digit manufacturing industries from 1989 to 2016. In two-way fixed effects specifications, we find that a two-standard-deviation increase in Location Covariance is associated with an increase in tariffs of 24% or 17% of the average tariff level in our data, depending on the tariff measure used. We obtain similar estimates in event-study specifications that exploit redistricting-induced shocks to industry co-location while holding constant the size, location, and import penetration of all industries. Extending the model to incorporate trade in intermediate inputs—a major source of firm support for globalization (Osgood 2018)—yields similar predictions and quantitatively comparable estimates.

The model also predicts that industries lobby legislators whose districts contain a larger share of the industry's employment and that legislators who are lobbied more exert greater influence over the policymaking process. We infer lobbying connections using campaign contributions from individual lobbyists and measure legislators' attention to trade policy using records of contact with the US Trade Representative—the primary trade policymaking agency in the United States—obtained through a Freedom of Information Act request. Using generalized difference-in-differences specifications, we find that district-level industry employment predicts lobbying contact and that legislators who are lobbied more, or whose districts contain greater employment in lobbying-prone industries, have more contact with the US Trade Representative.

A key assumption of the model is that lobbying generates spillovers within legislators' constituencies. When an industry lobbies a legislator, it expands the resources available to that legislator, enabling them to pursue policies that benefit other constituents as well. Following Hall and Deardorff (2006), we conceptualize lobbying as a "simple grant" (p. 74). When interest groups provide a legislator with policy information, political intelligence, or labor—even in pursuit of the groups' own objectives—they free up the legislator's resources for other policymaking activities. We evaluate this assumption using data on Miscellaneous Tariff Bills, legislation that grants tariff relief for narrowly defined products. We find that legislators representing industries that demand large numbers of these bills also sponsor more tariff bills benefiting other industries. This pattern is consistent with the argument that lobbying expands legislators' policymaking capacity.

The paper makes three contributions. First, we contribute to scholarship on lobbying. Hall and Deardorff (2006) point out that quid pro quo theories of lobbying are inconsistent with empirical regularities, especially the tendency of interest groups to lobby legislative allies rather than enemies. Despite the influence of their theory of lobbying as legislative subsidy, and of a related literature on informational lobbying, research studying the theoretical implications of lobbying for policy either builds on Grossman and Helpman's (1994) quid pro quo model of lobbying (see for instance Bombardini (2008), Kim (2017), Huneeus and Kim (2018), and Kennard (2020)) or does not explicitly microfound lobbying (e.g. Kang (2016) models lobbying as a contest function). No research draws out and tests the implications of legislative subsidy lobbying for policy.[1] In Grossman and Helpman (1994), policy maximizes the sum of social welfare and lobbying interest group welfare; the key questions for policy are which groups lobby and what they want. A vast body of empirical work explores those questions in the context of trade policy (e.g. Kim 2017; Osgood 2018; Baccini, Osgood, and Weymouth 2019; Blanga-Gubbay, Conconi, and Parenti 2025). While this literature has considered how many features of an industry, such as firm size, affect lobbying activity (Bombardini 2008; Osgood 2017), there is much less scholarship on how the form of lobbying or the characteristics of its targets affect lobbying activity or policy outcomes.[2] This paper elaborates the distinct implications of legislative subsidy for which industries mobilize, who they lobby, which legislators are influential, and which industries receive protection.

Second, we contribute to scholarship on political geography. A large literature studies how the spatial distribution of industries influences policy outcomes. In these accounts, the key geographic variable is the spatial concentration of the industry itself. Busch and Reinhardt (1999, 2000) analyze how concentration affects the likelihood that industries mobilize and receive favorable trade policy. McGillivray (2004) and Rickard (2012, 2018) study how electoral systems shape governments' incentives to target tariffs and subsidies toward concentrated or diffuse industries. Goldstein and Gulotty (2014) examine whether spatially concentrated industries were more able to resist liberalization in the mid-twentieth century US. Kim, Naoi, and Sasaki (2025) argue that parliamentary systems enable governments to make more credible commitments to spatially concentrated industries, relative to presidential systems. Our model shares these accounts' conclusion that, under the plurality institutions of the

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[1] The closest is Ellis and Groll (2020), who study the strategic choice of legislative subsidies in a formal model in which interest groups can subsidize information gathering or implementation costs for a policymaker. Their focus is on information acquisition by a single policymaker, not on lobbying altering which legislators are influential.

[2] A notable exception is Naoi and Krauss (2009) who study the incentives to lobby politicians or bureaucrats in different electoral systems.

United States, spatially concentrated industries should be more politically active and receive higher tariffs, all else equal. However, the model also generates a new prediction: an industry's spatial covariance with *other* lobbying-prone industries is a key determinant of its tariff level. Empirically, we find that this cross-industry component of Location Covariance is substantially more important than spatial concentration in explaining equilibrium trade policy.

Third, we offer a new solution to the puzzle identified by Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000). Estimating the model from Grossman and Helpman (1994), they find that US governments behave as though they place orders of magnitude more weight on social welfare than on lobbying contributions when setting trade policy, a conclusion that applies to various other countries (Mitra, Thomakos, and Ulubaşoğlu 2002; Gawande, Krishna, and Olarreaga 2009). Our explanation has two parts. First, because industries influence policy by providing resources to legislative allies, lobbying is constrained by legislators' preferences. Legislators representing districts with substantial employment in a given industry have incentives to support protection for that industry, but those incentives are tempered by the costs tariffs impose on other constituents. Second, Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) estimate the effect of lobbying by comparing tariffs for industries that lobby with those for industries that do not. Our model instead implies spillovers from lobbying industries to non-lobbying industries. By lobbying, an industry increases the influence of legislators representing districts where that industry is concentrated, enabling those legislators to protect other industries located in the same districts. This spillover biases down the estimated "effect" of lobbying because lobbying raises tariffs for both lobbying and non-lobbying industries. Our explanation to the puzzle is distinct from, but compatible with, Gawande, Krishna, and Olarreaga (2012), who emphasize the role of intermediate inputs, which we incorporate in a model extension, and Gawande and Hoekman (2006), who introduce an uncertainty term capturing whether proposed tariffs are implemented. They interpret this term as a reduced-form representation of a more complex legislative process, something we model directly.

More broadly, the paper builds on a number of studies that incorporate legislative politics into trade models. Grossman and Helpman (2005) develop a model in which factors of production are unevenly distributed across legislative districts and protectionist policy emerges because the majority party legislators maximize the welfare of their districts after elections. Hauk (2011) studies a similar model and documents a bias in favor of industries located in smaller states. Celik, Karabay, and McLaren (2013) analyze trade policy in a model of legislative bargaining, while Gawande, Pinto, and Pinto (2023, 2024) estimate a richer version of that model for US congressional districts in 2002. As in these papers, our model embeds a Grossman and Helpman (1994) trade model within a model of legislative politics featuring multiple districts containing different industries. Our analysis differs in considering lobbying as legislative subsidy.

The rest of the paper proceeds as follows. Section 2 presents the formal model and derives three key predictions. Section 3 describes the data used to test these predictions. Section 4 tests the main prediction, the relationship between Location Covariance and tariffs. Section 5 evaluates the theoretical mechanism by testing the model's additional predictions and providing evidence for within-legislator spillovers across industries. Section 6 discusses how the model rationalizes the low estimated weight on lobbying in existing research. Section 7 concludes.

2 MODEL

This section presents our formal model of trade policy. The players are industries, which seek protection, and legislators, who want to maximize the welfare of their districts. The economic environment is a specific-factors model following Grossman and Helpman (1994), in which each industry produces using industry-specific labor and capital. Our model departs from Grossman and Helpman in nesting workers within legislative districts. Legislators seek trade policies that benefit their constituents.[3] Lobbyists for industries—who seek to maximize returns to capital in the industry—provide resources to increase the weight certain legislators receive in the policymaking process. Each industry therefore has incentives to support its legislative champions: legislators whose districts contain substantial employment in the industry and who consequently prefer greater protection for that industry. Aggregating across industries, the legislators who receive the most lobbying—and therefore wield the most influence over policy—are those representing districts with high employment in industries with strong returns to lobbying. In turn aggregating over legislators, the industries that receive protection are those that co-locate with large and powerful industries.

2.1 *Setup*

DISTRICT PREFERENCES There are N industries and a numeraire sector. Each industry produces a good under perfect competition using a Cobb-Douglas aggregate of industry-specific labor and capital. Throughout, we use subscripts i and j to index industries. The total quantity produced in industry i is y_i. The domestic price of good i is p_i, and gross profits in industry i are $p_i y_i$. Perfect competition and Cobb-Douglas production ensures that workers in industry i receive a constant share of gross profits, $\theta \in (0, 1)$, which corresponds

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[3] One can think of legislators as seeking re-election subject to retrospective voters.

to the exponent on labor in the production function. Owners of the industry's capital receive the complement, $(1-\theta)p_i y_i$. Workers' preferences are linear in consumption of the numeraire and concave in consumption of all other goods.

Workers live in D legislative districts. Each district contains fraction $\frac{1}{D}$ of workers. We use superscripts d and k to index districts and their representatives. The share of industry i's workers living in district d is γ_i^d.

Capitalists only consume the numeraire. Each district contains an equal share of each industry's owners of capital.

The government levies a tariff τ_i on each good i, creating a wedge between the world price p_i^* and the domestic price $p_i = (1+\tau_i)p_i^*$. Tariff revenue is rebated lump-sum to workers.

The tariff on industry i that maximizes welfare for district d is

$$\hat{\tau}_i^d = \frac{D\theta y_i}{-m_i' p_i^*}\left(\gamma_i^d - \frac{1}{D}\right), \tag{1}$$

where $m_i' = \frac{dm_i}{dp_i}$ is the marginal effect of raising domestic prices on imports of good i. We present a full derivation of this result in Appendix B.1.[4]

A district's preferred tariff for an industry is increasing in the share of the industry's employment located in the district (γ_i^d). Imposing a tariff on a good raises wages for workers employed in the protected industry, and increases returns to capital, but harms consumers. Greater district employment in the industry increases the relative importance of the wage channel within the district. The effect of employment on the district's preferred policy is increasing in the size of the industry (y_i)—which scales the gains from higher wages in the industry—and the labor share (θ), the share of these gains flowing to workers. It is decreasing in the responsiveness of imports to tariffs ($|m_i'|$), which scales the deadweight loss from protection. A district prefers a zero tariff when its share of the industry (γ_i^d) matches its share of the population ($\frac{1}{D}$); in that case, the benefit of the tariff to workers in the industry is exactly offset by its loss to consumers. Within an industry, tariff preferences vary across districts because industry employment is unevenly distributed across districts.

POLITICAL INSTITUTIONS Each district is represented by a legislator. Implemented policy is a weighted average of district ideal points. District d receives weight ω^d, where

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[4] The assumption that capital owners are evenly distributed and consume the numeraire nests a range of microfoundations, for instance, that each worker owns a diversified portfolio of capital, or that rentiers are absent but are represented in the policy process proportional to their share of total profits. Alternative assumptions give very similar expressions. If capitalists located in the same districts as industry workers, district preferences would be $\hat{\tau}_i^d = \frac{Dy_i}{-m_i' p_i^*}\left(\gamma_i^d - \frac{1}{D}\right)$, if rentiers were absent from districts, district preferences would be $\hat{\tau}_i^d = \frac{Dy_i}{-m_i' p_i^*}\left(\theta\gamma_i^d - \frac{1}{D}\right)$.

$\sum_{d=1}^{D} \omega^d = 1$. Implemented policy is then

$$\tau_i = \sum_{d=1}^{D} \omega^d \hat{\tau}_i^d. \tag{2}$$

In Appendix B.2 we show that this expression follows from a model of legislative bargaining in which lobbying increases the resources available to legislators to develop high-quality policies.

Industry lobbyists provide resources to legislators to alter which legislators are influential in formulating policy. An industry's lobbyists act on behalf of the owners of industry-specific capital. Lobbying affects the weight that each district receives. Let l_i^d denote the resources industry i's lobbyists provide to district d. Legislator weights are linear in lobbying resources:

$$\omega^d = \alpha^d + \beta \sum_{i=1}^{N} l_i^d - \frac{1}{D} \beta \sum_{i=1}^{N} \sum_{k=1}^{D} l_i^k, \qquad \sum_{d=1}^{D} \alpha^d = 1$$

What ensures that district weights sum to 1 is that the average amount of lobbying resources is subtracted from each district. This linear functional form simplifies the analysis but is not consequential for our conclusions. Appendix B.3 shows the same conclusions hold, albeit with far more algebra, in a model in which the ω shares are normalized by dividing by the sum of shares. α^d represents legislator d's baseline influence in the absence of lobbying.

The cost of lobbying is quadratic. If industry i's lobbyists provide resources l_i^d to d, they spend $\frac{c}{2}(l_i^d - \chi_i)^2$, where χ_i is a parameter of the cost function that prevents lobbyists spending negative amounts.

POLICY AND PROFITS We write the average weight given to industry i as

$$\Omega_i := \sum_{d=1}^{D} \omega^d \gamma_i^d. \tag{3}$$

If we randomly sampled a worker in industry i, the expected weight in the policy process of their representative is Ω_i.

Inserting district preferences from Equation 1 into the identity for policy in Equation 2 gives the implemented policy

$$\tau_i = \sum_{d=1}^{D} \omega^d \left(\frac{D\theta y_i}{-m_i' p_i^*} \left(\gamma_i^d - \frac{1}{D} \right) \right) = \frac{\theta y_i}{-m_i' p_i^*} (D\Omega_i - 1), \qquad \frac{\tau_i}{1+\tau_i} = \frac{\theta z_i}{-\epsilon_i} (D\Omega_i - 1) \tag{4}$$

where $z_i = \frac{y_i}{m_i}$ is the inverse of import penetration and $\epsilon_i = m_i' \frac{p_i}{m_i}$ is the import-demand elasticity.[5]

In these expressions, protection is linearly increasing in Ω_i. If a larger share of an industry's employment locates in districts which receive more weight, it receives a higher tariff. Protection comes from the uneven weighting of districts. If all districts receive equal weight, equilibrium tariffs are zero.

Industry payments to capital can be written as the capitalists' share of gross profits under free trade ($(1-\theta)p_i^* y_i$), plus their share of additional profits from the tariff, which depend on Ω_i:

$$(1-\theta)p_i y_i = (1-\theta)(1+\tau_i)p_i^* y_i = (1-\theta)\left[p_i^* y_i + \theta\psi_i(D\Omega_i - 1)\right],$$

where ψ_i is the marginal effect of changing $\theta D\Omega_i$ on industry i's gross profits:

$$\psi_i := \frac{y_i^2}{-m_i'}. \tag{5}$$

Industries that are larger (y_i) or that have less responsive import demand ($|m_i'|$) have higher returns to political activity. Size matters because it scales the benefit from a higher price, both for the industry's rentiers and for the constituents of the legislator deciding the tariff. As above, the deadweight loss from protecting industries with less responsive import demand is lower, so these industries receive more protection for a given degree of influence.

2.2 *Analysis*

We solve for Nash Equilibrium: each industry's lobbyists choose how much to lobby each legislator to maximize returns to capital net of lobbying costs, taking the actions of other industries as given. Industry i's lobbyists allocate resources to legislators $\{l_i^1, ..., l_i^D\}$, to solve the following problem:

$$\max_{\{l_i^1,...,l_i^D\}} \left\{ \underbrace{(1-\theta)\left[p_i^* y_i + \theta\psi_i(D\Omega_i - 1)\right]}_{\text{Payments to capital}} - \underbrace{\frac{c}{2}\sum_{d=1}^{D}(l_i^d - \chi_i)^2}_{\text{Lobbying costs}} \right\}.$$

The first order condition is

$$\beta\left(\theta - \theta^2\right) D\psi_i \left(\gamma_i^d - \frac{1}{D}\right) - c\left(l_i^d - \chi_i\right) = 0.$$

At the optimum, the lobbyists equate the marginal benefit of increasing district d's weight, which is proportional to the tariff preferred by d, itself proportional to the share of industry

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[5] The right hand side expression in Equation 4 follows from the identity $1 + \tau_i = \frac{p_i}{p_i^*}$.

i's employment in d (γ_i^d), to the marginal cost of doing so.[6] Rearranging gives an expression for how much i's lobbyists lobby the representative of district d:

$$l_i^d = \frac{\beta\left(\theta - \theta^2\right) D\psi_i}{c}\left(\gamma_i^d - \frac{1}{D}\right) + \chi_i \tag{6}$$

An industry lobbies a representative more as the share of the industry's employees in the representative's district (γ_i^d) increases. This result matches the finding in much of the research that inspired or builds on Hall and Deardorff (2006), that interest groups tend to lobby legislators who share their preferences. This result runs counter to quid pro quo theories of lobbying, which predict that interest groups lobby opposed legislators.

Summing Equation 6 over industries gives the influence a given district receives in equilibrium:

$$\omega^d = \alpha^d + \beta\left(\sum_{i=1}^{N} l_i^d - \frac{1}{D}\sum_{i=1}^{N}\sum_{d=1}^{D} l_i^d\right) = \alpha^d + \frac{\beta^2\left(\theta - \theta^2\right) D}{c}\sum_{i=1}^{N}\psi_i\left(\gamma_i^d - \frac{1}{D}\right). \tag{7}$$

Legislators receive more weight in the policymaking process when their districts contain larger shares of the employment of industries (γ_i^d) that are both economically large and more prone to lobby (large ψ_i). Because legislators champion policies benefiting their district, the natural allies of industries with high returns to lobbying are those legislators whose districts contain larger shares of those industries' employment. Those industries provide resources to those legislators, which increase the legislators' influence on the policy process. The presence of high-influence industry employment in a district has larger effects if district weights are more responsive to lobbying (β is large), if the cost of lobbying is small (c is low), and if profits are split evenly between labor and capital (θ is near $\frac{1}{2}$). At low values of θ, workers gain little from tariffs, weakening the incentive for legislators to propose protectionism, while at high values of θ, capital owners gain little from tariffs, weakening the incentive to lobby.

The influence an industry receives in policy follows from inserting the solution for each

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[6] Note that

$$\frac{\partial \omega^d}{\partial l_i^d} = \frac{\beta(D-1)}{D}, \frac{\partial \omega^d}{\partial l_i^{k \neq d}} = -\frac{\beta}{D}$$

which imply that

$$\frac{\partial \Omega_i}{\partial l_i^d} = \sum_{k=1}^{D}\gamma_i^k\frac{\partial \omega^k}{\partial l_i^d} = \beta\left(\gamma_i^d - \frac{1}{D}\sum_{k=1}^{D}\gamma_i^k\right) = \beta\left(\gamma_i^d - \frac{1}{D}\right).$$

district's weight (ω^d) in Equation 7 into the definition of Ω_i, Equation 3:

$$\begin{aligned}
\Omega_i = \sum_{d=1}^{D} \omega^d \gamma_i^d &= \sum_{d=1}^{D} \left(\alpha^d + \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sum_{j=1}^{N} \psi_j \left(\gamma_j^d - \frac{1}{D} \right) \right) \gamma_i^d \\
&= \sum_{d=1}^{D} \alpha^d \gamma_i^d + \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sum_{j=1}^{N} \psi_j \left(\sum_{d=1}^{D} \gamma_j^d \gamma_i^d - \frac{1}{D} \right) \\
&= \sum_{d=1}^{D} \alpha^d \gamma_i^d + \frac{(\beta D)^2 \left(\theta - \theta^2\right)}{c} \sum_{j=1}^{N} \psi_j \mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)
\end{aligned}$$

where $\mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j) = \frac{1}{D} \sum_{d=1}^{D} \left(\gamma_j^d - \frac{1}{D}\right)\left(\gamma_i^d - \frac{1}{D}\right) = \frac{1}{D}\left(\sum_{d=1}^{D} \gamma_j^d \gamma_i^d - \frac{1}{D}\right)$ is the covariance across districts of industry i's location shares and industry j's location shares.

This equation says that an industry receives more weight in the policy process if it has more positive spatial covariance ($\mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)$) with industries which have high returns to lobbying (ψ_j). As in Equation 7, this effect is magnified when lobbying is effective (β is large), the cost of lobbying is low (c is small), and profits are split evenly between labor and capital ($\theta \approx \frac{1}{2}$). An industry also receives higher tariffs if it has a larger share of employment in districts with legislators who are more influential for reasons other than lobbying ($\sum_{d=1}^{D} \alpha^d \gamma_i^d$ is large).

Subbing back into the identity for tariffs in Equation 4, we have

$$\frac{\tau_i}{1+\tau_i} = \frac{z_i \theta}{-\epsilon_i} \left(D \sum_{d=1}^{D} \alpha^d \gamma_i^d + \frac{\beta^2 D^3 \left(\theta - \theta^2\right)}{c} \sum_{j=1}^{N} \psi_j \mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j) - 1 \right). \tag{8}$$

Equation 8 is the key result of the paper. It says that the tariff an industry receives is increasing in the industry's spatial covariance with industries which are prone to lobby.

2.3 *Empirical Analogues*

To take the model to data, we specify three objects that we can recover from observed data on industry locations, production, imports, and elasticities.

We measure ψ_i using data on industry production, import penetration, and import-demand elasticities. Multiplying both the numerator and denominator of Equation 5 by $\frac{p_i}{m_i}$ gives

$$\psi_i = \frac{p_i y_i \frac{y_i}{m_i}}{-m_i' \frac{p_i}{m_i}} = p_i y_i \frac{z_i}{-\epsilon_i}.$$

Given data on the nominal value of an industry's domestic production ($p_i y_i$), inverse import penetration ($\frac{y_i}{m_i}$), and import demand elasticity ($m_i' \frac{p_i}{m_i}$), we can calculate ψ_i for the industry.

Define an industry's *Location Covariance* as the sum of the covariance of its locational shares with other industries, weighted by the exogenous influence of each industry:

$$\textit{Location Covariance}_i := \sum_{j=1}^{N} \psi_j \left(\sum_{d=1}^{D} \gamma_j^d \gamma_i^d - \frac{1}{D} \right) = D \sum_{j=1}^{N} \psi_j \mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j) \tag{9}$$

Given data on ψ_i and the share of employment of each industry in each district, we can calculate this object for each industry.

Similarly, define a district's *Weighted Capacity* as the sum of the share of each industry in the district, weighted by ψ_i:

$$\textit{Weighted Capacity}^d := \sum_{i=1}^{N} \psi_i \gamma_i^d. \tag{10}$$

As with Location Covariance, Weighted Capacity is a function of ψ_i and industry shares γ_i^d and so can be calculated with this data.

2.4 *Empirical Predictions*

Our model generates the following empirical predictions:

1. Increasing the Location Covariance of an industry increases its tariff.
2. Industries with a larger share of employment in a given district will be more likely to lobby that district's representative.
3. The influence of a legislator on trade policy is increasing in the Weighted Capacity of their district.

Prediction 1 follows directly from substituting Location Covariance into Equation 8. Prediction 2 follows directly from Equation 6. Prediction 3 follows from substituting Weighted Capacity into Equation 7.

3 DATA

These predictions link tariffs, lobbying, and legislator activity to Location Covariance, employment shares, and Weighted Capacity. In turn, these quantities are functions of the share of each industry employed in each district, as well as each industry's size, import penetration, and import demand elasticity.

3.1 *Construction*

INDUSTRY LOCATIONS We construct data on the share of employment in each industry located in each congressional district by combining county-level data on industry employment from the County Business Patterns with the population-weighted crosswalks between counties and congressional districts from Ferrara, Testa, and Zhou (2024). The County Business Patterns data is from Eckert et al. (2020), who develop an algorithm to impute values reported as ranges due to privacy concerns in the original data published by the Census Bureau. We use this data through 2016, because changes in data suppression make the data from 2017 onward non-comparable. Eckert et al. (2020) also provide crosswalks between different industry classifications. Throughout, we harmonize industries to 2012 4-digit NAICS codes. We use this level of aggregation to minimize changes over time due to reclassification.

TRADE FLOWS AND TARIFFS We use data on trade flows published by Peter Schott (2008). We use Schott's crosswalks from Harmonized System products to the SIC or NAICS industry categories, and then concord to 2012 NAICS using the crosswalks from Eckert et al. (2020). This data is available from 1989 onward, when the US began using the Harmonized System classification. In addition to import values by industry, the data report duties collected as a share of imports, which we use as one measure of realized tariffs at the industry level. As an alternative measure of industry tariffs, we use the published Most Favored Nation (MFN) ad valorem tariff. For 1989–1996 we use data collected by Acosta and Cox (2019). For 1997–2016, we use the published tariffs from the US International Trade Commission (USITC).

There is debate over whether theories of the domestic determinants of protectionism should be tested using tariffs or non-tariff barriers. Classic papers focus on non-tariff barriers, with the justification that tariffs are largely determined through multilateral negotiations (e.g. Goldberg and Maggi 1999; Gawande and Bandyopadhyay 2000). More recent work, however, examines tariffs directly. Fredriksson, Matschke, and Minier (2011) obtain estimates similar to earlier studies using tariff data. Ma, McLaren, and Chalak (2025) argue that tariff data are appropriate because trade agreements primarily neutralize terms-of-trade externalities across countries while leaving the product-level pattern of liberalization to domestic political forces. Adão et al. (2023) use tariffs to estimate the weights US trade policy places on different social actors and use those estimates to evaluate competing political economy theories.

OTHER INDUSTRY DATA We use the NBER-CES Manufacturing Industry Database for data on industry shipment values used to calculate ψ. We use import-demand elasticity estimates from Kee, Nicita, and Olarreaga (2008).

LOBBYING Data on lobbying are from LobbyView (Kim 2018). As in Serlin and You (2025), we measure lobbying connections between interest groups and legislators as the number of lobbying reports filed by an interest group in a given year multiplied by the number of contributions made that year to a legislator by lobbyists listed on those reports. Data on individual lobbyists disclosed in each report and their campaign contributions are from the Senate Office of Public Records. Serlin and You (2025) validate this measure of lobbying connections using data on lobbying by foreign entities, who are required to disclose the legislators they contact as well as the lobbyists involved. They show that lobbying connections inferred from the individual lobbyists hired strongly predicts actual lobbying contact.

USTR We obtain data on contact between members of congress and the Office of the US Trade Representative (USTR) through a Freedom of Information Act Request. The USTR is the agency responsible for leading trade negotiations and coordinating trade policy across the federal government. The dataset records each meeting or call between members of Congress or their staffs and the USTR from 2000 to 2014, along with the topic discussed. For example, it reports that on May 8, 2000, "Congressman Waxman's Staff" met with the USTR about "Tobacco & China." We use this record to calculate the number of contacts each legislator has with the USTR in each year.

COMMITTEE MEMBERSHIP Data on legislators' membership and chairship of the Ways and Means committee are from Nelson (2005) and Stewart and Woon (2017).

3.2 *Distinguishing Between Spatial Concentration and Cross-Industry Covariance*

Location Covariance for each industry is a sum over all industries. It can therefore be decomposed into a component pertaining to the industry in question, and a sum over all other industries:

$$\mathit{Location\ Covariance}_i = \underbrace{\psi_i \left(HHI_i - \frac{1}{D} \right)}_{\text{Own industry spatial concentration}} + \underbrace{D \sum_{j \neq i} \psi_j \mathrm{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)}_{\text{Other-industry covariance}}, \tag{11}$$

where $HHI_i = \sum_{d=1}^{D} (\gamma_i^d)^2$ is the Herfindahl-Hirschman Index of industry i's shares across districts. This identity shows that the own-industry component of Location Covariance is proportional to the industry's spatial HHI across districts. Our model thus shares the prediction from much of the literature that spatially-concentrated industries will be more influential. However it differs in also attributing a role to the spatial covariance across industries.

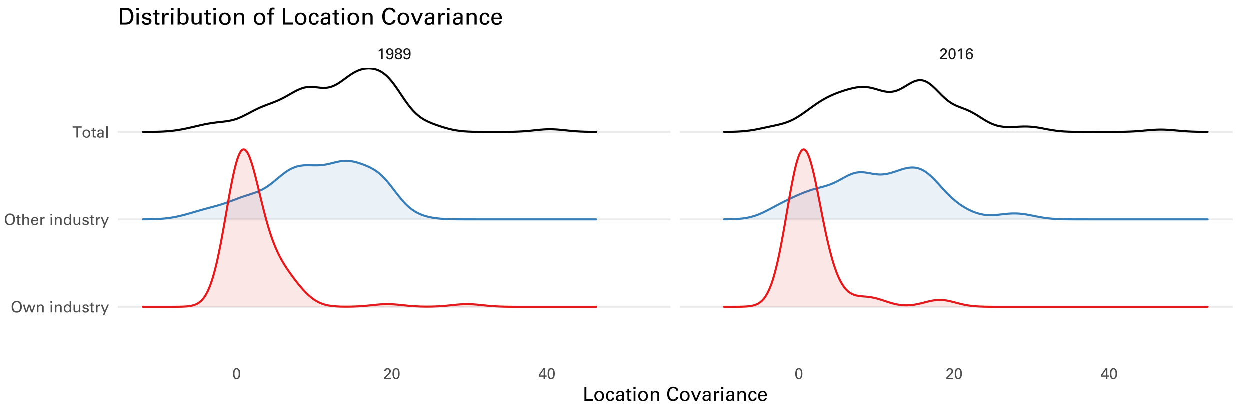

Figure 1: Location Covariance largely reflects cross-industry spatial covariance rather than own-industry concentration

The figure plots the kernel density of own industry and other industry Location Covariance, as in Equation 11, for 1989 and 2016.

In the data, the variance of the other-industry component is substantially larger than that of the own-industry component. Figure 1 plots the distribution of Location Covariance, decomposed into own- and other-industry components, in the first and last years of our dataset. In both years, the own-industry component is smaller in both magnitude and variance. This pattern is unsurprising because the other-industry component sums across all other industries; it would be smaller only if industries' locations were largely uncorrelated. As a result, most of the variation in Location Covariance comes from co-location with other industries, not spatial concentration.

4 LOCATION COVARIANCE AND TARIFFS

4.1 *Spillovers from the Automotive Industry to Foundries*

In our model, industries lobby representatives from districts with high industry employment. This lobbying increases the weight that legislators receive in the policy process, enabling them to push for policies that protect other industries in the same district. The foundries industry (NAICS 3315) illustrates this mechanism. In 2016, foundries received a higher tariff than two thirds of industries. Relative policy success came in spite of an apparent lack of lobbying effort. Our data record only 201 lobbying connections involving foundry firms between 2008 and 2016, compared to more than 25,000 for pharmaceuticals and more than 10,000 for motor vehicle manufacturing. Rather than mobilizing extensively on their own, foundries appear to benefit from lobbying spillovers generated by the automotive industry.

The American Foundry Society gives a Congressional Champion Award to legislators who “have demonstrated support for the metalcasting industry on national issues.”[7] The award provides a direct measure of which legislators are viewed as advancing the industry’s interests. Congressional champions of the foundry industry almost exclusively represent districts with both high auto industry employment and high foundry employment. The left panel of Figure 2 plots the log share of auto industry employment in a legislator’s district against the log share of foundry employment. There is a clear positive relationship between the two, indicating positive covariance of industry location. Legislators recognized by the American Foundry Society are highlighted in red. All but one represent districts above the median in both foundry and auto employment. No congressional champion represents a district with above-median foundry employment but below-median auto employment.

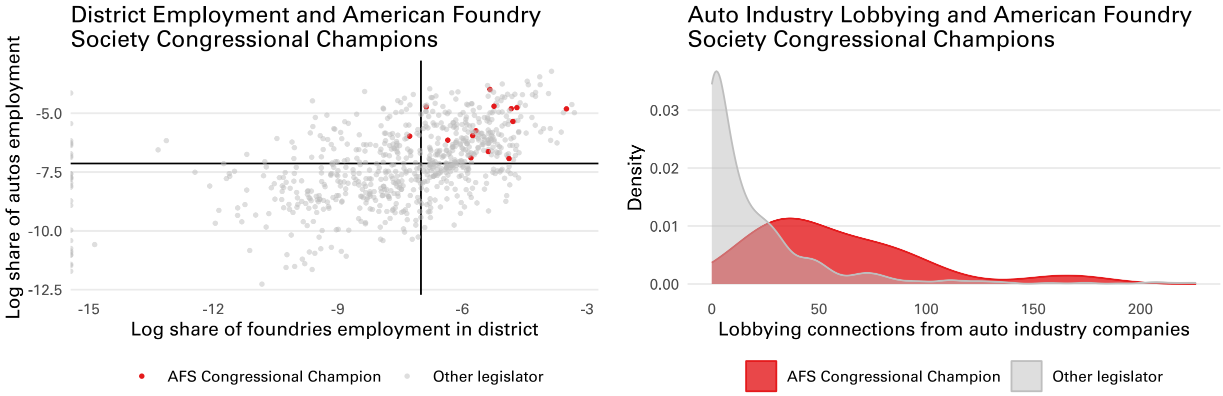

Figure 2: Foundry industry congressional champions tend to come from districts with high foundry and autos employment, and are lobbied extensively by the autos industry

The left figure plots the log share of autos industry employment (NAICS 3361–3363) in a legislator’s district against the log share of foundry employment (NAICS 3315) in a legislator’s district. District shares are averaged over the 2008–2016 period. Legislators who received the American Foundry Society’s Congressional Champion Award are highlighted in red. The black vertical and horizontal lines show the respective medians. The right figure plots the distribution of the total number of lobbying connections by the auto industry with the legislator, over the period 2008–2016, separately for congressional champions and other legislators. None of the AFS Congressional Champions have lobbying connections with firms in the foundry industry.

This pattern is consistent with the argument that the foundry Congressional Champion Award reflects both alignment with the foundry industry—which is associated with foundry employment—and legislative influence, which is enhanced by resources from the automotive industry. The right panel plots the distribution of lobbying connections from the auto industry, separating congressional champions from other legislators. The distribution for congressional champions is shifted substantially to the right, indicating that foundry champions are lobbied far more by the auto industry than other legislators.

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[7] https://www.afsinc.org/congressional-champion-award

The lobbying spillover from the auto industry to foundries is only consistent with the legislative subsidy theory. Metalcastings produced by foundries are key inputs into automobile production. If legislators lobbied by the auto industry acted solely to maximize auto industry profits, they would push for lower tariffs on foundry products and policies that would decrease prices and profits in metalcasting. Instead, many American Foundry Society congressional champions, such as Chuck Fleischmann and Fred Upton, are also prominent members of the House Auto Caucus. Fleischmann's district, for example, contained both the Volkswagen Chattanooga assembly plant and the Waupaca Foundry Etowah plant.

4.2 *Relationship between Location Covariance and tariffs*

We first test the model's main prediction: industries with greater Location Covariance receive higher tariffs. We estimate regressions of the form

$$\tau_{it} = \beta \mathit{Location\ Covariance}_{it} + \gamma_i + \delta_t + \varepsilon_{it},$$

where the dependent variable is the tariff received by industry i in year t, measured either as import duties as a percentage of imports, or the MFN ad valorem rate. The independent variable is Location Covariance for industry i in year t, calculated according to equation 9. γ_i is an industry fixed effect that accounts for time-invariant factors that affect an industry's level of protection. δ_t is a year fixed effect that accounts for common shocks in a given year. ε_{it} is an error term.[8]

Table 1 reports the resulting estimates. Models (1) and (4) present the baseline specification. The coefficients imply that a 10-point increase in Location Covariance corresponds to a 0.43 percentage point increase in duties per import, and a 0.38 percentage point increase in MFN tariffs. Given the low level of tariffs in the US 1989–2016, these estimates are substantively meaningful. A two standard deviation increase in Location Covariance—equivalent to going from 0 to 1 on a binary variable—corresponds to an increase in duties per import of 0.59 percentage points, or 24% of the sample mean, and a 0.53 percentage point increase in MFN tariffs, or 17% of the sample mean. Models (2) and (5) decompose Location Covariance into own-industry and other-industry components, following Equation 11. The estimates are driven almost entirely by the other-industry component rather than the own-industry component. While many theories predict that spatially concentrated industries should be more

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[8] We cluster standard errors by industry, the level of treatment. In Appendix D, we calculate "exposure robust" standard errors that account for correlation in the error term across industries that locate in similar districts or states, or with particular industries (Borusyak, Hull, and Jaravel 2022). Across specifications, the resulting standard errors are smaller than conventional standard errors. To err towards conservative inference, we report conventional clustered standard errors throughout.

influential (Busch and Reinhardt 1999; McGillivray 2004), the prediction that cross-industry covariance shapes protection is unique to our theory and therefore provides a more direct test of the mechanism. Models (3) and (6) add controls for industry size and imports, and for industry employment in districts represented by members or chairs of the House Ways and Means Committee, the congressional committee most relevant for trade policy. The coefficients remain essentially unchanged, consistent with the fact that our results are driven by industries' spatial covariance with other industries rather than by the characteristics of the industries themselves, or other features of the districts with large industry employment.

Table 1: Reduced form effects of industry Location Covariance on tariffs

	Duty per import (%)			MFN ad valorem (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
Location Covariance	0.043^{**}			0.038^{*}		
	(0.014)			(0.015)		
- Own industry (HHI)		0.029	0.003		-0.010	-0.019
		(0.026)	(0.033)		(0.025)	(0.026)
- Other industry		0.047^{*}	0.042^{*}		0.055^{**}	0.053^{**}
		(0.020)	(0.019)		(0.019)	(0.018)
FE: Industry	x	x	x	x	x	x
- Year	x	x	x	x	x	x
Controls			x			x
N	2292	2292	2292	2292	2292	2292
R^2	0.941	0.941	0.943	0.953	0.953	0.954

This table reports regressions of duties collected as a percentage of imports (1)–(3) or MFN ad valorem tariffs (4)–(6) against the industry Location Covariance. The unit of observation is a 4-digit NAICS manufacturing industry in a year. All models include industry and year fixed effects, (2)–(3) and (5)–(6) disaggregate the measure of Location Covariance into its own- and other-industry components, as in Equation 11. (3) and (6) control for the log value of industry shipments and log imports, variables relevant to the Grossman-Helpman model, and for the share of industry employment in districts represented by the chair of the House Ways and Means Committee, and by members of the committee. Standard errors clustered by industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Figure 3 plots changes in MFN tariffs between 1989 and 2016 against changes in other industry Location Covariance. This figure illustrates the within-industry variation underlying our estimates. Although tariffs declined broadly over this period, the decline was substantially larger for industries such as communications equipment and fabric mills that experienced large decreases in cross-industry Location Covariance, than for industries such as animal food manufacturing and foundries, which experienced increases in Location Covariance.

Our estimates are not driven by any particular industry or group of industries, nor by quirks of the process of harmonizing industries across categories. Figure A.1 shows that the

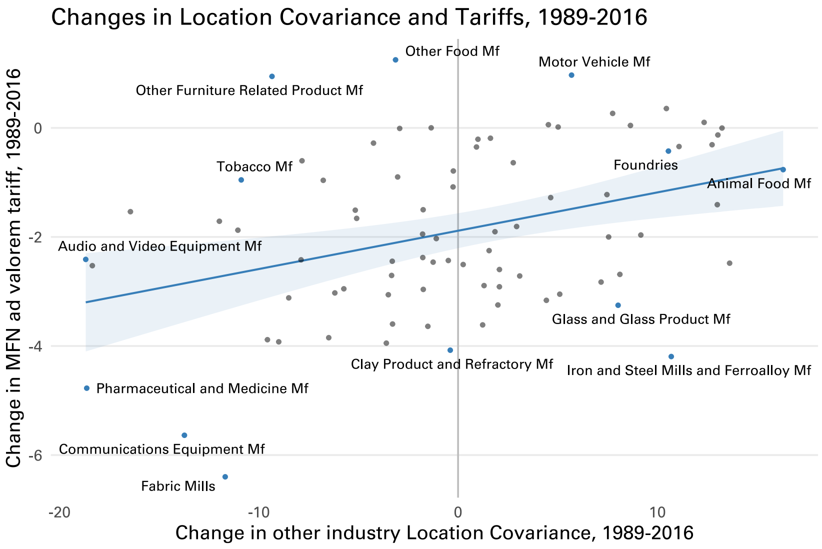

Figure 3: Relationship between changes in Location Covariance and tariffs over the entire period

This figure plots the change in MFN ad valorem tariffs between 1989 and 2016 against the change in other-industry Location Covariance, labeling industries. The blue line shows the OLS fit. The shaded area shows the 95% confidence interval constructed from robust standard errors.

estimates remain essentially unchanged when dropping any individual 4-digit industry or 3- or 2-digit industry group. Much of the tariff decline during our study period followed the Uruguay Round of GATT negotiations, which extended GATT rules to agriculture and textiles. One might be concerned that these sectors happened to be experiencing falls in Location Covariance coterminous with the implementation of the Uruguay Round. However, our results are robust to excluding textile- and agriculture-related industries, both separately and jointly within the broader 2-digit category containing textile, food, and leather industries. A broader challenge in studying industry-level variables over a longer period is that Census industry classifications change. While we concord everything to 2012 NAICS categories, changes in classification could mechanically introduce variation into both Location Covariance and industry-level tariffs. The largest classification change occurred between 1996 and 1998, when the US switched from SIC to NAICS codes.[9] Figure A.2 shows that the 1996–1998 change in Location Covariance—largely due to the switch in categories—does not correlate with changes in either measure of tariffs, though it is associated with a persistent shift in Location Covariance. This null relationship suggests that reclassification does not drive our results.

In additional analyses, we estimate specifications corresponding to Equation 8. In these

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[9] NAICS codes were introduced in 1997 but first used for the County Business Patterns in 1998 (Eckert et al. 2020).

specifications, the dependent variable is $\frac{\tau_i}{1+\tau_i}$, and we interact Location Covariance with inverse import penetration divided by the import demand elasticity. This approach yields similar coefficients and patterns of statistical significance (Table A.1). We nevertheless prefer the simpler specification because interacting Location Covariance with import penetration introduces an endogeneity problem, because import penetration is itself endogenous to tariffs, as noted by Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000).

The key assumption required to interpret the estimates in Table 1 as causal is parallel trends. Absent changes in Location Covariance, one would need to assume that industries that experienced increases in Location Covariance would have followed the same trajectories as industries that did not. Location Covariance combines factors determining the influence of each industry—its size, import penetration, and import demand elasticity—with the covariance of industry shares across locations. By focusing on the cross-industry component of Location Covariance, we do not identify effects driven by those characteristics of the focal industry itself. A remaining concern, however, is that the changing spatial clustering of industries may reflect political incentives or broader economic changes affecting the industry.

4.3 *Identification From Redistricting Shocks*

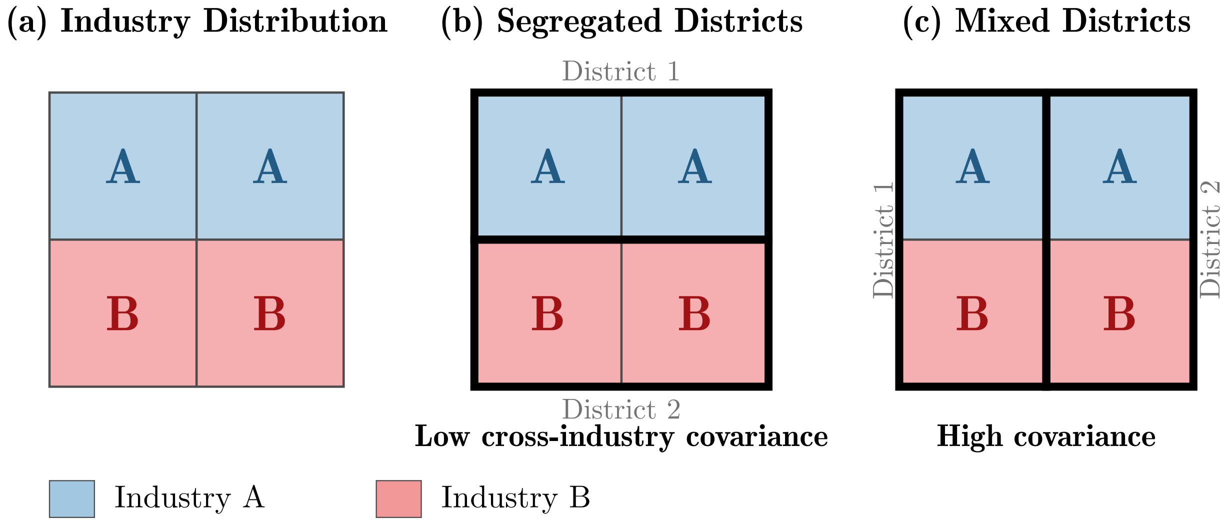
To address this concern, we isolate exogenous shocks to cross-industry Location Covariance generated by redistricting. Congressional districts are redrawn every ten years following the decennial census. In our sample, this produces three redistricting events: 1993, 2003 and 2013. For each event, we calculate a redistricting shock in the year before redistricting as the change in cross-industry Location Covariance induced solely by the shift from old to new district boundaries, while holding fixed at pre-redistricting levels all industry sizes, import penetration rates, import demand elasticities, and the distribution of industries across counties.

For the 1993 redistricting, define the vector of district shares for industry i in 1992 using the pre-redistricting boundaries in place as $\boldsymbol{\gamma}^{\text{old}}_{i,1992}$. Using the to-be-implemented district boundaries, but the distribution of industries across counties in 1992, we calculate the share of industry i in each new district, $\boldsymbol{\gamma}^{\text{new}}_{i,1992}$. We calculate the change in cross-industry Location Covariance from this change in district boundaries, as follows

$$\textit{Redistricting shock}_{i,1993} = D \sum_{j \neq i} \psi_{j,1992} \left(\text{Cov}(\boldsymbol{\gamma}^{\text{new}}_{i,1992}, \boldsymbol{\gamma}^{\text{new}}_{j,1992}) - \text{Cov}(\boldsymbol{\gamma}^{\text{old}}_{i,1992}, \boldsymbol{\gamma}^{\text{old}}_{j,1992}) \right).$$

How can redistricting alone change covariance if the industry locations themselves remain fixed? Figure 4 presents a stylized example with two industries and four counties grouped into two districts. When district boundaries are drawn to separate the industries (panel b), the cross-industry covariance term is negative, leading to negative overall Location Covariance for the industry with the lower ψ. Redrawing the districts to combine both industries (panel c) increases Location Covariance for the lower ψ industry because it can now partially free-ride on the lobbying effort of the larger industry.

Figure 4: Example of how district boundaries affect covariance



This figure shows a stylized example of how changing district boundaries can change Location Covariance. Suppose there are four counties and industries A and B are each evenly split across two counties. Suppose also that B is larger than A, so $\psi_B > \psi_A$. Panel (b) shows an example where district boundaries separate the two industries; in this case the cross-industry term of Location Covariance is negative, though the within-industry term is large, and so the smaller industry's Location Covariance is negative (specifically it equals $\frac{1}{2}(\psi_A - \psi_B)$). Panel (c) shows an example where boundaries place counties containing A in the same districts as B. In this case the cross-industry term is more positive, leading to more positive Location Covariance for the smaller industry (in this example equalling 0).

We estimate event-study regressions of the form

$$\tau_{itw} = \sum_{t=-10, t\neq -1}^{10} \beta_t \mathit{Redistricting\ shock}_{iw} + \gamma_{iw} + \delta_{tw} + \varepsilon_{itw}$$

The coefficient β_t captures the relationship between the redistricting shock in wave w (e.g. 1993) and tariffs t years before or after redistricting, relative to the base year immediately before redistricting. The industry-by-wave fixed effects γ_{iw} absorb time-invariant industry characteristics, while the year-by-wave fixed effects δ_{tw} account for common shocks within each redistricting wave. Using data from 1989–2016, we have three redistricting shocks. We construct a stacked panel containing the ten years before and after each redistricting event and interact both industry and year fixed effects with the corresponding redistricting wave. These specifications allow us to isolate more plausibly exogenous variation in Location Covariance and estimate its dynamic effects on tariffs.

Figure 5 presents the resulting estimates. In the years before redistricting, there is no clear evidence that industries experiencing increases in Location Covariance were already on different tariff trajectories. The absence of a discernible pre-trend makes the parallel trends assumption more plausible. Following redistricting, we observe a gradual increase in tariffs for those industries that gained Location Covariance. Figure A.3 reports dynamic two stage least squares estimates, instrumenting for changes in Location Covariance with the redistricting shock. Five years after redistricting, a one-unit increase in Location Covariance corresponds to roughly a 0.1 percentage point increase in duties per import, and a 0.05 percentage point increase in MFN ad valorem rates. These estimates are broadly comparable to those reported in Table 1.

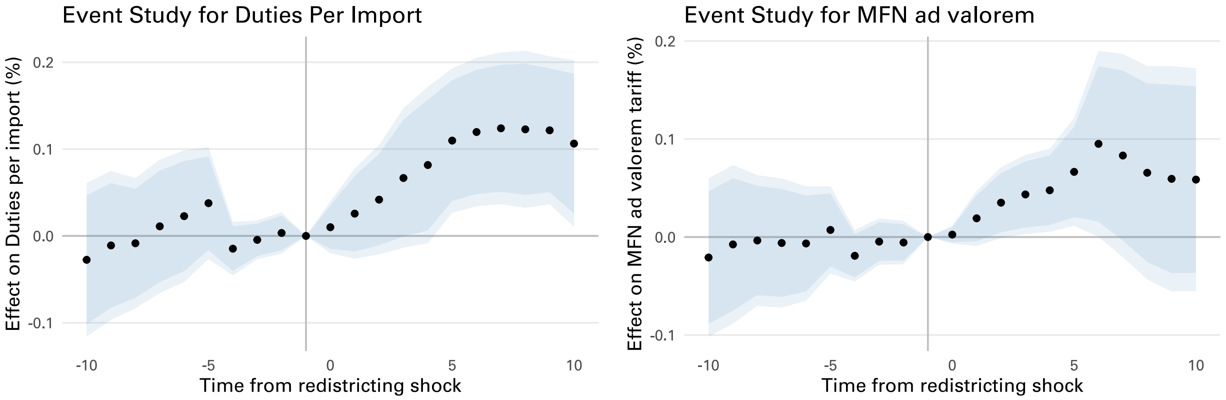


Figure 5: Redistricting shocks lead to higher tariffs

The left panel plots the coefficients and confidence intervals from a regression of duties per import against the redistricting shock interacted with the number of years prior to or post redistricting, at the level of 4-digit NAICS industry-by-year-by-redistricting cycle. The light shaded area gives the 95% confidence interval constructed from standard errors clustered by industry, the dark shaded area gives the 90% confidence interval.

We further assess the robustness of this design by investigating whether redistricting shocks correlate with levels and trends in variables unrelated to our theoretical mechanism. Figure A.4 shows that redistricting shocks correlate with a pre-redistricting trend in industry employment growth, but not with trends in output per worker, productivity, or trade orientation, or characteristics of the legislators representing industry-heavy districts, such as party affiliation or committee membership. Figure A.5 shows that, prior to redistricting, the redistricting shock is uncorrelated with these outcomes in levels, although industries experiencing subsequent increases in Location Covariance from redistricting tend to have lower pre-redistricting tariffs. Combined, these exercises suggest that Location Covariance is not systematically correlated with other observable factors, reducing the concern that spurious trends drive our findings. Figure A.6 re-estimates the event study while controlling for employment growth and trends related to initial tariff levels—the two variables correlated with the redistricting shock—and produces nearly identical estimates.

We also find no evidence that more powerful industries are able to influence redistricting at the state level to increase their Location Covariance. If locally-powerful industries are able to influence redistricting, we might expect industries with more employment in a state to receive more positive redistricting shocks. Table A.2 instead documents the null relationship between industry employment in a given state, and that state's contribution to the industry's redistricting shock. Our estimates are also robust to just identifying off redistricting from states in which no single party controlled the redistricting process (Figure A.7). In these cases we would expect redistricting to be less reflective of local political interests, and so less open to manipulation by interest groups.

4.4 *Trade in Intermediate Inputs and Lobbying for Liberalization*

In our model industries seek protection. This conclusion follows naturally from standard trade theory: even firms producing differentiated products benefit from a protected domestic market. It is also consistent with a large body of empirical research that shows that politically mobilized industries in the US receive more protection (Goldberg and Maggi 1999; Gawande and Bandyopadhyay 2000; Fredriksson, Matschke, and Minier 2011; Adão et al. 2023). These findings suggest that one objective of trade lobbying is to secure protection. More broadly, a large literature following Autor, Dorn, and Hanson (2013) documents the negative effects of import competition on industries and the labor markets that depend on them.

More recent research shows that firms and industries often lobby in favor of trade agreements (Osgood 2017, 2018; Kim 2017; Blanga-Gubbay, Conconi, and Parenti 2025). This raises the question of how to reconcile support for trade liberalization with evidence that lobbying increases protection. Firms may support trade agreements because they benefit from cheaper imported inputs and improved access to foreign markets (Osgood 2018). Of the two motives, Osgood (2018) finds that access to imported inputs plays the larger role in shaping industry preferences.

In Appendix C we extend the model to incorporate access to intermediate inputs, following Gawande, Krishna, and Olarreaga (2012). Industries then have incentives to lobby for lower tariffs on upstream products, while legislators' incentives to protect industries in their districts are offset by incentives to secure cheaper inputs for downstream industries in the same locations. The model's core results hold in a modified form. The relevant quantity for industry lobbying in a district becomes the share of industry employment net of the share of industry output used as inputs by other industries in the district. Empirically, this measure is highly positively correlated with the share of industry employment in the district (Figure

C.1). The extended model generates a modified version of Location Covariance in which the relevant covariance term is based on these net output shares rather than employment shares across districts. Using input-output data, we calculate this modified Location Covariance and find that it is positively associated with tariffs (Table C.1). However, it provides little additional explanatory power beyond the baseline measure of Location Covariance. Thus, while the model can incorporate intermediate inputs—an important source of lobbying for trade liberalization—doing so does not substantially alter the model's theoretical or empirical predictions.

But what if industries support domestic tariff cuts because they are paired with foreign tariff reductions? Theoretically, it is unclear why industries would lobby for this particular policy bundle when it is dominated by a combination of lower domestic tariffs on other industries and foreign tariff cuts on the industry itself. Gawande, Pinto, and Pinto (2023) extend their model to include exporters and import-competing industries, with tariffs determined through Nash bargaining between the home country and rest of world. In their framework, exporting interests push for lower tariffs, but not on their own products. Kim (2017) develops a model in which domestic tariffs in an industry are exogenously mirrored by foreign tariffs. This assumption is central to the result that firms producing differentiated products—which benefit disproportionately from access to foreign markets—lobby for lower tariffs in both domestic and foreign markets.

If industries lobbied for domestic liberalization accompanied by foreign liberalization, as in Kim (2017), we would expect that high Location Covariance industries would receive the lowest tariffs, contrary to the evidence in Table 1. One possible alternative is that legislators protect import-competing industries while liberalizing export-oriented ones. However, Table A.3 shows that the export or import orientation of an industry does not moderate the effect of Location Covariance, consistent with industries broadly seeking protection in the domestic market. Industry size also does not moderate the effect of Location Covariance, which rules out an account in which only small industries free-ride on the lobbying efforts of larger industries. There is also little evidence that industries with high Location Covariance lobby primarily for changes in foreign trade policy that facilitate exports. Table A.4 shows no clear relationship between Location Covariance and exports.

5 MECHANISMS: LOBBYING PATTERNS, LEGISLATOR EFFORT, AND WITHIN-LEGISLATOR SPILLOVERS

Having established that industries with higher Location Covariance receive higher tariffs, we now investigate the mechanisms underlying this relationship. This section tests the model's remaining predictions and provides evidence of within-legislator spillovers using data on Miscellaneous Tariff Bills.

5.1 *District employment and lobbying patterns*

In the model, legislators support higher tariffs for industries with greater employment in their districts. Industries therefore have stronger incentives to lobby legislators representing districts where their industry employs more workers. Using data on lobbying connections between individual firms and legislators, we estimate the following relationship

$$\log \textit{Lobbying connections}_{fidt} = \beta \, \textit{Share of employment in district}_{idt} + \gamma_{ft} + \delta_{dt} + \varepsilon_{fidt} \quad (12)$$

where the dependent variable is the log (1+) number of lobbying connections between firm f in industry i and the legislator representing district d in year t, and the independent variable is the share of industry i's employment in district d. γ_{ft} and δ_{dt} are firm-year and district-year fixed effects, which account for factors that affect individual firms' propensities to lobby any legislator in a given year, such as size and productivity, and individual legislators' propensities to be lobbied in a given year, such as committee membership. In additional specifications, we include firm-district fixed effects to account for unobserved factors that affect a given firm's propensity to lobby the representative of a particular district. These specifications resemble a difference-in-differences design, identifying off within-dyad changes in industry employment shares over time.

Table 2 reports the resulting estimates. Model (1) examines the cross-sectional relationship between industry employment and lobbying, using firm-year fixed effects to compare lobbying across districts within a firm-year. Model (2) adds district-year fixed effects to account for legislators who are generally more likely to be lobbied, corresponding to Equation 12. The coefficient indicates that a 10 percentage point increase in the share of an industry located in a given district is associated with a 16% increase in lobbying connections. (3) further adds dyad fixed effects. Although the coefficient attenuates, the relationship remains substantively large and statistically significant.

5.2 *District composition and legislator attention to trade*

If lobbying increases legislators' influence over trade policy, legislators who are lobbied more—and legislators representing districts with industries that strongly seek protection—should engage more actively in trade policymaking. To examine this prediction, we analyze contact between legislators (including their staffs and committees) and the Office of the US Trade

Table 2: Industries lobby legislators whose districts contain industry employment

	log lobbying connections		
	(1)	(2)	(3)
Share of employment in district	1.598^{**}	1.495^{**}	0.840^{*}
	(0.330)	(0.331)	(0.412)
FE: Firm × Year	x	x	x
- District × Year		x	x
- District × Firm			x
N	707795	707795	707795
R^2	0.085	0.135	0.408

This table reports regressions of lobbying activity against industry employment in the legislator's district. Data is at the level of legislator-lobbying interest group-year. The dependent variable is log (1+) lobbying connections, the number of lobbying reports in which a lobbyist is hired who donates to the legislator. The independent variable is the share of the NAICS 4-digit industry in the legislator's district. All models include fixed effects for firm-by-year, (2) adds district-by-year fixed effects, (3) adds fixed effects for the district-firm dyad. Standard errors clustered by state and industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Representative. Specifically, we estimate models of the form

$$\log \mathit{Contacts\ with\ USTR}_{dt} = \beta\, \mathit{Weighted\ Capacity}_{dt} + \gamma_d + \delta_t + \varepsilon_{dt} \tag{13}$$

where the dependent variable is the log (1+) number of recorded contacts between the legislator and the Office of the US Trade Representative. The key independent variable is Weighted Capacity: the sum across industries of the share of national employment in each industry in the district multiplied by the industry's return to lobbying, ψ, as defined in Equation 10. The prediction of a positive relationship between Weighted Capacity and influence over trade policy follows directly from Equation 7. γ_d and δ_t are district and year fixed effects, that hold fixed time-invariant district factors and common shocks.

Table 3 reports the resulting estimates. Model (1) shows a positive cross-sectional relationship between Weighted Capacity and contact with USTR. Model (2) adds district fixed effects, corresponding to Equation 13, and produces an essentially unchanged coefficient. A two-standard deviation increase in Weighted Capacity corresponds to a 39% increase in contacts with the USTR. Model (3) adds controls for membership of the House Ways and Means Committee, which increases the precision of the estimate while leaving its magnitude largely unchanged. Models (4)–(6) re-estimate these models using the log number of lobbying connections for trade as the independent variable. Although we are cautious about assigning a causal interpretation—lobbying may itself be endogenous to legislators' expertise in trade policy—the positive coefficients are consistent with the model's assumption that lobbying increases legislators' influence over trade policy.

Table 3: Lobbied legislators have more contact with USTR

	log contacts with USTR					
	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Capacity	0.005^{*}	0.006^{*}	0.005^{*}			
	(0.002)	(0.003)	(0.002)			
Log lobbying connections				0.178^{**}	0.112^{**}	0.038^{*}
				(0.030)	(0.025)	(0.018)
Chair of Ways and Means			0.179			-0.099
			(0.164)			(0.266)
Member of Ways and Means			3.306^{**}			3.771^{**}
			(0.098)			(0.138)
FE: Year	x	x	x	x	x	x
- District		x	x		x	x
N	6604	6604	6604	3095	3095	3095
R^2	0.059	0.513	0.705	0.040	0.574	0.756

This table reports regressions of the log number of recorded contacts between the legislator and their committees, and the USTR, against measures of lobbying. Data is at the legislator-year level. In (1)–(3) the independent variable is the sum over industries of the share of the industry employed in the district times ψ, the returns to lobbying for the industry. In (4)–(6) the independent variable is log (1+) the number of lobbying connections on trade with the legislator. All models include year fixed effects, (2), (3), (5) and (6) add district fixed effects, (3) and (6) also control for chairship and membership of the House Ways and Means committee. Standard errors clustered by district in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

5.3 *Lobbying Spillovers in Miscellaneous Tariff Bills*

A key assumption in our model is that lobbying generates within-legislator spillovers across industries. By lobbying a legislator, an industry increases that legislator's influence and therefore their ability to protect other industries located in the same district. While the results in Table 1 document one implication of this mechanism—industries that co-locate with lobbying-prone industries receive higher tariffs—they do not provide direct evidence of spillovers themselves.

In this section we use Miscellaneous Tariff Bills to provide more direct evidence of these spillovers.[10] A Miscellaneous Tariff Bill temporarily reduces or suspends tariffs on a specific product. Prior to the 2016 American Manufacturing Competitiveness Act, legislators

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[10] Figure A.8 presents additional evidence of spillovers, showing that legislators who are lobbied on trade have greater legislative effectiveness on a range of issue areas.

introduced these bills. The bills were reviewed by the US International Trade Commission to ensure that the products were not produced domestically and that the resulting revenue loss was limited, after which they were bundled into omnibus legislation by the House Ways and Means and Senate Finance Committees.[11] For our purposes, Miscellaneous Tariff Bills provide observable data on legislators intervening in trade policy to benefit firms in a specific industry. The relevant policy instrument is tariff suspension on imported inputs rather than protection for final goods, but the underlying politics still follow the "concentrated benefits and diffuse costs" logic of tariffs in our model. Because tariff relief applies only to goods not produced domestically, few concentrated domestic interests are harmed.[12] Critics of the Miscellaneous Tariff Bill process highlighted the costs to (diffuse) taxpayers from forgone tariff revenue.[13]

We scrape the USITC's reports on Miscellaneous Tariff Bills for the 105th–112th congresses. These reports identify the firm requesting tariff suspension, the tariff line to be suspended, and the legislator sponsoring the bill. We calculate the number of bills sponsored by each legislator in each Congress for which the petitioning firm belongs to a given 4-digit manufacturing industry.[14]

Legislators tend to sponsor bills benefiting industries located in their districts. Figure 6 plots the number of bills sponsored by a legislator for a given industry in a given congressional session against the share of the industry's national employment in the legislator's district. The relationship is strongly positive, consistent with legislators having electoral incentives to promote policies that benefit local industries.

Legislators propose bills for a wide range of interests. For instance, in the 109th congress, Ellen Tauscher, representing California's 10th district, introduced 16 bills proposing duty suspensions on various chemicals used by Valent USA, a company based in Walnut Creek, CA that manufactures herbicides, insecticides, and fungicides. She also introduced two bills sought by "Various canned seafood distributors" to suspend duties on "certain sardines in oil, in airtight containers, neither skinned nor boned" and on "prepared or preserved oysters, not smoked."

Sponsoring a Miscellaneous Tariff Bill on behalf of an industry is both an output of

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[11] The American Manufacturing Competitiveness Act changed this structure, so that instead of going via legislators, importers seeking tariff relief petition the USITC directly. See https://www.usitc.gov/mtb_faqs.htm.

[12] Ludema, Mayda, and Mishra (2018) find that opposition from other firms to Miscellaneous Tariff Bills is very effective in preventing tariff relief, consistent with rules requiring no domestic producers for products subject to tariff relief.

[13] https://sunlightfoundation.com/2012/04/30/tariff-bill-opens-the-floodgates-for-lobbyists/

[14] We manually assign firms to industries. As a robustness check, we instead use the industry of the product line to be liberalized, though we prefer the firm-based classification because firms do not always petition to liberalize products in their own sector.

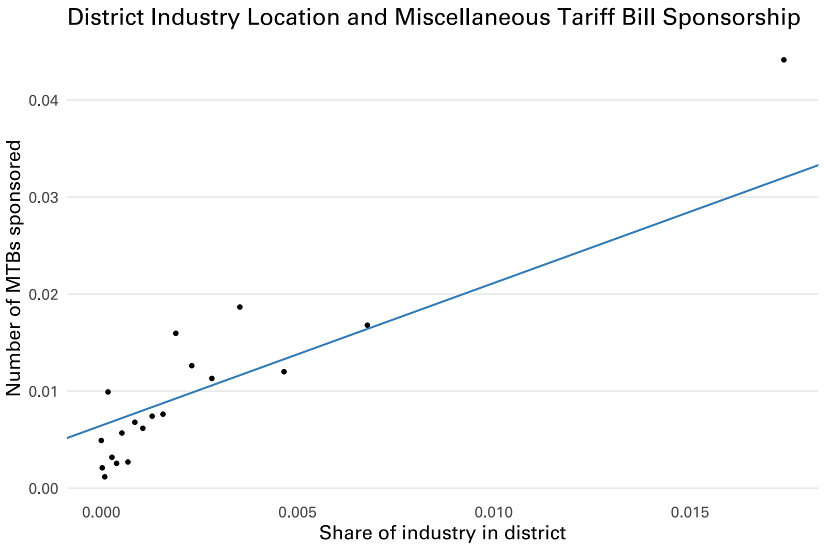

Figure 6: Legislators sponsor Miscellaneous Tariff Bills that benefit industries in their districts

This figure plots the number of Miscellaneous Tariff Bills sponsored by a legislator in a given congressional session, for which the firm petitioning is in a given industry, against the share of that industry located in the legislator's district. Dots are equal size binned averages, the line is the OLS fit.

lobbying and evidence that lobbying has occurred. Legislators sponsor these bills in response to firms petitioning them for tariff relief. If lobbying expands legislators' capacity, we would observe that legislators who sponsor more bills for one industry—and therefore are lobbied more by that industry—also sponsor more bills for other industries. By contrast, if lobbying crowds out legislators' finite attention and resources to other issues, sponsoring more bills for one industry will reduce sponsorship for others. The challenge in estimating this relationship is that legislators may differ systematically in underlying capacity; more productive legislators may be sought out by a broad range of industries.

To avoid this problem, we exploit plausibly exogenous variation in bill sponsorship generated by district composition. The intuition is that legislators representing districts with industries that frequently seek Miscellaneous Tariff Bills, such as chemicals, should be lobbied more by those industries. If lobbying expands legislators' capacity, those legislators will also sponsor more bills for other industries that do not on average demand as many bills. Figure 6 shows that the share of an industry located in a legislator's district predicts the number of bills the legislator sponsors for that industry. Combining district composition with temporal variation in industry demand for Miscellaneous Tariff Bills yields a Bartik-style shock to bill sponsorship at the level of industry (i), legislator (d) and session of congress (t):

$$\mathit{Industry\ MTB\ shock}_{idt} = \gamma_{id}^{\text{base}} \sum_{k \neq d} \mathit{MTBs\ sponsored}_{ikt}$$

Table 4: Lobbying spillovers in Miscellaneous Tariff Bill sponsorship

	Log MTBs for industry			for other industries		
	(1)	(2)	(3)	(4)	(5)	(6)
Industry MTB shock	0.076^{**}	0.076^{**}	0.076^{**}	0.067^{**}	0.043^{**}	0.043^{**}
	(0.006)	(0.006)	(0.006)	(0.021)	(0.012)	(0.012)
Average other industry MTB shock		0.057^{*}	0.057^{*}		4.390^{**}	4.382^{**}
		(0.028)	(0.028)		(0.903)	(0.903)
Chair of Ways and Means			$-0.005^{\dagger}$			-0.231^{*}
			(0.003)			(0.107)
Member of Ways and Means			0.007^{*}			0.242^{**}
			(0.003)			(0.059)
FE: Industry × period	x	x	x	x	x	x
- Industry × district	x	x	x	x	x	x
N	165696	165696	165696	165696	165696	165696
R^2	0.329	0.329	0.330	0.404	0.427	0.432

This table reports regressions of Miscellaneous Tariff Bill sponsorship at the level of industry-by-legislator-by-session of congress against shocks to predicted sponsorship from district and industry characteristics. The dependent variable in (1)–(3) is the log (1+) number of Miscellaneous Tariff Bills sponsored for firms in the industry in question, in (4)–(6) the log number sponsored for all other industries. In (1) and (4) the independent variable is the industry MTB shock, calculated by interacting the number of MTBs sponsored by other legislators with the share of the industry located in the district in the first period. (2) and (5) add the average of this shock for all other industries; in (2) this provides a measure of spillover effects. (3) and (6) control for membership and chairship of the ways and means committee. All models include fixed effects for industry-by-congressional session and district-industry pairs. Standard errors clustered by industry and district in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

where $\gamma_{id}^{\text{base}}$ is the share of industry i's employment in district d in the first year in the dataset, and $\sum_{k\neq d} \textit{MTBs sponsored}_{ikt}$ is the number of Miscellaneous Tariff Bills that benefit industry i in period t, sponsored by legislators other than d. The $\textit{Industry MTB shock}_{idt}$ corresponds to the number of Miscellaneous Tariff Bills legislator d would sponsor for industry i in period t, if bill sponsorship by each legislator was directly proportional to the share of national industry employment in that legislator's district in the base period, leaving out the legislator's own bills sponsored from the calculation. Within a legislator-industry pair, variation over time in this measure is driven by changes in national demand for bills in a given industry interacting with the industry's baseline presence in the district. For example, if the chemical industry demands more bills in a particular period, legislators whose districts initially contained more chemical industry employment will experience larger industry-specific MTB shocks.

Table 4 examines how shocks to sponsorship for one industry affect sponsorship of bills benefiting other industries. Model (1) reports the estimates from regressing the number of bills a legislator sponsors for a given industry on the corresponding industry shock, including industry-period and industry-district fixed effects. This specification is akin to a "first stage" in an instrumental variables design, confirming that the sponsorship shock predicts actual bill sponsorship. The industry-district and industry-period fixed effects correspond to a generalized difference in differences in which the unit is the industry-district pair and in which we hold fixed common shocks at the industry level. A one unit increase in the industry shock corresponds to an 8% increase in actual bill sponsorship.

Model (2) provides our first test of spillovers. We add the average of the industry shock for all other industries as a covariate. Higher values of this variable correspond to districts containing more employment in industries demanding larger numbers of Miscellaneous Tariff Bills in that period. A positive coefficient would indicate that lobbying by other industries for tariff relief expanded legislator capacity to address the concerns of the industry in question; a negative coefficient would suggest crowding out. We estimate a positive coefficient similar in magnitude to the own-industry shock. Model (3) adds controls for membership or chairship of the House Ways and Means Committee and produces nearly identical estimates. This result is reassuring, in suggesting that the shock does not correlate with changes in legislator committee membership relevant for trade policy.

Models (4)–(6) present an alternative test of spillovers. Rather than examining how shocks to other industries affect sponsorship for a given industry, these models examine how shocks to one industry affect sponsorship of bills benefiting other industries. In (4), a unit increase in the industry shock corresponds to a 7% increase in bill sponsorship for other industries. The coefficient attenuates slightly but remains positive after controlling for the average shock to other industries. Adding controls for Ways and Means committee membership leaves the estimates essentially unchanged in Model (6). Overall, the evidence from Miscellaneous Tariff Bills suggests that lobbying in one policy area expands legislators' capacity to act in others.

6 DISCUSSION: WHY EXISTING LITERATURE ESTIMATES THAT POLICY PLACES SO LITTLE WEIGHT ON INTEREST GROUPS

Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) estimate a Grossman and Helpman (1994) model using cross-sectional data on US trade policy from the 1980s. They estimate a, the weight that the government places on social welfare relative to the welfare of lobbying interest groups. Goldberg and Maggi (1999) estimate $a = 70$.[15] Gawande and Bandyopadhyay (2000), in a slightly different framework estimate $a = 3175$. These findings are puzzling given the prevalence of trade lobbying and the widespread assumption that lobbying plays a central role in shaping trade policy.

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[15] Specifically their Table 1 reports $\beta = 0.986$ where $a = \frac{\beta}{1-\beta}$.

This section explores how our model rationalizes these findings. Grossman and Helpman (1994) derive the following equation relating tariffs to I_i, an indicator that industry i lobbies, a, and α_L, the share of the population represented by lobbies:

$$\frac{\tau_i}{1+\tau_i} = \frac{I_i - \alpha_L}{a + \alpha_L} \frac{z_i}{-\epsilon_i}.$$

All other variables are as in Section 2. An industry receives higher tariffs if it lobbies ($I_i = 1$), and the magnitude of that increase is decreasing in a. Because social welfare is maximized at zero tariffs, larger values of a pull tariffs toward zero. Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) estimate a by regressing the tariff an industry receives on $\frac{z_i}{-\epsilon_i}$ and its interaction with an indicator that the industry lobbies. Their large estimates of a are driven by two features of the data. First, tariffs are generally low across industries. Second, the estimates come from comparing tariffs received by lobbying and non-lobbying industries. Small differences between the two imply that policymakers place a high weight on social welfare, and so only trade off small decreases in social welfare in the form of tariffs in exchange for contributions from interest groups.

Our model rationalizes both patterns. First, the need for legislative allies imposes a constraint on the tariffs an industry can obtain through lobbying, even if lobbying is highly effective at reallocating legislative influence. Under legislative subsidy lobbying, the highest tariff an industry can obtain is bounded by the tariff preferred by the legislator whose district benefits the most from protecting the industry. Yet even that legislator represents consumers and workers employed in other industries who bear the costs of tariffs and therefore oppose higher tariffs on the industry in question.

Second, the model generates spillovers in protection from industries that lobby to industries that do not but are located in the same districts. By lobbying, an industry seeking protection increases the influence of legislators whose districts contain the industry, empowering these legislators to protect both the industry in question and non-lobbying industries in their districts. Comparing industries that lobby to those that do not understates the effectiveness of lobbying, much as spillovers in an experiment bias down the estimated treatment effect because the control group is partially treated.

In Appendix E we show that applying a Goldberg-Maggi estimation procedure to data generated by our model yields estimates of a approximately proportional to the ratio of cross-industry Location Covariance to own-industry Location Covariance. We calculate the implied a under different assumptions about which industries lobby and the effect of lobbying on legislator influence. If lobbying industries are similar to non-lobbying industries, we obtain estimates ranging from 7 to 41, depending on how responsive legislator weights are to lobbying. The larger value follows from using the estimate of the effect of lobbying on legislator weights from the specification with industry and year fixed effects most similar to those in Table 1. These large estimates of a come despite assuming away many of the factors like selection into lobbying, measurement error, or the endogeneity of import penetration that may bias the estimates in Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000). Furthermore, if the largest lobbying industries tend to locate more with non-lobbying industries than with other lobbying industries, the implied estimates of a can become substantially larger.

7 CONCLUSION

Trade policy is the canonical setting for lobbying influencing policy, yet most research on the consequences of lobbying for trade policy either assumes lobbying takes the form of quid pro quo or does not specify the mechanism of influence. In this paper, we develop a model of lobbying as legislative subsidy and apply it to the study of trade policy. In the model, lobbying increases the weight legislators receive in the policymaking process. Industries therefore have incentives to lobby legislators whose districts contain more industry employment. Aggregating across industries, legislators representing districts with greater employment of large and lobbying-prone industries become more influential in shaping policy. Aggregating across districts, industries receive greater protection when they are co-located with politically influential and lobbying-intensive industries. We find empirical support for these predictions using data on lobbying, contact with federal agencies, and tariffs in the US. Our central finding is that lobbying generates spillovers across industries within districts: lobbying by one industry increases the protection received by other industries represented by the same legislators. This mechanism helps rationalize why existing studies estimate that policymakers place relatively little weight on lobbying in trade policy. Hall and Deardorff (2006) observe that under legislative subsidy, “representation is compromised without individual representatives being compromised” (p. 81). Our framework illustrates how legislative subsidy can shift policy away from the social optimum and toward protection for spatially-correlated industries.

Our model assumes that individual legislators represent geographically distinct districts and exert influence over policy. While this assumption fits the US context it does not map directly onto systems with strong parties or non-geographical representation. Nevertheless, legislative subsidy theories of lobbying are relevant in a wide range of institutional settings, including the European Parliament (Marshall 2010), Chilean Chamber of Deputies (Alemán and Dockendorff 2024), and German Bundesrat (Spohr, Bernhagen, and Krüger 2025). Our framework can be extended to contexts with different assumptions about the relevant political actors (e.g. parties rather than individual legislators) or about the sources of those actors' preferences (i.e. not their districts). For instance, in a system with strong parties, we would expect that industries would target parties rather than individual legislators, and the relevant spatial covariance would be across the groups of districts represented by parties rather than across individual legislative districts.

Beyond trade policy, our theoretical framework offers a broader perspective on how lobbying distorts policymaking. In the aggregate, legislative subsidy lobbying may generate inequalities in representation across districts and contribute to more extreme policy outcomes. Because lobbying is dominated by business interests, our model predicts that legislators representing districts with more employment of the most lobbying-prone firms and industries will wield disproportionate influence over policy. As a result, policy outcomes may become systematically biased toward the interests of those legislators' constituents, including in policy areas not directly subject to lobbying. In the trade context, industries lobby legislators representing districts with greater industry employment because those legislators prefer higher tariffs. Extending this logic to other policy domains implies that interest groups will disproportionately lobby the legislators who are most disposed to push for the interest groups' priorities, often more ideologically extreme legislators. By increasing those legislators' influence, lobbying can shift policy toward the extremes, even when the interests lobbying are relatively moderate. Through this mechanism, legislative subsidy may contribute to political polarization.

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Online Appendix for Protection by Covariance

Table of Contents

A additional tables and figures

A.1 *Tables*

Table A.1: Model-consistent estimates of effects of industry covariance on tariffs

	$\frac{\tau}{1+\tau}$: Duty per import				MFN ad valorem			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Location Covariance $\times \frac{z}{-\epsilon}$	0.066^{*}	0.010^{*}	0.016	0.049^{*}	0.080^{**}	0.008^{*}	0.029^{*}	0.048^{*}
	(0.026)	(0.004)	(0.012)	(0.020)	(0.027)	(0.004)	(0.011)	(0.021)
$\frac{z}{-\epsilon}$	-1.318^{*}		-0.149	-0.771^{*}	-1.659^{**}		$-0.468^{\dagger}$	-0.836^{*}
	(0.553)		(0.253)	(0.336)	(0.618)		(0.246)	(0.357)
Estimator	OLS	OLS	OLS	TSLS	OLS	OLS	OLS	TSLS
FE: Year	x	x	x	x	x	x	x	x
- Industry		x	x	x		x	x	x
First stage F-stat				20.825				20.825
N	2292	2292	2292	2252	2292	2292	2292	2252
R^2	0.117	0.940	0.940	0.941	0.096	0.947	0.947	0.947

This table reports regressions of tariffs against industry Location Covariance, in specifications consistent with the formal model. Data is at the level of NAICS 4-digit industry by year. The dependent variable is $\frac{\tau}{1+\tau}$ where τ is the tariff rate, calculated using duties relative to imports in (1)–(4) or MFN ad valorem rates (5)–(8). The independent variable is Location Covariance interacted with $\frac{z}{-\epsilon}$, inverse import penetration (z) divided by minus the import demand elasticity (ϵ). All models include year fixed effects, (2)–(4) and (6)–(8) include industry fixed effects, and (1), (3), (4), (5), (7), and (8) control for $\frac{z}{-\epsilon}$. Models (4) and (8) instrument for the independent variable with the other-industry component of Location Covariance interacted with $\frac{z}{-\epsilon}$ in 1989, the first year of our panel. Standard errors clustered by industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

A.2 *Figures*

Table A.2: State industry employment is uncorrelated with state-level redistricting shocks

	State component of redistricting shock (×100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log state industry employment	−0.093	−0.040	−0.215	−0.062				
	(0.857)	(0.478)	(0.899)	(0.408)				
Share of industry in state					−74.634	−92.483	−92.483	−66.643
					(104.926)	(107.950)	(105.076)	(124.419)
FE: State × wave		x	x	x		x	x	x
- Industry × wave			x	x			x	x
- State × industry				x				x
N	15137	15137	15137	15137	15696	15696	15696	15696
R^2	0.000	0.303	0.324	0.602	0.009	0.309	0.328	0.599

This table reports regressions at the state-by-industry-by-redistricting wave of the state component of the Redistricting shock, that is, the change in location covariance from adopting the new boundaries just in the state in question, against state industry employment. For legibility, the dependent variable is multiplied by 100. In models (1)–(4), the independent variable is log industry employment in the state in the year before the new districts are adopted, in (5)–(8) it is the share of the industry's national employment in the state. Models (1) and (5) include an intercept, (2) and (6) add state-by-redistricting wave fixed effects, (3) and (7) add industry-by-wave fixed effects. (4) and (8) further add state-by-industry fixed effects. Standard errors clustered by industry and state in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Table A.3: Industry size and export/import orientation does not moderate the effect of Location Covariance

	Duty per import (%)				MFN ad valorem (%)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Location Covariance	0.046^{**}	0.040^{**}	0.037^{*}	0.044^{*}	0.033^{*}	0.036^{*}	0.043^{*}	0.045^{*}
	(0.013)	(0.014)	(0.016)	(0.017)	(0.014)	(0.016)	(0.017)	(0.018)
× log value of shipments, 1989	−0.014				$0.024^{\dagger}$			
	(0.013)				(0.013)			
× log value of shipments, year		−0.008				0.013		
		(0.009)				(0.009)		
× log exports / imports, 1989			0.009				−0.005	
			(0.006)				(0.010)	
× log exports / imports, year				0.007				−0.004
				(0.007)				(0.009)
FE: Industry	x	x	x	x	x	x	x	x
- Year	x	x	x	x	x	x	x	x
Moderator x year	x	x	x	x	x	x	x	x
N	2252	2292	2252	2268	2252	2292	2252	2268
R^2	0.942	0.942	0.944	0.944	0.954	0.954	0.953	0.953

This table reports regressions of tariffs against industry Location Covariance, interacting Location Covariance with the log value of shipments in the industry, a measure of industry size, and the log ratio of exports to imports, a measure of export orientation. In odd-numbered models, these moderators are measured in 1989, in even-numbered models in the year in question. In (1)–(4) the dependent variable is duties as a percentage of imports, in (5)–(8) it is the MFN ad valorem tariff. All models include industry and year fixed effects, and control for the moderator interacted with the year fixed effects. We subtract the means from the moderators, so that the coefficient on Location Covariance gives the marginal effect at the mean of the moderator. Standard errors clustered by industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Table A.4: Location Covariance does not predict exports

	log exports / output			
	(1)	(2)	(3)	(4)
Location Covariance	0.000	0.019		
	(0.013)	(0.014)		
- Own industry (HHI)			0.014	0.059^{*}
			(0.039)	(0.027)
- Other industry			-0.004	0.007
			(0.012)	(0.011)
FE: Industry	x	x	x	x
- Year	x	x	x	x
Controls		x		x
N	2261	2261	2261	2261
R^2	0.907	0.925	0.907	0.928

This table reports regressions of log exports as a share of industry output against industry Location Covariance. All models include industry and year fixed effects. (2) and (4) also control for the log value of output and the log value of imports. Standard errors clustered by industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Table A.5: Lobbying spillovers in Miscellaneous Tariff Bill sponsorship, robustness to defining beneficiaries using product information

	Log MTBs for industry			for other industries		
	(1)	(2)	(3)	(4)	(5)	(6)
Industry MTB shock	0.041^{**}	0.040^{**}	0.040^{**}	0.035^{*}	0.020^{**}	0.020^{**}
	(0.003)	(0.003)	(0.003)	(0.015)	(0.004)	(0.004)
Average other industry MTB shock		0.035^{*}	0.035^{*}		2.543^{**}	2.548^{**}
		(0.016)	(0.016)		(0.473)	(0.475)
Chair of Ways and Means			$-0.009^{\dagger}$			-0.378^{*}
			(0.005)			(0.167)
Member of Ways and Means			0.009^{**}			0.305^{**}
			(0.003)			(0.066)
FE: Industry × period	x	x	x	x	x	x
- Industry × district	x	x	x	x	x	x
N	203668	203668	203668	203668	203668	203668
R^2	0.318	0.318	0.319	0.382	0.396	0.402

This table reproduces Table 4, inferring the industry benefiting from the Miscellaneous Tariff Bill from the product being liberalized, rather than from the firm benefiting from the bill. The table reports regressions of Miscellaneous Tariff Bill sponsorship at the level of industry-by-legislator-by-session of congress against shocks to predicted sponsorship from district and industry characteristics. The dependent variable in (1)–(3) is the log (1+) number of Miscellaneous Tariff Bills sponsored for firms in the industry in question, in (4)–(6) the log number sponsored for all other industries. In (1) and (4) the independent variable is the industry MTB shock, calculated by interacting the number of MTBs sponsored by other legislators with the share of the industry located in the district in the first period. (2) and (5) add the average of this shock for all other industries; in (2) this provides a measure of spillover effects. (3) and (6) control for membership and chairship of the ways and means committee. All models include fixed effects for industry-by-congressional session and district-industry pairs. The sample is restricted to industries with at least one MTB during the period. Standard errors clustered by industry and district in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

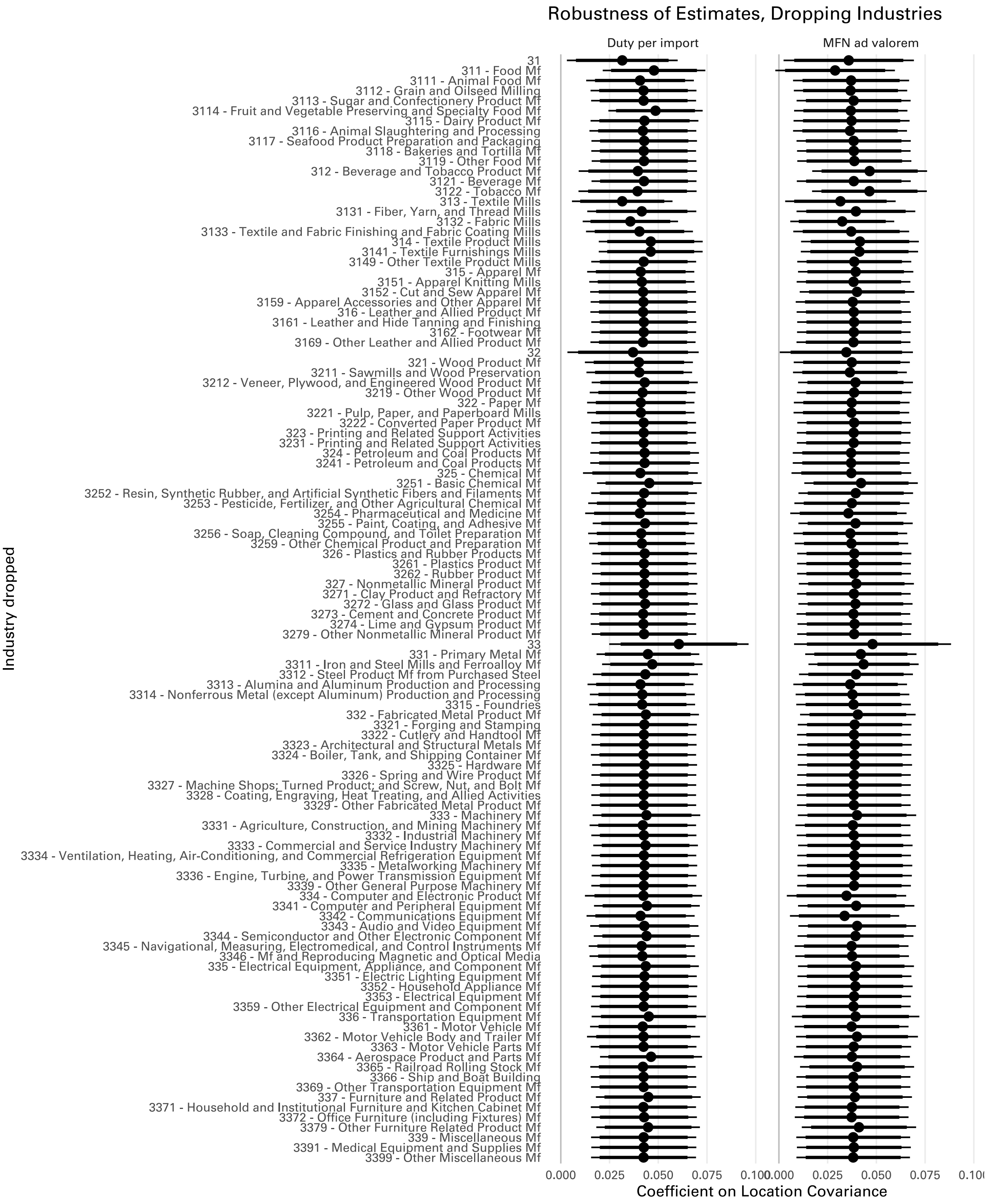

Figure A.1: Estimates are robust to dropping any industry or group of industries

The figure plots coefficients from regressions of duties per import and MFN ad valorem tariffs against Location Covariance with industry and year fixed effects, as in Table 1 models (1) and (4), dropping each 2-, 3- or 4-digit industry in turn. Recall that the dataset is at the level of 4-digit industries. Errorbars show 90% and 95% confidence intervals, calculated using standard errors clustered by (4-digit) industry.

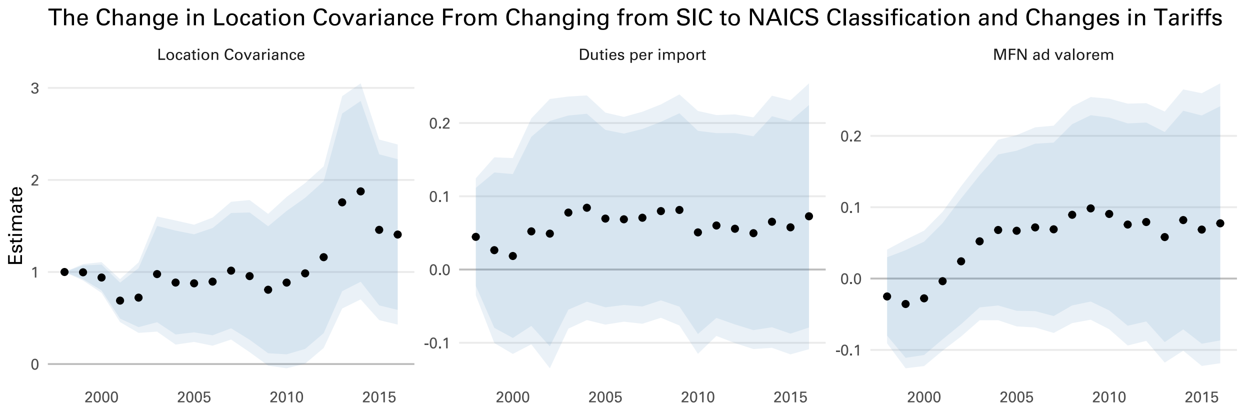

Figure A.2: Estimates are not driven by the switch from SIC to NAICS industry categories

The figure plots coefficients from regressions of the form

$$y_{it} - y_{i,1996} = \alpha_t + \beta_t \left(\mathit{Location\ Covariance}_{i,1998} - \mathit{Location\ Covariance}_{i,1996} \right) + \varepsilon_{it},$$

where the dependent variable is the change in Location Covariance or tariffs for industry i between year t and 1996, and the independent variable is the change in Location Covariance between 1996 and 1998. This change likely picks up artifacts of the change from SIC to NAICS industry categories, which should not affect actual tariffs. The left panel shows that this 1996–1998 change correlates with a persistent change in Location Covariance. The right two panels show that this mechanical change in the measure does not correlate with changes in either measure of tariffs. Each point is from a separate regression. The light shaded area gives the 95% confidence interval constructed from robust standard errors, the dark shaded area gives the 90% confidence interval.

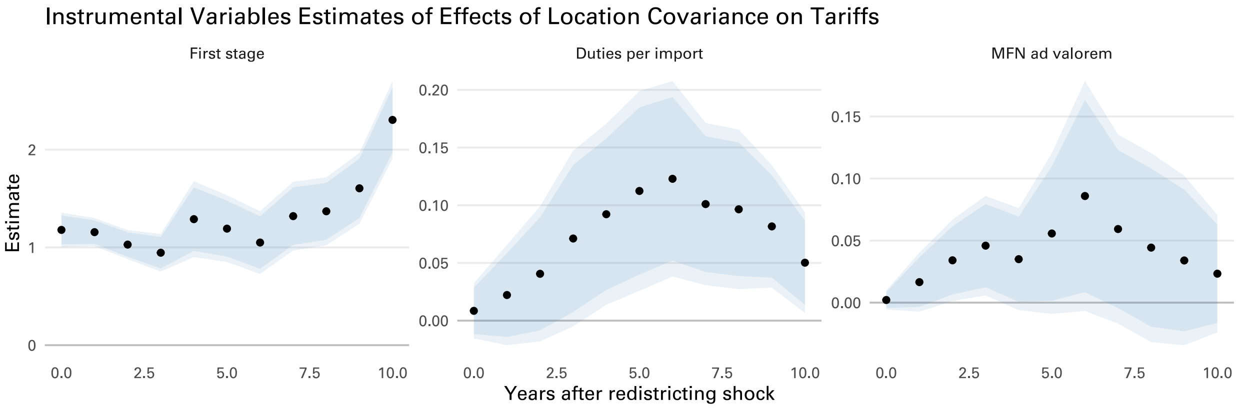

Figure A.3: Dynamic IV estimates exploiting redistricting shock

The figure plots coefficients and confidence intervals from a regression of

$$\begin{aligned} \textit{Location Covariance}_{it} - \textit{Location Covariance}_{i,\text{base}} &= \gamma_t + \delta \textit{Redistricting shock}_{i,\text{base}} + u_{it} \\ \tau_{it} - \tau_{i,\text{base}} &= \alpha_t + \beta \left(\widehat{\textit{Location Covariance}_{it} - \textit{Location Covariance}_{i,\text{base}}} \right) + \varepsilon_{it} \end{aligned}$$

i.e. an instrumental variables regression of the change in tariffs between the year in question and a base year against the change in Location Covariance for the industry over that period, instrumented with the redistricting shock. Each point is a coefficient from a different regression, varying the number of years post-redistricting. The light shaded area gives the 95% confidence interval constructed from standard errors clustered by industry, the dark shaded area gives the 90% confidence interval.

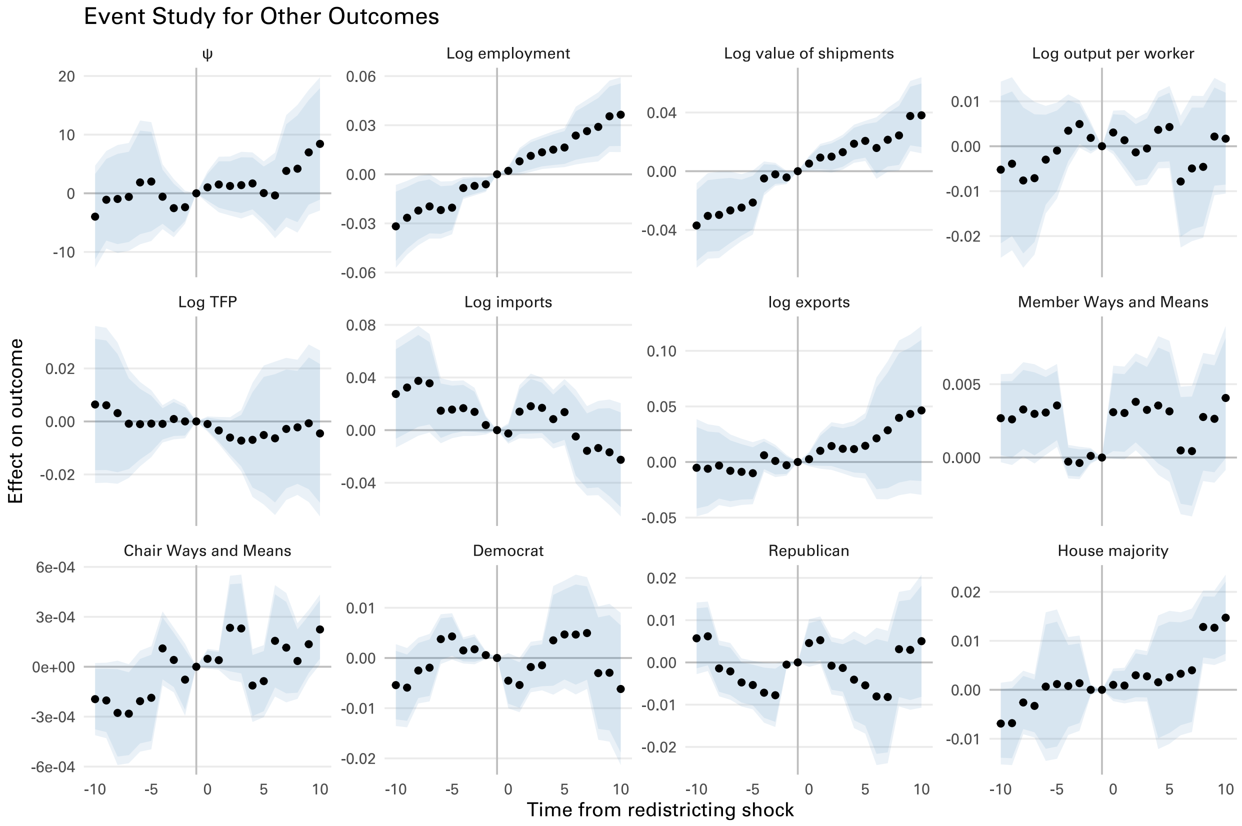

Figure A.4: Redistricting shocks correlate with trends in industry total employment but not other variables

The figure reproduces Figure 5, using alternative dependent variables to investigate whether the redistricting shock is picking up characteristics of industries, or changes to the kinds of legislators representing the industry, rather than the mechanism specified in the paper. The variables “Member Ways and Means,” “Chair Ways and Means,” “Democrat,” “Republican” and “House Majority” are constructed as the share of industry employment in congressional districts where the representative has the given characteristic. The key pattern is that industries that experience an increase in Location Covariance from redistricting shocks follow a positive trajectory in terms of total employment and output both prior to and post redistricting. However, there is not a clear pattern for the other variables. The light shaded area gives the 95% confidence interval constructed from standard errors clustered by industry, the dark shaded area gives the 90% confidence interval.

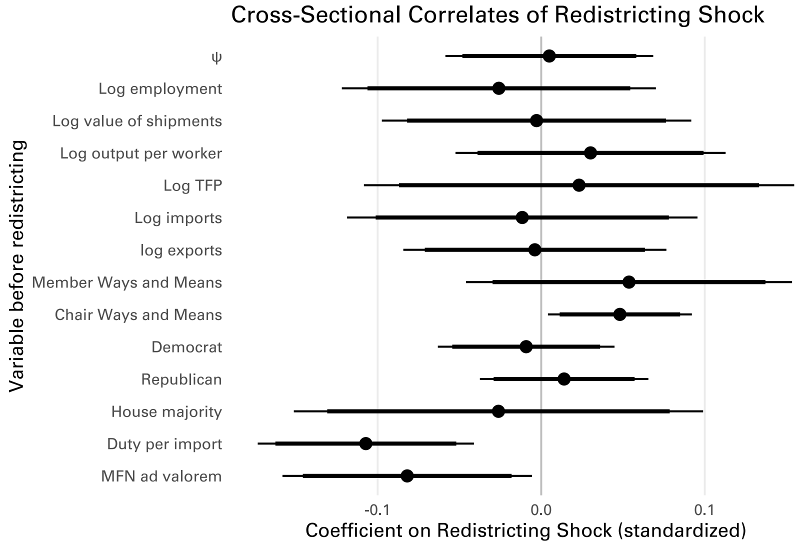

Figure A.5: Redistricting shocks correlate with lower pre-redistricting tariffs but not other variables

The figure shows coefficients from regressing different variables, standardized and in levels in the last year before redistricting, against the redistricting shock. All models include redistricting wave fixed effects. Thin lines give 95% confidence intervals constructed from standard errors clustered by industry, thick lines give 90% confidence intervals.

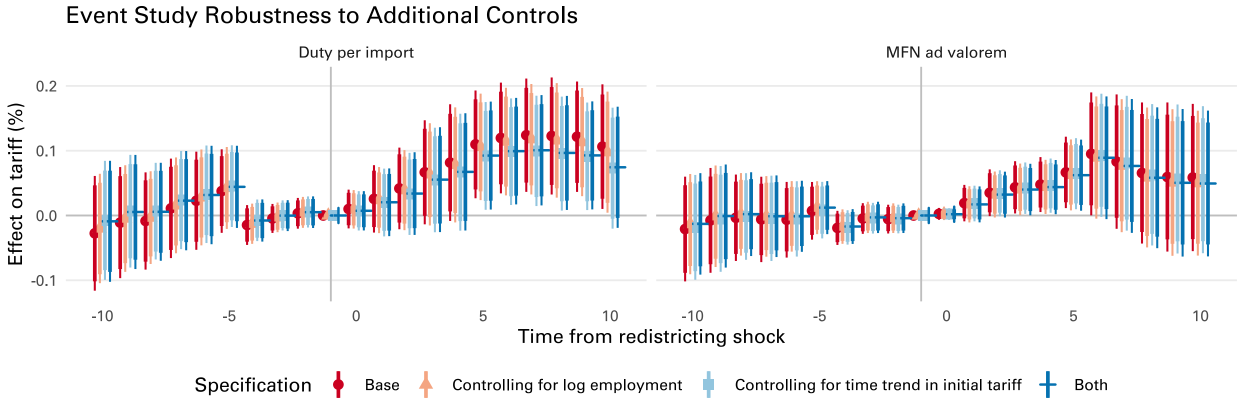

Figure A.6: Robustness of redistricting shock results to controlling for industry employment and time trends related to pre-redistricting tariffs

The figure reproduces Figure 5, adding controls for variables that correlate with levels or trends of the redistricting shock in Figures A.4 and A.5. The dark red dots give the base specification, as reported in Figure 5. Light red triangles add a control for log industry employment. Light blue squares control for a time-trend in the tariff in the year before redistricting. Dark blue crosses control for both. Thin lines give 95% confidence intervals constructed from standard errors clustered by industry, thick lines give 90% confidence intervals.

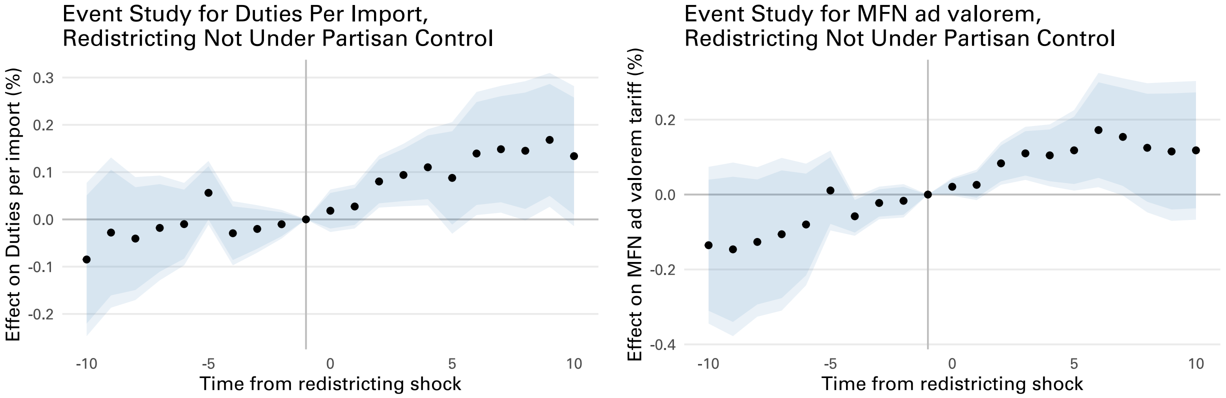

Figure A.7: Restricting to Redistricting Shocks in states without partisan control for redistricting gives similar estimates

The figure plots coefficients from regressions of tariffs against the redistricting shock interacted with the number of years before or after the redistricting shock, as in Figure 5. The specification differs from Figure 5 in only using changes in Location Covariance from state-waves in which one party does not control the redistricting process. Light shaded area gives the 95% confidence interval constructed from robust standard errors, the dark shaded area gives the 90% confidence interval.

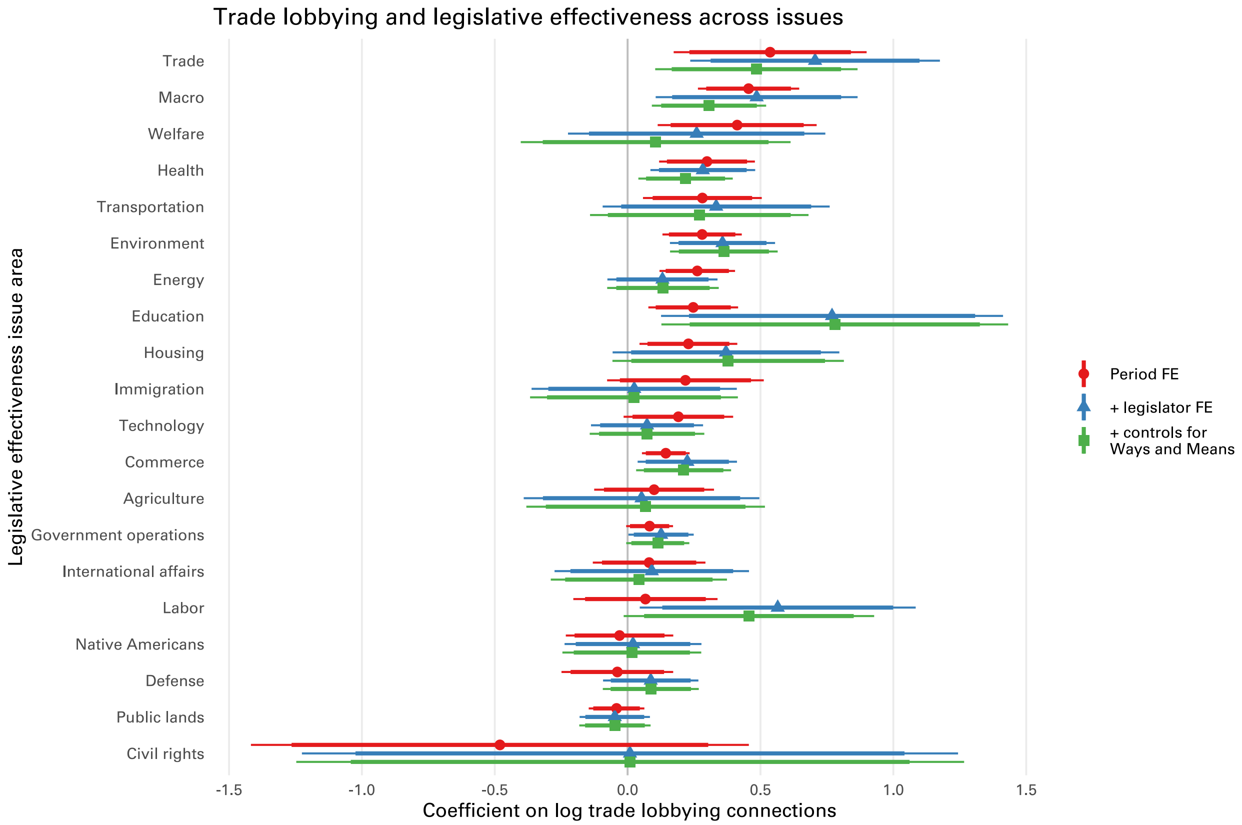

Figure A.8: Legislators lobbied on trade are more effective on a range of issues

The figure plots coefficients from regressions of log legislative effectiveness on different issues against the log number of trade-related lobbying connections, at the level of legislator-by-session of congress. Each point is from a different regression. Red dots are from specifications with only period fixed effects and so identify off comparison across legislators in a given session. Blue triangles add legislator fixed effects and so exploit only within-legislator variation. Green squares control for membership and chairmanship of the Ways and Means Committee. Thick lines show 90% confidence intervals, thin lines 95% confidence intervals, constructed from standard errors clustered by legislator.

B MODEL EXTENSIONS

B.1 *Derivation of Trade Model*

This appendix presents a full derivation of the trade model, resulting in the identity for district preferences, Equation 1.

There are two types of agents: a unit mass of workers, and a smaller mass of capitalists. There are N industries $1, ..., N$ each of which produces a good, and a numeraire sector, 0.

Workers maximize utility given by

$$u(\mathbf{x}) = x_0 + \sum_{i=1}^{N} u_i(x_i)$$

where x_0 is consumption of good 0 and x_i consumption of good i. Throughout, we use bold letters to refer to vectors, so $\mathbf{x} = \{x_0, x_1, ..., x_N\}$. The domestic price of good i is p_i, and the world price is p_i^*. Good 0 is a freely traded numeraire that can be produced with 1 unit of labor. We normalize the price of good 0 to 1.

A worker spending E consumes $x_i = d_i(p_i)$ of good i and $x_0 = E - \sum_{i=1}^{N} p_i d_i(p_i)$ of the numeraire. We assume that $d_i(p_i)$, the demand function, is linear. Indirect utility for workers can be written $E + s(\mathbf{p})$ where $s(\mathbf{p}) = \sum_{i=1}^{N} u_i[d(p_i)] - \sum_{i=1}^{N} p_i d_i(p_i)$ is consumer surplus.

Capitalists only consume the numeraire. A capitalist spending E receives indirect utility E. This assumption implies that capitalists only care about nominal returns and not the prices of other goods. This could be the case because individual capitalists are much richer than individual workers, and so spend a trivial fraction of their budgets on regular consumption goods. Alternatively, one can think of capitalists as representing corporate entities such as investment funds that maximize profits.

Each industry i produces output y_i under perfect competition using a Cobb-Douglas aggregate of sector-specific skilled labor and sector-specific capital: $y_i = L_i^{\theta} K_i^{1-\theta}$, where L_i is the sector-specific labor used, K_i the sector specific capital used, and θ is the labor share. Labor and capital are paid their marginal products. As a result, labor receives share θ of total production. The wage paid per unit of labor in industry i is $\frac{\theta p_i y_i}{L_i}$. Capitalists receive share $(1-\theta)$, implying payments to capital of $(1-\theta)p_i y_i$.

The country is a small open economy. The government imposes a system of import tariffs and subsidies, $\boldsymbol{\tau}$, that drive a wedge between the world and domestic prices of each differentiated good, so $p_i = (1+\tau_i)p_i^*$. The country imports $m_i(p_i) = d_i(p_i) - y_i$ units of good i, and taxes these imports at rate τ_i. The resulting revenue per capita is

$$r(\mathbf{p}) = \sum_{i=1}^{N} \tau_i m_i(p_i) = \sum_{i=1}^{N} (p_i - p_i^*) \left[d_i(p_i) - y_i\right].$$

This revenue is rebated back to workers, lump sum.

The indirect utility of a worker who provides 1 unit of i-specific labor is $\frac{\theta p_i y_i}{L_i} + r(\mathbf{p}) + s(\mathbf{p})$.

Since capitalists care about nominal returns, total welfare of capitalists corresponds to total payments to capital, $\sum_{i=1}^{N}(1-\theta)p_i y_i$.

Summing over all workers and capitalists, social welfare is

$$W = \zeta + \sum_{i=1}^{N} p_i y_i + r(\mathbf{p}) + s(\mathbf{p}),$$

where ζ is the amount of production of good 0.

Social welfare is maximized at free trade. The first order condition gives

$$\frac{\partial W}{\partial p_i} = (p_i - p_i^*) m_i'$$

which equals zero if $p_i = p_i^*$, that is, when tariffs are zero.[16]

Voters live in D districts. We will use superscripts d and k to refer to districts. Each district contains share $\frac{1}{D}$ of voters. We assume capitalists are distributed equally across districts.

Write the share of skilled labor in industry i resident in district d as γ_i^d. The amount of i-specific labor in district d is then $\gamma_i^d y_i$. Wage payments to workers in sector i in district d are then $\theta p_i \gamma_i^d y_i$. Dividing by $\frac{1}{D}$ gives an average payment for i-specific labor in district d of $\theta D \gamma_i^d p_i y_i$. The average welfare of voters in district d is then

$$V^d = \sum_{i=1}^{N} \big(\theta D \gamma_i^d p_i y_i + (1-\theta) p_i y_i\big) + r(\mathbf{p}) + s(\mathbf{p}) + \zeta,$$

where ζ is the amount of production of good 0. The first order condition gives district d's preferred policy on issue i:

$$\frac{\partial V^d}{\partial p_i} = \theta(D\gamma_i^d - 1) y_i + (p_i - p_i^*) m_i' = 0$$

rearranging gives

$$\hat{\tau}_i^d = \frac{p_i - p_i^*}{p_i^*} = \frac{D\theta y_i}{-m_i' p_i^*}\left(\gamma_i^d - \frac{1}{D}\right).$$

This identity corresponds to Equation 1 in the main text. A district prefers a higher tariff on an industry if it contains a larger than average share of that industry's employment, γ_i^d.

B.2 *Microfoundations*

This appendix develops a formal microfoundation for the claim that policy is a weighted average of district ideal points, where the weight a district receives is increasing in the extent to which the district's legislator is lobbied and decreasing in the extent to which other legislators are lobbied.

As in the main text, there are D legislators. Legislators work to formulate a bill, which sets tariffs and thus nominal prices on N industries.

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[16] Note that with a fixed stock of domestic industry-specific inputs, $m_i'(p_i) = d_i'(p_i)$. The assumption of linear demand implies this is a constant for each industry. We therefore suppress the (p_i) argument.

For each industry, policy is made up of a continuum of sub-issues, $s \in [0, 1]$:

$$\frac{p_i - p_i^*}{p_i^*} = \tau_i = \int_0^1 \tau_i(s) ds.$$

One can think of these sub-issues as being varieties of products, as in Eaton and Kortum (2002), or as being varieties of policy instrument, such as tariffs, rules of origin, and regulations. District utility depends on these sub-issues

$$\begin{aligned}
V^d(\mathbf{p}) &= \sum_{i=1}^{N} [\theta D \gamma_i^d + (1-\theta)] p_i y_i + r(\mathbf{p}) + s(\mathbf{p}) + \zeta \\
&= \sum_{i=1}^{N} \left([\theta D \gamma_i^d + (1-\theta)] p_i y_i + (p_i - p_i^*) \left[d_i(p_i) - y_i \right] + u_i[d(p_i)] - p_i d_i(p_i) \right) + \zeta \\
&= \sum_{i=1}^{N} \int_0^1 \left([\theta D \gamma_i^d + (1-\theta)] p_i(s) y_i + (p_i(s) - p_i^*) \left[d_i(p_i(s)) - y_i \right] + u_i[d_i(p_i(s))] - p_i(s) d_i(p_i(s)) \right) ds + \\
&= \sum_{i=1}^{N} \int_0^1 v_i^d(p_i(s)) ds + \zeta
\end{aligned}$$

where $v_i^d(p_i(s)) = \left([\theta D \gamma_i^d + (1-\theta)] p_i(s) y_i + (p_i(s) - p_i^*) \left[d_i(p_i(s)) - y_i \right] + u_i[d_i(p_i(s))] - p_i(s) d_i(p_i(s)) \right)$ is the payoff to the district from variety s of industry i.

Legislators propose policies for each sub-issue but have limited capability. As in Hirsch and Shotts (2015), policies are differentiated both in their material content (i.e. the tariff) and in their quality. Define the capability of legislator d as

$$R^d = \alpha^d + \beta \sum_{i=1}^{N} l_i^d$$

where as in the main text α^d is an exogenous scalar that increases d's influence, and l_i^d is the amount of lobbying of d by industry i. The quality of a proposal on sub-issue s by a legislator with capability R^d is drawn from a Fréchet distribution:

$$P(q^d(s) < q) = e^{-\frac{R^d}{q}}.$$

Note that we would obtain this distribution of quality if legislator d draws R^d policy ideas from a Fréchet distribution with scale and shape 1, and takes the highest quality policy idea. One can think of legislators with more capability as being able to try out more policy ideas and pick the highest quality one, leading to a higher quality policy. As in Hall and Deardorff (2006, p. 81), lobbying "enlarge[s] the resources that legislators have to work on behalf of their constituents." Note that lobbying here corresponds to the "simple grant" considered by Hall and Deardorff (p. 74), not a "matching grant" which alters legislators' effort allocation across issues.

On each sub-issue, the highest-quality proposal is included in the resulting bill.

Legislators maximize the welfare of their districts. One can think of this as following from a desire to be re-elected, subject to retrospective voting.

The game proceeds over a series of periods. In each period, the sequence of moves is as follows:

1. Legislators formulate policy proposals, drawing quality across sub-issues
2. The highest quality proposal on each sub-issue is included in the bill
3. Legislators vote on the bill. If a majority vote for the bill, it is implemented and the game ends.
4. If a majority do not vote for the bill, the game moves to the following period and payoffs are discounted by $\delta \in [0, 1]$.

Proposition 1. *There is a unique stationary equilibrium in which the implemented policy is*

$$\tau_i = \frac{\theta y_i}{-m_i' p_i^*} \left(D \sum_{d=1}^{D} \omega^d \gamma_i^d - 1 \right), \ \omega^d = \frac{R^d}{\sum_{k=1}^{D} R^k}$$

and the bill passes unanimously in the first period

Proof. The proof is in three stages. First, we show that the policy takes the form of a weighted sum of individual legislators' proposals, where the weights are ω^d. Second, we show that the bill passes unanimously. Finally we verify that legislators choose the policy that maximizes their district's payoff.

Policy selection It follows from the properties of the Fréchet distribution that the probability that d's proposal on sub-issue s of issue i is the highest quality is

$$\omega_i^d(s) = \omega_i^d = \frac{R^d}{\sum_{k=1}^{D} R^k}.$$

We suppress the s argument because it is the same for all sub-issues.

Suppose that d proposes the same policy τ_i^d on each sub-issue of i. Then the proposed policy is

$$\tau_i = \int_0^1 \sum_{d=1}^{D} \mathbf{1}_{\{d\text{'s policy on } s \text{ is the highest quality}\}} \tau_i^d(s) ds = \sum_{d=1}^{D} \omega_i^d \tau_i^d, \tag{14}$$

where the second equality follows from the law of large numbers.

Bill passage Write d's utility from the resulting bill as $V^d(\mathbf{p})$. If the bill fails, stationarity and the law of large numbers ensures that the proposal in the following period will be identical. Legislator d's continuation value, i.e. his payoff if the bill does not pass is

$$C^d = \delta \left(\phi V^d(\mathbf{p}) + (1 - \phi) C^d \right)$$

where ϕ is the probability the bill passes in the following period. For d to vote for the bill, we require $V^d(\mathbf{p}) \geq C^d$. Rearranging the definition of the continuation value gives

$$C^d = \frac{\delta\phi}{1-\delta(1-\phi)} V^d(\mathbf{p}) < V^d(\mathbf{p})$$

which is satisfied for any $V^d(\mathbf{p}) \geq 0$. So the proposal passes in the first period.

Preferred policies Finally, we show that legislators propose their preferred policies,

$$\tau_i^d = \frac{(D\gamma_i^d - 1)\theta y_i}{-m_i' p_i^*}.$$

Because $V^d(\mathbf{p})$ is additively separable in sub-issues, in any sub-issue on which d's proposal is selected, d chooses $\tau_i^d(s)$ to maximize $v_i^d(p_i(s))$. The first order condition is

$$\frac{dv^d(p_i(s))}{dp_i(s)} = \theta(D\gamma_i^d - 1)y_i + (p_i^d(s) - p_i^*)m_i' = 0$$

which implies

$$\tau_i^d(s) = \frac{p_i^d(s) - p_i^*}{p_i^*} = \frac{\theta(D\gamma_i^d - 1)y_i}{-m_i' p_i^*}.$$

Note that the right hand side does not depend on sub-issue s.

Inserting into Equation 14 gives the identity in the proposition.

Uniqueness follows from the policy proposal being a deterministic sum of individual legislators' proposals, combined with legislators having a dominant strategy to propose the unique policy that maximizes their district's welfare on the issue in question.

□

B.3 *Alternative functional forms for* ω^d

In the main text, the weight a district receives is linear in the lobbying directed at the district's representative. While analytically convenient, this functional form does not follow directly from the microfoundations in Appendix B.2. This appendix shows the model's predictions also apply with an alternative microfoundation-consistent functional form.

Suppose instead the following functional form for the weights districts receive (ω^d):

$$\omega^d = \frac{\alpha^d + \beta\sum_{i=1}^N l_i^d}{\Phi}, \Phi = \sum_{k=1}^{D}\left(\alpha^k + \beta\sum_{i=1}^{N} l_i^k\right)$$

Note that

$$\frac{\partial\omega^d}{\partial l_i^d} = \frac{\beta}{\Phi}(1-\omega^d), \frac{\partial\omega^d}{\partial l_i^k} = -\frac{\beta}{\Phi}\omega^d$$

which imply that

$$\frac{\partial \Omega_i}{\partial l_i^d} = \sum_{k=1}^{D} \gamma_i^k \frac{\partial \omega^k}{\partial l_i^d} = \frac{\beta}{\Phi}\left(\gamma_i^d - \sum_{k=1}^{D} \gamma_i^k \omega^k\right) = \frac{\beta(\gamma_i^d - \Omega_i)}{\Phi}$$

The industry first order condition is then

$$\frac{\beta D\left(\theta - \theta^2\right)\psi_i(\gamma_i^d - \Omega_i)}{\Phi} - c(l_i^d - \chi_i) = 0$$

which we rearrange to

$$l_i^d = \chi_i + \frac{\beta\left(\theta - \theta^2\right) D\psi_i(\gamma_i^d - \Omega_i)}{c\Phi}$$

Holding fixed industry characteristics which do not vary by district(χ_i, ψ_i and Ω_i), and the total amount of lobbying in the economy (Φ), an industry lobbies a district more if that industry has more employment in that district (γ_i^d is large). This is substantively the same result as Equation 6.

Summing over industries gives

$$\omega^d = \frac{\alpha^d + \beta\sum_{i=1}^N l_i^d}{\Phi} = \frac{\alpha^d + \beta\sum_{i=1}^N \chi_i}{\Phi} + \frac{\beta^2\left(\theta - \theta^2\right) D}{c\Phi^2}\sum_{i=1}^{N} \psi_i(\gamma_i^d - \Omega_i)$$

Again, note that holding fixed factors that affect all districts ($\sum_{i=1}^N \chi_i$, Φ, and $\sum_{i=1}^N \psi_i\Omega_i$), districts with greater Weighted Capacity ($\sum_{i=1}^N \psi_i\gamma_i^d$) have more influence. This is the same prediction as equation 7.

Finally, summing over districts gives each industry's influence,

$$\Omega_i = \sum_{d=1}^{D} \gamma_i^d\omega^d = \frac{1}{\Phi}\sum_{d=1}^{D}\left(\alpha^d + \beta\sum_{i=1}^{N}\chi_i\right)\gamma_i^d + \frac{\beta^2\left(\theta - \theta^2\right) D}{c\Phi^2}\left(\sum_{j=1}^{N}\sum_{d=1}^{D}\psi_j\gamma_j^d\gamma_i^d - \sum_{j=1}^{N}\psi_j\Omega_j\right)$$

Note that this expression is increasing in $\sum_{j=1}^N \sum_{d=1}^D \psi_j\gamma_j^d\gamma_i^d$, which is the component of Location Covariance which varies across industries. As above, holding fixed factors that apply to each industry, industries with greater Location Covariance receive higher tariffs, as in Equation 8.

Thus far we have shown that the model's key predictions apply with this alternative functional form. Doing so gives expressions similar to the key equations in Section 2, but which include endogenous scalars that apply to all locations or industries. For instance, these equations include Φ, the total amount of lobbying in the economy. Inserting the various identities into the definition of Φ gives an expression in terms of Φ and Ω_i:

$$\Phi = \sum_{k=1}^{D}\left(\alpha^k + \beta\sum_{i=1}^{N} l_i^k\right) = \sum_{k=1}^{D}\left(\alpha^k + \beta\sum_{i=1}^{N}\chi_i\right) + \frac{\beta^2\left(\theta - \theta^2\right) D}{c\Phi}\sum_{k=1}^{D}\sum_{i=1}^{N}\psi_i\left(\gamma_i^k - \Omega_i\right)$$

If we make the following assumptions,

$$\alpha^d = 0 \, \forall d, \text{ and } \sum_{i=1}^{N} \chi_i = 0$$

we can obtain closed-form solutions for lobbying and tariffs that do not depend on these endogenous terms. Substantively, this assumption means that the strategic decisions of industries to lobby, rather than unmodeled factors that affect which industries lobby (χ_i) or which districts receive weight in the policy process (α^d), determine policy.

Making this assumption, we have

$$\Phi^2 = \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sum_{k=1}^{D} \sum_{i=1}^{N} \psi_i \left(\gamma_i^k - \Omega_i\right) = \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \left(\sum_{j=1}^{N} \psi_j - D \sum_{j=1}^{N} \psi_j \Omega_j \right)$$

and

$$\Omega_i = \frac{\beta^2 \left(\theta - \theta^2\right) D}{c \Phi^2} \left(\sum_{j=1}^{N} \sum_{d=1}^{D} \psi_j \gamma_j^d \gamma_i^d - \sum_{j=1}^{N} \psi_j \Omega_j \right)$$

Writing $\Psi = \sum_{j=1}^{N} \psi_j \Omega_j$, we have

$$\Psi = \sum_{j=1}^{N} \psi_j \Omega_j = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d - \Psi \sum_{j=1}^{N} \psi_j}{\sum_{j=1}^{N} \psi_j - D\Psi}.$$

This gives a quadratic equation in Ψ. Solving it gives

$$\Psi = \frac{1}{D} \sum_{j=1}^{N} \psi_j - \frac{1}{D} \sqrt{\left(\sum_{j=1}^{N} \psi_j \right)^2 - D \sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d}.$$

Subbing back into Φ gives

$$\Phi^2 = \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sqrt{\left(\sum_{j=1}^{N} \psi_j \right)^2 - D \sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d}$$

and into Ω_i gives

$$\Omega_i = \frac{D \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_j \gamma_j^d \gamma_i^d + \sqrt{\left(\sum_{j=1}^{N} \psi_j \right)^2 - D \sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d} - \sum_{j=1}^{N} \psi_j}{D \sqrt{\left(\sum_{j=1}^{N} \psi_j \right)^2 - D \sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d}}$$

Note that $D \sum_{j=1}^{N} \sum_{d=1}^{D} \psi_j \gamma_j^d \gamma_i^d - \sum_{j=1}^{N} \psi_j = D \sum_{j=1}^{N} \psi_j (\sum_{d=1}^{D} \gamma_j^d \gamma_i^d - \frac{1}{D})$, which in turn equals $D^2 \sum_{j=1}^{N} \psi_j \text{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)$, which in turn implies that this expression simplifies further to

$$\Omega_i = \frac{\sum_{j=1}^{N} D\psi_j \text{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)}{\sqrt{\left(\sum_{j=1}^{N} \psi_j\right)^2 - D\sum_{i=1}^{N}\sum_{j=1}^{N}\sum_{d=1}^{D} \psi_i \psi_j \gamma_j^d \gamma_i^d}} + \frac{1}{D}.$$

In other words, at the industry-level, Location Covariance also determines the tariff an industry gets with this alternative microfoundation.

C INTERMEDIATE INPUTS

This appendix extends the model and empirics to incorporate intermediate inputs.

C.1 *Extending the model*

We assume that, as in Gawande, Krishna, and Olarreaga (2012), the production function is Leontief:

$$y_i = \min\left\{Q_i, \frac{x_{1i}}{\mu_{1i}}, ..., \frac{x_{Ni}}{\mu_{Ni}}\right\}, i = 1, ..., N$$

where $Q_i = L_i^{\theta} K_i^{1-\theta}$ is the sector-specific Cobb-Douglas aggregate and x_{ji} is i's use of good j as an intermediate input. It follows that to produce Q_i units of output, i needs to use $x_{ji} = \mu_{ji} Q_i$ units of j. Profit is then

$$\pi_i(\mathbf{p}) = p_i Q_i - \sum_{j=1}^{N} p_j \mu_{ji} Q_i = \left(p_i - \sum_{j=1}^{N} p_j \mu_{ji}\right) Q_i$$

The average welfare of voters in district d is

$$\begin{aligned}
V^d &= \sum_{i=1}^{N} \left[D\theta\gamma_i^d + (1-\theta)\right] \left(p_i - \sum_{j=1}^{N} p_j \mu_{ji}\right) Q_i + r(\mathbf{p}) + s(\mathbf{p}) + \zeta \\
&= \sum_{i=1}^{N} p_i [\theta D \gamma_i^d + (1-\theta)] Q_i - \sum_{i=1}^{N} p_i \sum_{j=1}^{N} \mu_{ij} [D\theta\gamma_j^d + (1-\theta)] Q_j + r(\mathbf{p}) + s(\mathbf{p}) + \zeta \\
&= D\theta \sum_{i=1}^{N} p_i Q_i \left(\gamma_i^d - \sum_{j=1}^{N} \frac{\mu_{ij}\gamma_j^d Q_j}{Q_i}\right) + (1-\theta)\sum_{i=1}^{N} p_i Q_i \left(1 - \sum_{j=1}^{N} \frac{\mu_{ij} Q_j}{Q_i}\right) + r(\mathbf{p}) + s(\mathbf{p}) + \zeta
\end{aligned}$$

In this expression, $\frac{\mu_{ij}\gamma_j^d Q_j}{Q_i}$ is the share of industry i's output that is consumed by industries in district d.

The district's preferred policy is pinned down by the first order condition:

$$\frac{\partial V^d}{\partial p_i} = \theta Q_i D\left(\gamma_i^d - \sum_{j=1}^N \frac{\mu_{ij}\gamma_j^d Q_j}{Q_i}\right) + m_i'(p_i - p_i^*) - \theta Q_i\left(1 - \sum_{j=1}^N \frac{\mu_{ij}Q_j}{Q_i}\right) = 0$$

$$\begin{aligned}\hat{\tau}_i^d = \frac{p_i - p_i^*}{p_i^*} &= \frac{\theta Q_i D\left(\gamma_i^d - \sum_{j=1}^N \frac{\mu_{ij}\gamma_j^d Q_j}{Q_i}\right) - \theta Q_i\left(1 - \sum_{j=1}^N \frac{\mu_{ij}Q_j}{Q_i}\right)}{-m_i' p_i^*} \\ &= \frac{\theta Q_i D\left(\left(\gamma_i^d - \frac{1}{D}\right) - \sum_{j=1}^N \frac{\mu_{ij}Q_j}{Q_i}\left(\gamma_j^d - \frac{1}{D}\right)\right)}{-m_i' p_i^*}\end{aligned}$$

As in the main text, policy is a weighted average of district preferences: $\tau_i = \sum_{d=1}^D \omega^d \hat{\tau}_i^d$:

$$p_i - p_i^* = \frac{\theta Q_i D \sum_{d=1}^D \omega^d\left(\left(\gamma_i^d - \frac{1}{D}\right) - \sum_{j=1}^N \frac{\mu_{ij}Q_j}{Q_i}\left(\gamma_j^d - \frac{1}{D}\right)\right)}{-m_i'}$$

As in the main text, the tariff an industry receives depends on whether it locates in high-influence districts. Unlike in the main text, an industry now receives lower tariffs if industries that use its products locate in important districts. Define q_i^d as the share of industry i's output in district d relative to the average, minus the share of that output consumed by industries in district d:

$$q_i^d := \left(\left(\gamma_i^d - \frac{1}{D}\right) - \sum_{j=1}^N \frac{\mu_{ij}Q_j}{Q_i}\left(\gamma_j^d - \frac{1}{D}\right)\right). \tag{15}$$

Then we have

$$p_i - p_i^* = \frac{\theta Q_i D \sum_{d=1}^D \omega^d q_i^d}{-m_i'}$$

which is similar to the expression for tariffs in the main text, swapping out industry shares γ_i^d for q_i^d, which incorporates downstream industries. An industry receives protection if it locates in districts with influential legislators, provided that the benefit to those districts of protecting the industry is not offset by downstream industries which would benefit from lower tariffs on the industry.

Industry i's problem is

$$\max_{\mathbf{l}_i}\left\{(1-\theta)\left(p_i - \sum_{j=1}^N p_j \mu_{ji}\right) Q_i - \frac{c}{2}\sum_{d=1}^D (l_i^d - \chi_i)^2\right\},$$

The first order condition is

$$(1-\theta)\left[Q_i \frac{\partial p_i}{\partial l_i^d} - \sum_{j=1}^N Q_i \mu_{ji} \frac{\partial p_j}{\partial l_i^d}\right] - c(l_i^d - \chi_i) = 0$$

Note that

$$\begin{aligned}\frac{\partial p_i}{\partial l_i^d} = \frac{\beta\theta Q_i D}{-m_i'}\sum_{d=1}^{D} q_i^d \frac{\partial \omega^d}{\partial l_i^d} &= \frac{\beta\theta Q_i D}{-m_i'}\left(q_i^d - \frac{1}{D}\sum_{k=1}^{D} q_i^k\right) \\ &= \frac{\beta\theta Q_i D}{-m_i'} q_i^d\end{aligned}$$

where the second line follows from $\sum_{d=1}^{D} q_i^d = 0$.

Inserting back into the first order condition and rearranging gives

$$l_i^d = \chi_i + \frac{\beta\left(\theta-\theta^2\right) Q_i D}{c}\left(\frac{Q_i}{-m_i'} q_i^d - \sum_{j=1}^{N} \frac{Q_j \mu_{ji}}{-m_j'} q_j^d\right)$$

As in Equation 6, industries lobby legislators whose districts contain more employment in the industry (a key component of q_i^d). However, industries do not lobby legislators whose districts contain industries downstream of the industry—because the legislator will be less willing to protect the industry—and industries upstream, because protecting those industries will harm the industry in question.

Summing over industries gives legislator influence:

$$\begin{aligned}\omega^d = \alpha^d + \beta\left(\sum_{i=1}^{N} l_i^d - \frac{1}{D}\sum_{i=1}^{N}\sum_{k=1}^{D} l_i^k\right) &= \alpha^d + \frac{\beta^2\left(\theta-\theta^2\right) D}{c}\sum_{i=1}^{N}\left(\frac{Q_i^2}{-m_i'} q_i^d - \sum_{j=1}^{N}\frac{Q_j^2}{-m_j'}\frac{\mu_{ji} Q_i}{Q_j} q_j^d\right) \\ &= \alpha^d + \frac{\beta^2\left(\theta-\theta^2\right) D}{c}\sum_{i=1}^{N}\frac{Q_i^2 q_i^d}{-m_i'}\left(1 - \sum_{j=1}^{N}\frac{\mu_{ij} Q_j}{Q_i}\right)\end{aligned}$$

Write $\xi_i = \sum_{j=1}^{N} \frac{\mu_{ij} Q_j}{Q_i}$ as the share of i's production that is consumed by domestic industries. Then this expression simplifies to

$$\omega^d = \alpha^d + \frac{\beta^2\left(\theta-\theta^2\right) D}{c}\sum_{i=1}^{N}\frac{Q_i^2 (1-\xi_i)}{-m_i'} q_i^d$$

Note that $\frac{Q_i^2}{-m_i'}$ is equal to the ψ_i term in Section 2. Adding intermediate inputs creates a similar expression to Equation 7, where the influence given to an industry in the summation is weighted by the share of production that is not consumed by other industries $(1-\xi_i)$, and in which the share of employment in the district is offset by the presence of downstream industries (q_i^d in place of γ_i^d).

Finally summing over locations gives the analogue to our Ω_i industry influence term:

$$\begin{aligned}
\sum_{d=1}^{D} \omega^d q_i^d &= \sum_{d=1}^{D} \alpha^d q_i^d + \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sum_{d=1}^{D} \sum_{j=1}^{N} \frac{Q_j^2}{-m_j'} (1 - \xi_j) q_j^d q_i^d \\
&= \sum_{d=1}^{D} \alpha^d q_i^d + \frac{\beta^2 \left(\theta - \theta^2\right) D}{c} \sum_{j=1}^{N} \frac{Q_j^2 (1 - \xi_j)}{-m_j'} \sum_{d=1}^{D} q_j^d q_i^d \\
&= \sum_{d=1}^{D} \alpha^d q_i^d + \frac{(\beta D)^2 \left(\theta - \theta^2\right)}{c} \sum_{j=1}^{N} \frac{Q_j^2 (1 - \xi_j)}{-m_j'} \mathrm{Cov}(\mathbf{q}_i, \mathbf{q}_j) \qquad (16)
\end{aligned}$$

As in Section 2, the tariff an industry receives is increasing in the covariance of its locations with industries prone to lobby. Unlike in the main text, the weight each industry receives in that summation depends on the share of output that is not used as inputs by other industries, and the measure of industry presence across districts nets out the offsetting effect of downstream industries.

C.2 *Empirical Analogues*

As in the main text, we can take the model to the data. To do so we need to calculate q_i^d and ξ_i, in addition to the industry sizes, district employment shares, and import demand elasticities used in the main text.

Given data on employment shares, γ_i^d, and the share of industry i's output used by industry j, $\frac{\mu_{ij} Q_j}{Q_i}$, q_i^d can be calculated directly following Equation 15. We do so using the Use Table from the Bureau of Economic Analysis Input-Output matrices.

Figure C.1 plots this measure of district net output against the district industry shares, for 1989 and 2016. The two are extremely similar (the black line is the 45 degree line). This similarity suggests that adding intermediate inputs will not radically change our empirical predictions.

Similarly, with data on the share of production used by domestic industries (ξ_j), we calculate

$$\begin{aligned}
\text{Intermediate input Location Covariance}_i &= \sum_{j=1}^{N} \frac{Q_j^2 (1 - \xi_j)}{-m_j'} \sum_{d=1}^{D} q_j^d q_i^d \\
&= \sum_{j=1}^{N} \frac{p_j y_j z_j (1 - \xi_j)}{-\epsilon_j} \sum_{d=1}^{D} q_j^d q_i^d \qquad (17)
\end{aligned}$$

where $p_j y_j$ is the nominal value of shipments from industry j, z_j is the ratio of domestic production to imports, and ϵ_j is the import demand elasticity.

The key prediction is that this augmented measure of Location Covariance should positively correlate with tariffs. Table C.1 tests that prediction, and shows that industries that experience increases in intermediate input Location Covariance do receive higher tariffs. However, adding intermediate inputs does not seem to give additional empirical leverage over the baseline measure. Adding the baseline measure to the regression, the coefficient on the intermediate inputs measure flips.

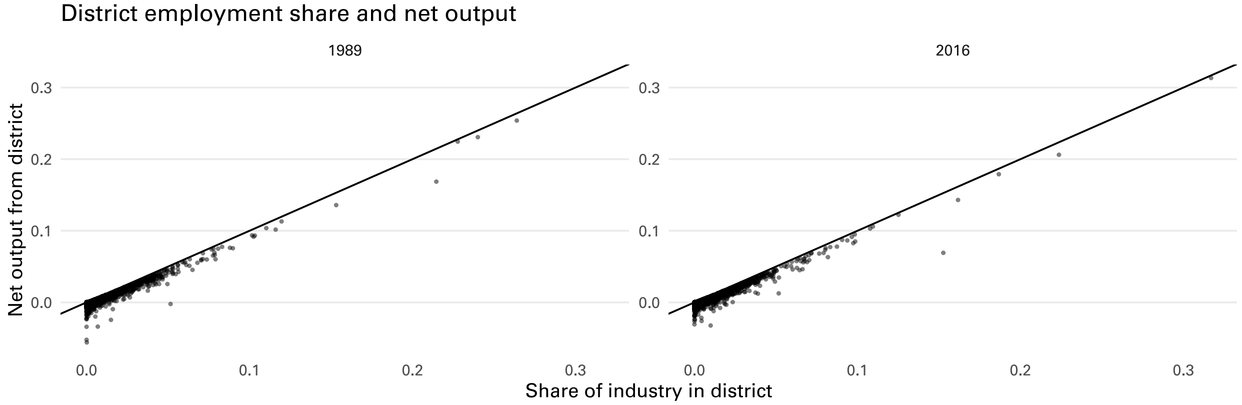

Figure C.1: District net output and industry shares are almost identical

The figure plots district net output (q above, calculated following Equation 15) in 1989 and 2016 against the share of industry employment in the district (γ above). The black line has a slope of 1.

Table C.1: Location Covariance still predicts tariffs when incorporating intermediate inputs, but does not perform better than the baseline measure

	Duty per import (%)		MFN ad valorem (%)	
	(1)	(2)	(3)	(4)
Intermediate input Location Covariance	0.065**	-0.072	0.052†	$-0.122^{\dagger}$
	(0.023)	(0.066)	(0.029)	(0.064)
Baseline Location Covariance		0.077†		0.097**
		(0.039)		(0.036)
FE: Industry	x	x	x	x
- Year	x	x	x	x
N	2240	2240	2240	2240
R^2	0.937	0.939	0.948	0.950

This table reports regressions of tariffs against industry Location Covariance, calculating Location Covariance incorporating intermediate inputs as in Equation 17. In (1) and (2) the dependent variable is duties as a percentage of imports, in (3) and (4) it is the MFN ad valorem tariff. All models include industry and year fixed effects. (2) and (4) include the baseline measure of Location Covariance. Standard errors clustered by industry in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

D exposure robust standard errors

This appendix replicates our main regressions using standard errors that account for dependence across industries with more employment in similar districts. Doing so gives smaller standard errors than those reported in the main text.

Our main estimating equation relates the tariffs an industry receives to its Location Covariance, the sum over industries of its covariance across districts with each industry multiplied by factors that increase that industry's propensity to lobby. We report robust standard errors clustered by industry. A plausible concern is that conventional standard errors fail to account for correlation in the error term across industries that tend to locate in similar districts. For instance, if a given legislator is better at securing tariffs for industries in her district for reasons other than lobbying, the error term for industries with employment in her district will be more positive. Adao, Kolesár, and Morales (2019) discuss how this concern can lead to incorrect standard errors in shift-share designs, where the independent variable takes the form $\textit{Shift-share}_i = \sum_j \text{Share}_{ij} \times \text{Shift}_j$. In these designs, the total exposures of a given unit is calculated by summing over a series of shocks, multiplying each shock (Shift_j) by the unit's exposure to that shock (Share_{ij}).

Borusyak, Hull, and Jaravel (2022) show that a regression using data aggregated to the level of the relevant shock and weighted by the sum of unit shares exposed to the shock gives identical point estimates to a shift-share regression at the unit level. However, the shock-level regression gives standard errors that account for the dependence across units with exposure to similar shocks, much as one can obtain a valid alternative to clustered standard errors by aggregating to the level of the cluster.

In our context, Location Covariance can be thought of as a shift-share variable where the shifts are either at the district level, or at the level of the industries with which an industry co-locates. The equation below decomposes Location Covariance into these two types of shift-share:

$$\textit{Location covariance}_i = \sum_{d=1}^{D} \underbrace{\gamma_i^d}_{\text{Share}} \underbrace{\left(\sum_{j=1}^{N} \psi_j \left(\gamma_j^d - \frac{1}{D}\right)\right)}_{\text{District shift}} = \sum_{j=1}^{N} \underbrace{\left(\sum_{d=1}^{D} \gamma_j^d \gamma_i^d\right)}_{\text{Share}} \underbrace{\psi_j}_{\text{Industry shift}} - \underbrace{\frac{1}{D}\sum_{j=1}^{N} \psi_j}_{\text{Constant}} .$$

In the middle object, the share variable is the share of industry employment in the district, and the shift is the weighted capacity of the district, plus a constant equal to the average weighted capacity across districts. On the right-hand side, the share is the extent to which industry i co-locates with industry j, and the shift is industry j's propensity to lobby. This identity includes a constant proportional to average weighted capacity. This term will be absorbed by the intercept or year fixed effect in a regression. We pull it out, rather than include the $\frac{1}{D}$ term in the construction of the shares, to ensure that all the shares are positive, a precondition for the estimation routine outlined by Borusyak, Hull, and Jaravel (2022).

In Table D.1, we replicate the main specifications in Table 1 using exposure-robust standard errors as proposed by Borusyak, Hull, and Jaravel (2022). Doing so gives smaller standard errors than conventional standard errors clustered by industry, suggesting our inference in the main text is conservative. For reference, the first two rows report the point estimates and standard errors clustered by industry, as in models (1) and (4) of Table 1. For the third and fourth rows, we aggregate to the level of the district and report standard errors clustered by district or state. For the fifth row, we aggregate to the level of the shocked industry, as on the right hand side of the equation above. Across these different specifications, exposure-robust standard errors are consistently smaller than conventional standard errors.

Table D.1: Exposure robust standard errors are smaller than conventional standard errors

	Duty per import	MFN ad valorem
	(1)	(2)
Coefficient	0.043	0.038
Standard error: Clustered by industry	(0.014)	(0.015)
- Exposure-robust, District	(0.008)	(0.01)
- Exposure-robust, State	(0.013)	(0.009)
- Exposure-robust, Industry	(0.011)	(0.009)

This reproduces models (1) and (4) of Table 1, using the aggregation procedure described by Borusyak, Hull, and Jaravel (2022) to obtain standard errors that are "exposure-robust" to dependency in the error term across industries with employment shares in similar districts. Both models include industry and year fixed effects. The conventional standard error is clustered by industry, as in Table 1. The third and fourth rows give exposure-robust standard errors clustered by district and state, respectively, aggregating to the district level. The bottom row gives exposure robust standard errors clustered by industry after aggregating to the level of the shifter industries.

E ESTIMATES OF THE WEIGHT PLACED ON SOCIAL WELFARE FROM A MISSPECIFIED GROSSMAN-HELPMAN MODEL

This appendix derives the estimate of a, the weight placed on social welfare relative to contributions from lobbyists by policymakers in Grossman and Helpman (1994), that one would obtain by running a Goldberg and Maggi-style estimation routine on data generated by our model.

Grossman and Helpman (1994) gives the following equation relating tariffs to I_i, an indicator that industry i lobbies, a, and α_L, the share of the population represented by lobbies:

$$\frac{\tau_i}{1+\tau_i} = \frac{I_i - \alpha_L}{a+\alpha_L}\frac{z_i}{-\epsilon_i}.$$

All other variables are as in Section 2. One can then estimate a through the following regression:

$$\frac{\tau_i}{1+\tau_i} = \beta_0\frac{z_i}{-\epsilon_i} + \beta_1\frac{z_i I_i}{-\epsilon_i} + \varepsilon_i. \tag{18}$$

In that specification, $\beta_0 = \frac{-\alpha_L}{a+\alpha_L}$ and $\beta_1 = \frac{1}{a+\alpha_L}$, and so one can back out a from the coefficients:

$$a = \frac{1+\beta_0}{\beta_1}.$$

Inspecting this equation, we see that our estimate of a will be large if β_1 is low, that is, if industries that lobby do not receive much larger tariffs than industries that do not lobby.

Suppose that the correct model for tariffs is given by Equation 8, but that a randomly-selected subset of industries lobby.[17] Suppose also that $\alpha^d = \frac{1}{D}$ for all districts d, so that it is

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[17] Clearly lobbying is non-random, and both Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) develop instrumental variables strategies to address this problem, though Goldberg and Maggi (1999)

only lobbying that determines cross-industry variation in tariffs, as assumed in Grossman and Helpman (1994). Equation 8 simplifies to

$$\begin{aligned}\frac{\tau_i}{1+\tau_i} &= \frac{z_i}{-\epsilon_i}\left(\frac{\beta^2 D^3\left(\theta^2-\theta^3\right)}{c}\sum_{j=1}^{N}\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)\right) \qquad (19)\\ &= \frac{(\beta D)^2\left(\theta^2-\theta^3\right)}{c}\frac{z_i}{-\epsilon_i}\left(\underbrace{D\sum_{j\neq i}\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)}_{\text{Cross-industry Location Covariance}} + I_i \underbrace{\psi_i\left(HHI_i-\frac{1}{D}\right)}_{\text{Own-industry Location Covariance}}\right)\end{aligned}$$

The second line shows that we can separate out an industry's tariff into the cross-industry Location Covariance term, which does not depend on whether the industry lobbies, and the industry's lobbying, which has an effect on its tariff proportional to the industry's spatial concentration. Denote the set of industries that lobby by $\mathcal{I}$. Then if one estimates Equation 18 by OLS using data generated by this model, the coefficient on $\frac{zI}{-\epsilon}$ corresponds to

$$\beta_1 = \frac{(\beta D)^2\left(\theta^2-\theta^3\right)}{c}\left(\frac{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2\sum_{j=1}^{N}D\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)}{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2} - \frac{\sum_{i\notin\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2\sum_{j=1}^{N}D\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)}{\sum_{i\notin\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2}\right)$$

that is, the difference in ($\frac{z}{-\epsilon}$-weighted) average Location Covariance between industries that lobby and industries that do not, multiplied by $(\beta D)^2\left(\theta^2-\theta^3\right)/c$. The derivation follows from inserting Equation 19 into the OLS solution. We can further decompose this difference into the weighted average own-industry Location Covariance for industries that lobby, plus the difference in weighted-average cross-industry Location Covariance between industries that lobby and do not lobby:

$$\begin{aligned}\beta_1 = \frac{(\beta D)^2\left(\theta^2-\theta^3\right)}{c}&\left(\frac{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2\psi_i\left(HHI_i-\frac{1}{D}\right)}{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2}\right.\\ &\left.+\frac{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2 D\sum_{j\neq i}\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)}{\sum_{i\in\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2} - \frac{\sum_{i\notin\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2 D\sum_{j\neq i}\psi_j I_j \mathrm{Cov}(\boldsymbol{\gamma}_i,\boldsymbol{\gamma}_j)}{\sum_{i\notin\mathcal{I}}\left(\frac{z_i}{-\epsilon_i}\right)^2}\right)\end{aligned}$$

If lobbying is randomly assigned, then industries that lobby should not differ from industries that do not lobby in their ($\frac{z}{-\epsilon}$-weighted) average cross-industry Location Covariance, and this equation essentially simplifies to the own-industry component of Location Covariance, for industries that lobby.[18]

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note that their results are unchanged treating lobbying as exogenous. We make this assumption so that the only factor explaining the large estimate of a is the particular model of lobbying.

[18] The reason this simplification is not exact, even if the characteristics of lobbying and non-lobbying industries are identical in everything except lobbying, is that the cross-industry component of Location Covariance for lobbying industries is a sum over all lobbying industries except the industry in question, whereas the cross-industry component of Location Covariance for non-lobbying industries is a sum over all

By a similar derivation, we also have

$$\beta_0 = \frac{(\beta D)^2 \left(\theta^2 - \theta^3\right)}{c} \left(\frac{\sum_{i \notin \mathcal{I}} \left(\frac{z_i}{-\epsilon_i}\right)^2 D \sum_{j=1}^{N} \psi_j I_j \text{Cov}(\boldsymbol{\gamma}_i, \boldsymbol{\gamma}_j)}{\sum_{i \notin \mathcal{I}} \left(\frac{z_i}{-\epsilon_i}\right)^2} \right).$$

That is β_0 is the ($\frac{z}{-\epsilon}$-weighted) average cross-industry Location Covariance for industries that do not lobby, multiplied by $(\beta D)^2 \left(\theta^2 - \theta^3\right)/c$. Recall that Figure 1 shows that the cross-industry component of Location Covariance is much larger in magnitude than the own-industry component, which makes sense given that the cross-industry component is a sum over many industries, relative to one industry for the own-industry component. This difference between the cross-industry and own-industry component of Location Covariance implies we would expect β_1 to be much smaller than β_0, giving low estimates of a.

To calculate β_0 and β_1, and thus a, we need an estimate of $(\beta D)^2 \left(\theta^2 - \theta^3\right)/c$. Fortunately, when we estimate Equation 8 in Table A.1, the coefficient on Location Covariance interacted with $\frac{z}{-\epsilon}$ estimates that quantity. To see how, recall that if we assume $\alpha^d = \frac{1}{D}$ for all d, and insert our identity for Location Covariance from Equation 9 into Equation 8, we obtain

$$\frac{\tau_i}{1+\tau_i} = \frac{(\beta D)^2(\theta^2 - \theta^3)}{c} \frac{z_i}{-\epsilon_i} \textit{Location Covariance}_i,$$

and so in a regression of $\tau_i/(1+\tau_i)$ on Location Covariance multiplied by the industry's inverse import penetration rate (z_i) divided by its import demand elasticity ($-\epsilon_i$), the coefficient on that combined variable is an estimate of $(\beta D)^2(\theta^2 - \theta^3)/c$. Table A.1 runs versions of that regression, giving estimates ranging from 0.008 to 0.08. The lower estimates, 0.008 and 0.01, are from specifications with two-way fixed effects close to Table 1.

We run a series of simulations in which we sample a set of industries, classify them as lobbying, and then calculate the implied β_0, β_1 and $a = \frac{1+\beta_0}{\beta_1}$ assuming only this subset lobbies, for different estimates of $(\beta D)^2 \left(\theta^2 - \theta^3\right)/c$ from Table A.1. We fix the probability of an industry lobbying at 0.74 as in Goldberg and Maggi (1999). Table E.1 reports key quantiles of the resulting distributions. At the median, different estimates of the effect of lobbying on the weight received by legislators imply estimates of a ranging from 7 to 41. The right tail of the distribution also indicates that, depending on the subset of industries that lobby, very high values of a are possible. Such high values would occur if the largest industries that lobby tend to co-locate with non-lobbying industries.

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lobbying industries.

Table E.1: Goldberg and Maggi a estimates implied by the model

	Implied a (quantile)		
$(\beta D)^2(\theta^2 - \theta^3)/c$	2.5th	50th	97.5th
0.080	2.741	6.541	42.737
0.066	3.115	7.380	48.103
0.049	3.884	9.096	58.422
0.048	3.911	9.158	58.788
0.029	5.869	13.493	84.797
0.016	9.815	22.283	136.657
0.010	15.974	35.829	217.721
0.008	18.212	40.752	247.182

This table shows the estimates of a, the weight placed on social welfare relative to campaign contributions that one would obtain by naively running the Goldberg-Maggi regression on data generated by our model. We run 1,000 simulations in which we draw a subset of industries and calculate the implied β_1 and β_0 values assuming this subset lobbies, and thus a, for different values of $(\beta D)^2(\theta^2 - \theta^3)/c$ from Table A.1. The table reports quantiles of the distribution of a across simulations.

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