Heterogeneous Districts, Interests, and Trade Policy*

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Abstract: Representation of the interests of Congressional districts with heterogeneous trade policy preferences is missing in canonical political economy models of trade protection. We characterize the (unobserved) district-level demand for protection and show how these preferences may be aggregated into national tariffs. Importantly, we show how export interests can become a domestic force countering protectionism. Using 2002 data from U.S. Congressional Districts, the model's predictions are used to estimate welfare weights implied by tariff and non-tariff measures. This supply-side explanation for trade policy, while complementing Grossman and Helpman (1994), reveals winners and losers, providing fresh insight into the backlash against globalization.

Keywords: Trade Policy, Political Economy, Districts, Tariffs, NTMs, Legislature.

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1 Introduction

Political economy models of trade posit that a political entity, a "government," decides how much trade protection is optimal for every sector of the economy. This may diverge from free trade because what is politically optimal for the tariff setter may not be optimal for citizens taken together. A classic model explaining this divergence is Grossman and Helpman (1994) in which special interests pay the government for protection from imports according to the willingness of the government to receive. That, in turn, is determined by the weight the government places on (a dollar of) its citizens' welfare relative to (a dollar of) campaign contributions that the government pockets. Thus, protection is endogenous: the payoffs from protection to owners of specific factors of production (workers and capitalists) who benefit from trade restrictions incentivize them to try to alter the government's calculus by making quid pro quo contributions. Helpman (1997) unifies analytically several models of endogenous protection in which the government's calculus is altered by interest groups (Magee et al., 1989); by political support from producers and consumers (Hillman, 1982); by competing lobbies (Bhagwati and Feenstra, 1982, Findlay and Wellisz, 1982); or by balancing domestic and foreign policy motivations (Hillman and Ursprung, 1988, Ossa, 2014).

The paper makes four primary contributions to this literature. The first is an answer to the question: Who or what is "government?" Our model brings to the fore the preferences of economically heterogeneous districts. This is absent in most political economy models of trade policy, including Grossman and Helpman (1994) where a unilateral decision-maker sets tariffs.[1] But that sidelines the institutionally most important actors in the tariff game, legislators, who must coalesce to form trade policy. In this paper, we attempt to restore the place of the legislature in a model of endogenous protection.

The second contribution is finding a theory-based answer to the empirical puzzle posed by estimates of the influence of special interests in the Grossman and Helpman (1994) model. Empirical investigations (Goldberg and Maggi, 1999, Gawande and Bandyopadhyay, 2000) find that, despite being politically organized, contributions by import-competing interests have had limited influence on trade protection. The finding is implied by large estimates of the weight that the U.S. government places on citizens' welfare relative to campaign

[1] Few of the existing models have allowed the actual process of preference aggregation in trade policy-making a significant role. Grossman and Helpman (1996) model the determinants of trade policy platforms chosen by representatives competing at the polls, which sheds light on the importance of ideology, uninformed voters, and special interest. The legislature and executive, however, remain passive players. Even in models featuring electoral competition (Magee et al., 1989, Chapter 6) or direct democracy (Mayer, 1984, Dutt and Mitra, 2002), incentives faced by members of the legislature are abstracted (Rodrik, 1995).

contributions. Our answer to the first question deconstructs this finding. The political economy model incorporates individual districts and legislative bargaining as fundamental units of trade policymaking, thereby capturing how heterogeneous regional preferences influence trade policy. Legislators representing diverse constituencies, tasked to deliver trade policy, engage in a process of preference aggregation to determine the overall degree of trade protection. This preference aggregation process produces losers - interests whose tariff preferences are not satisfied - and winners - interests that exert influence on trade policy. The national tariffs thus delivered may differ from those enacted by a unitary government balancing aggregate welfare across all regions. Specifically, the legislative bargaining process can blunt the impact of lobbying, which is the primary driver of protection in the Grossman-Helpman model. By explicitly accounting for this aggregation mechanism, our model offers a more robust and theoretically grounded explanation for the observed level of trade protection. We, therefore, bring theory closer to the real world of trade policy, where representatives in Congress have historically played the central role in making trade policy (Irwin and Kroszner, 1999, Irwin, 2017).

The model with heterogeneous districts provides the micro-foundations for our third, new, contribution to the political economy of trade policy literature. We extend our model to include the countervailing influence of *exporters* on the determination of the national tariff. The extended model provides a new explanation, beyond the empirical puzzle addressed above, for why post-WWII tariffs have been low in the U.S.[2] China's 2001 WTO accession is often taken to be de facto evidence of the U.S. as a welfare-maximizing free-trading nation. Our answer to why market access was granted to a large country is motivated by Johnson's (1976) conjecture that political representation of strong exporter interests acts as a counterbalance to the influence of specific factor owners in industries negatively affected by import competition. The extended model with exporter interests highlights the role of terms of trade externalities in bringing exporters, who value access to foreign markets, into the calculus determining domestic protection.[3] This is among the first models of exporters influencing *domestic* U.S. tariffs in the way described in Irwin and Kroszner (1999), Irwin (2017) and Bailey et al. (1997).

[2]The Grossman-Helpman model predicts that, regardless of the overall level of trade protection, in goods where protectionist special interests are organized tariffs should move according to the good's output-to-import ratio scaled by its absolute import demand elasticity. The empirical finding is that if trade protection was doled out according to this prediction, then the low levels of U.S. tariffs implied that the government was almost a welfare maximizer with little regard for contributions. Our explanation is that the influence of exporters represented in the legislative coalition that enacted trade policy underpins the finding.

[3]Ossa (2011) builds a related argument where GATT/WTO allows governments to internalize a production relocation externality.

We then take our models to trade and output data at the district level to make our fourth, novel, contribution that potentially moves this vast empirical literature on the political economy of trade policy forward.[4] Our empirical investigation probes the influence of import-competing and exporting interests in determining U.S. tariffs in 2002, at the crucial historical juncture of China's WTO accession. A counterfactual view of China's unfettered MFN access to the U.S. market is that it was the equivalent of further lowering tariffs to the point where domestic manufacturing was rendered uncompetitive and manufacturing imports surged. Estimates of our structural parameters, the *welfare weights* accorded to import-competing interests wishing to legislate their tariff preferences, and exporting interests that were anti-protectionist, quantifies the influence of these opposing interests in the making of U.S. trade policy. Our identification strategy introduces Bartik-like instruments to this area of research. The findings provide a striking answer to why U.S. manufacturing tariffs have been low, and most importantly, remained low even at the onset of the *China shock*.

The results suggest that the weights placed by the legislative bargaining process on specific factor owners in import-competing industries were distributed unequally across districts and industries. Further, in the early 2000s Republican-controlled districts took the lion's share of the aggregate weights placed on specific factor owners, outweighing Democrat districts by a 2-to-1 ratio. The role of exporting interests is critical: their welfare is weighted as much as the welfare of factor owners in all import-competing industries. Moreover, when accounting for reciprocity with the rest of the world in determining U.S. tariffs, the results show that specific factor owners in safe Republican districts in states carried by the Republican Presidential ticket and safe Republican districts in battleground states received positive weights. Thus, the legislative majority enacting the tariffs includes representatives from districts with a higher concentration of specific factor owners in exporting industries. These are novel results not conveyed by existing models of the political economy of trade.

Our supply-side explanation of trade policymaking also connects with the literature on legislative bargaining on aggregating district preferences into national policy (Baron and Ferejohn, 1989, Eraslan and Evdokimov, 2019, Celik et al., 2013). We address legislative bargaining over tariffs theoretically in a companion paper (Gawande et al., 2024), and here interpret our theory-based estimation as revealing which legislative coalitions were influential in delivering trade policy in 2002, a critical period preceding the "China shock".

[4] A large empirical literature in economics and political science has sought to explain U.S. protectionism (Deardorff and Stern, 1983, Marvel and Ray, 1983) and its political economy determinants (Baldwin, 1985, Ray, 1981, Trefler, 1993). These empirical examinations make the case that, ultimately, the government dispenses trade protection in response to demands from economic actors affected by trade.

The paper proceeds as follows. Section 2 develops the general framework of tariff determination assuming world prices are exogenous (small country case). Section 2.1 builds a model of district tariff preferences and Section 2.2 builds a model of national tariff determination. By contrasting these two models, we can understand how national tariffs may be formed by aggregating district tariff preferences. Section 3 extends the analysis by including terms of trade effects and reciprocity in the process of determination of the level of protection in a *large country* setting. This more general framework highlights the influence of *export* interests in the determination of *domestic* tariffs, a new contribution to this literature. Section 4 describes the empirical strategy followed to estimate the structural parameters of the model: the welfare weights. The estimation uses tariff and non-tariff data from 2002, a period that presaged the China shock. Results are presented in Section 5. Section 6 concludes.

2 Tariffs in a Small Open Economy

Our starting point is to derive the tariffs that would be preferred by representatives from particular districts, i.e., the tariffs applied to the whole nation that a district would select if it had the authority to do so. These tariffs are not directly observable and reflect the level of protection that each district desires. Next, we move to a model of national tariffs determined centrally, where a "government" chooses the tariffs that maximize a weighted national welfare. The centralized tariffs aggregate district tariff preferences using district-level weights. We provide a legislative bargaining interpretation of this result. In both the district and national cases, domestic tariffs are chosen taking world prices as given, consistent with the small country assumption.[5]

Section 3 extends the analysis to a large open economy and reciprocity in the formation of tariffs. In this case, the domestic country interacts with other countries, and the rest of the world may respond to changes in the domestic trade policy. We show that in this case *exporters* play a crucial role in countervailing the influence of import-competing interests and hence limiting domestic tariffs. The large country model and results are, to the best of our knowledge, novel. Importantly, these solutions are analytically tractable and allow us to estimate district-specific welfare weights for different types of factor owners, which we take up in Section 4.

[5]We are recently aware of a related paper by Adao et al. (2023), which applies a similar framework and uses observed tariffs to interpret welfare weights for *states* in the U.S.. In footnote 30, we compare the two papers underscoring the distinctive features and wider-reaching implications of our work.

2.1 District Tariff Preferences

A small open economy is populated by two types of factors owners. The first type owns factor $K_j, j = 1, \ldots, J$, which is specific to the production of good j, which we also refer to as *specific capital*, or just *capital*. The second type owns a homogenous factor L, typically referred to as labor. Each individual owns one unit of either L or K_j. While the J goods are produced nationally, their production is dispersed across R districts. All the districts are equally represented politically in the nation's legislature. The composition of output, however, depends on the (exogenous) distribution of factor endowments across districts and is therefore heterogeneous across districts. Factor owners are immobile across districts, that is, a district is a local labor market (Topel, 1986, Moretti, 2011, Autor et al., 2014, 2013).[6] The non-specific factor (labor) is mobile across goods while the specific factor (capital), by definition, is immobile outside the good in whose production it is employed. The population of district r is $n_r = n_r^L + n_r^K$, comprising n_r^K owners of capital and n_r^L owners of labor. Aggregate population $n = \sum_r n_r$.

We assume, for now, that the world consists of small countries that take world prices as exogenously determined (we relax this in Section 3). Goods $j = 1, \ldots, J$ are tradable. The domestic price of good j may be changed by raising or lowering tariffs on good j. To keep the model simple (and consistent with the data), negative tariffs are disallowed.[7] There are no transport costs and goods are delivered to consumers at these domestic prices.

Production. Each district $r = 1, \ldots, R$ produces a non-tradable numeraire good 0 with a linear technology that uses only labor, $q_{0r} = w_0\, n_{0r}^L$, where n_{0r}^L owners of labor in district r are employed in producing the numeraire good. Labor's wage is therefore fixed nationally at w_0. Units are chosen such that the price of the numeraire good (nationally) is $p_0 = 1$. Prices p_j in the J non-numeraire goods are expressed in these units.

Good j is produced using CRS technology. In district r, the technology combines n_{jr}^L units of labor with the fixed endowment of n_{jr}^K units of specific capital. Capital earns the indirect profit function $\pi_{jr}(p_j)$, and labor earns wage w_0 regardless of its sector (good) of employment. A district does not necessarily produce all goods. If good j is not produced in district r, $n_{jr}^K = n_{jr}^L = 0$ and $\pi_{jr} = 0$. The output of good j in district r is $q_{jr}(p_j) = \pi'_{jr}(p_j) > 0$ and its aggregate output is $Q_j(p_j) = \sum_r q_{jr}(p_j)$.

[6]The assumption that labor markets are local plays a fundamental role in contributing to the impact of trade and innovation on manufacturing employment and wages (Autor et al., 2013, 2014).

[7] Import subsidies are, in any case, negligible in U.S. manufacturing. With supply chains, downstream producers may have an interest in subsidizing the purchase of imported upstream inputs. We do not attempt this here but intermediate goods may be easily incorporated into the model as in Gawande et al. (2012).

Preferences. Preferences are homogeneous across individuals regardless of their factor ownership and represented by the quasi-linear utility function $u = x_0 + \sum_j u_j(x_j)$. This implies (separable) demand functions $x_j = d_j(p_j)$ for each good. The indirect utility of an individual who spends z on consumption is $z + \sum_j \phi_j(p_j)$, where $\phi_j(p_j) = v_j(p_j) - p_j\, d_j(p_j)$ is the consumer surplus from good j.[8]Per capita consumer surplus from the consumption of goods $j = 1, \ldots, J$ is $\phi = \sum_j \phi_j(p_j)$. The aggregate demand for good j is $D_j(p_j) = nd_j(p_j)$, where n is the country's population.

Imports, tariffs, and tariff revenue. Aggregate (national) imports of good j, denoted M_j, is given by $M_j(p_j) = D_j(p_j) - Q_j(p_j)$. Trade policy consists of imposing a specific per unit tariff t_j on import of goods j, $j = 1, \ldots, J$. Total revenue generated by the tariffs, denoted T, is given by $T = \sum_j (p_j - \overline{p}_j) M_j(p_j) = \sum (p_j - \overline{p}_j)[D_j(p_j) - Q_j(p_j)]$, where $\overline{p}_j$ is the world price and $t_j = p_j - \overline{p}_j \geq 0$. Tariffs on imports are collected at the country's border and tariff revenue is distributed nationally on an equal per capita basis, so each individual receives $\frac{T}{n}$.

Total utility. The total utility of the n^L_{jr} owners of labor employed in producing good j in district r is $W^L_{jr} = n^L_{jr}\left(w_0 + \frac{T}{n} + \phi\right)$, and the total utility of the n^K_{jr} capital owners in good-district jr is $W^K_{jr} = n^K_{jr}\left(\frac{\pi_{jr}}{n^K_{jr}} + \frac{T}{n} + \phi\right)$. Common to both is the per capita tariff revenue, $\frac{T}{n}$, and the total per capita consumer surplus, ϕ (given the assumption of identical preferences across groups). The expressions differ in the income received by the two factors of production. While a tariff increases p_j and lowers consumer surplus, it raises the return to specific capital in j. The n^K_{jr} owners of such capital in district r therefore have a potentially strong interest in demanding protection from imports of good j.

District Preferred Tariffs

Tariffs are, of course, decided at the national level. However, we seek to understand how a policymaking body comprising representatives from each district – like the U.S. House of Representatives – arrives at national tariffs. We approach this problem by answering two questions. First, if a district were granted the authority to choose tariffs for the entire nation, what would its preferred tariffs be? Second, how are these (heterogeneous) tariff preferences across districts aggregated into national tariffs? This section addresses the first question.

A representative of district r chooses (national) tariffs to maximize the district's welfare,

[8] The index r is dropped as demand functions are the same across districts (prices are nationally determined). Online Technical Appendix B considers heterogeneous tastes for the two types of agents. This model assumes preferences described by the utility function $u^m = x^m_0 + \sum_j u^m_j(x^m_j)$, where $m = \{L, K\}$ indexes owners of labor and owners of the specific factor (capital), yielding demand functions $d^m_j(p_j)$ and consumer surplus $\sum_j \phi^m_j(p_j) = \sum_j [v^m_j(p_j) - p_j d^m_j(p_j)]$.

defined as a weighted sum of the welfare of each factor owner in the district. These welfare weights on the two groups of factor owners are allowed to differ across districts and their sectors of employment. In district r, the welfare of an owner of capital (a unit of capital) employed in producing good j gets weight Λ_{jr}^K and the welfare of a unit of labor employed in producing good j gets weight Λ_{jr}^L. District r's aggregate welfare is

$$\Omega_r = \sum_j \Lambda_{jr}^L W_{jr}^L + \sum_j \Lambda_{jr}^K W_{jr}^K,$$

where the total welfare of type-m factor owners employed in producing good j in district r, W_{jr}^m, depends on the vector of domestic prices $\mathbf{p} = (p_1, ..., p_J)$. In the small open economy, there is a one-to-one relationship between the tariff t_j and price p_j since the world price $\overline{p}_j$ is exogenous. Total welfare W_{jr}^m for the two types of factors owners are therefore functions of tariffs. District r's aggregate welfare may be decomposed as

$$\Omega_r = \sum_j \Lambda_{jr}^L n_{jr}^L \left(w_0 + \frac{T}{n} + \phi \right) + \sum_j \Lambda_{jr}^K n_{jr}^K \left(\frac{\pi_{jr}}{n_{jr}^K} + \frac{T}{n} + \phi \right). \tag{1}$$

The first parenthesis decomposes the welfare of a non-specific factor owner (labor) producing good j as the sum of wage, per capita tariff revenue, and consumer surplus. The second decomposes the welfare of an owner of capital employed in producing good j as the sum of per capita returns, $\frac{\pi_{jr}}{n_{jr}^K}$, per capita tariff revenue and consumer surplus. District r's welfare Ω_r is the sum across all goods of the welfare-weighted aggregate of the two components.[9]

Noting that T, ϕ and π_{jr} are functions of t_j, the good j tariff preferred by district r is obtained by maximizing (1) with respect to t_j. Denote the aggregate welfare weights on factor owners in district r as $\lambda_r^K = \sum_{j=1}^J \Lambda_{jr}^K n_{jr}^K$ and $\lambda_r^L = \sum_{j=0}^J \Lambda_{jr}^L n_{jr}^L$, respectively, and their sum as $\lambda_r = \lambda_r^L + \lambda_r^K$. Then, district r's preferred tariff on good j, t_{jr}, is

$$t_{jr} = -\frac{n}{M_j'} \left[\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r} \left(\frac{q_{jr}}{n_{jr}^K} \right) - \frac{D_j}{n} + \frac{M_j}{n} \right], \quad j = 1, \ldots, J, \tag{2}$$

for $r = 1, \ldots, R$, where $\frac{D_j}{n}$ is the country's per capita demand for good j, $\frac{M_j}{n}$ is the country's per capita imports of good j, and $M_j' \equiv \frac{\partial M_j}{\partial t_j} < 0$. Expression (2) captures both the interests of producers in district r and (assuming identical tastes) the welfare of consumers nationally. The first term in the square brackets indicates that the tariff increases with r's output of

[9] A district r does not necessarily produce all goods j. When good j is not active in district r, $\pi_{jr} = 0$; in this case, $n_{jr}^m = 0$, and $\Lambda_{jr}^m = 0$, $m \in \{L, K\}$.

good j through the tariff's positive impact on profits.[10] The second term shows that the tariff declines with the nation's per capita demand via the negative impact of the tariff on consumer surplus. The third term indicates the tariff increases with national imports through its impact on tariff revenue, which is redistributed lump-sum to the nation's residents.

An institutional interpretation is that (2) characterizes the tariff on good j preferred by the representative of district r, which is one among a federation of districts. In the determination of the nation's tariff on good j, the local interests of district r's capital owners are represented via $\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\left(\frac{q_{jr}}{n_{jr}^K}\right)$. The tariff reduces the consumer surplus of the representative national consumer via $\frac{-D_j}{n}$, and revenue from the tariff is distributed as a lump sum back to all consumers via $\frac{M_j}{n}$.[11] In a majoritarian electoral system such as in the U.S., a member of the House of Representatives representing district r chooses national tariff $t_j = t_{jr}$ in (2).[12] The following proposition describes the level of protection in terms of ad-valorem tariffs:

Proposition 1 *District r's effective demand for tariff protection in good j is:*

$$\frac{\tau_{jr}}{1+\tau_{jr}} = \frac{\Lambda_{jr}^K n}{\lambda_r}\left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right) = \frac{\Lambda_{jr}^K n_r}{\lambda_r}\left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right), \tag{3}$$

where $\tau_{jr} = \frac{t_{jr}}{\bar{p}_j}$, $\frac{\tau_{jr}}{1+\tau_{jr}} = \frac{t_{jr}}{p_j}$ is the ad-valorem tariff proposed by district r as the national tariff on imports of good j, and $M_{jr} = M_j \times \left(\frac{n_r}{n}\right)$.

Proof Using good j's import demand elasticity $\epsilon_j = M_j'\left(\frac{p_j}{M_j}\right)$, the market clearing condition $D_j = Q_j + M_j$, and defining *ad-valorem* tariffs as $\tau_{jr} = \frac{t_{jr}}{\bar{p}_j}$ or $\frac{\tau_{jr}}{(1+\tau_{jr})} = \frac{t_{jr}}{p_j}$, (2) may be written as:

$$\frac{\tau_{jr}}{1+\tau_{jr}} = \frac{n}{-\epsilon_j M_j}\left(\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right) = \frac{\Lambda_{jr}^K n}{\lambda_r}\left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right). \tag{4}$$

Assuming M_j is distributed according to districts' populations, district r's imports of j, M_{jr}

[10] By the envelope theorem the derivative of profits with respect to price is output, reflecting the impact of the tariff on returns to owners of sector-specific capital in district r.

[11] If preferences across groups L and K are heterogeneous or allocation of factors L and K varies across districts, the tariff's impact on consumer surplus will differ across districts - e.g., if good j is consumed less in district r then a higher t_{jr} has a smaller impact on district r's welfare due to its smaller impact on consumer surplus. The burden of raising t_{jr} is shifted to districts with higher consumption of good j.

[12] The district is institutionally constrained, being part of the federation of districts, to distribute import tariff revenue equally across all districts in the federation. Further, the market for each good clears at the national level. District r considers the impact of higher tariffs on district r's consumers; because preferences across groups are assumed identical, some effects "wash out" on the consumer side. The good j tariff enacted by Congress for the nation will then reflect the weights Λ_{jr}^K and Λ_r^L "assigned" to each of the R districts by the legislative bargaining process (given their heterogeneous output-to-import ratios and import elasticities).

are $M_{jr} = M_j \times \left(\frac{n_r}{n}\right)$. The second equality in (3) predicts tariffs with district output-to-import ratios. □

District r's preferred national tariff on good j is determined by the output-to-import ratio times its inverse import demand elasticity, $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$. If $\Lambda^K_{jr} = \Lambda^L_{jr} = \Lambda_r$ in (3), that is, if all factor owners in district r have equal weight, the coefficient on $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$ equals 1 and

$$\frac{\tau_{jr}}{1+\tau_{jr}} \begin{cases} > 0, & \text{if } \left(\frac{q_{jr}}{M_{jr}}\right) > \left(\frac{Q_j}{M_j}\right) \\ = 0, & \text{if } \left(\frac{q_{jr}}{M_{jr}}\right) \leq \left(\frac{Q_j}{M_j}\right), \end{cases} \tag{5}$$

where we impose the non-negativity constraint on tariffs (and $-\epsilon_j$ cancels out). From (5) it is apparent that even when special interests, that is, specific capital owners, have the same welfare weight as labor, tariffs can be positive. If, for example, production of good j is concentrated in district r, then $q_{jr} = Q_j$ and $\tau_{jr} > 0$. The national tariff schedule aggregates tariff preferences of districts, given by (3). The aggregation of district preferences into national trade policy is discussed in the next section.

It is also useful to compare (3) with the tariff prediction of Grossman and Helpman (GH 1994). In the GH model, the welfare of specific capital employed in good j is given the weight $\mathbb{1}_j + a$, where $\mathbb{1}_j$ is a binary indicator equal to one if sector j is politically organized to lobby and zero otherwise. The parameter a represents the weight given to consumers in the model so that $\frac{1+a}{a}$ is the relative weight on the welfare of organized specific capital owners and reflects their influence in tariff-making. Adapting the GH model to a district whose representative is lobbied, let district r's representative place weight a_r on the welfare of labor and the weight $\mathbb{1}_{jr} + a_r$ on the welfare of capital owners. Here, $\mathbb{1}_{jr}$ equals one if owners of capital employed in the production of good j in district r are politically organized to lobby district r's representative, and zero otherwise. That is, $\Lambda^L_{jr} = a_r$ and $\Lambda^K_{jr} = \mathbb{1}_{jr} + a_r$. Then (3) may be written as

$$\begin{aligned} \frac{\tau_{jr}}{1+\tau_{jr}} &= \frac{(\mathbb{1}_{jr} + a_r)\, n_r}{\sum_{j=1}^J (\mathbb{1}_{jr} + a_r) n^K_{jr} + \sum_{j=0}^J a_r\, n^L_{jr}} \left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right) \\ &= \frac{(\mathbb{1}_{jr} + a_r)\, n_r}{\sum_{j=1}^J \mathbb{1}_{jr} n^K_{jr} + a_r\, n_r} \left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right). \end{aligned}$$

Let α^K_r denote the fraction of district r's population that is politically organized, $\alpha^K_r =$

$\frac{\sum_{j=1}^{J} \mathbb{1}_{jr} n_{jr}^K}{n_r}$, the district-equivalent of GH's α_L. Then,

$$\frac{\tau_{jr}}{1+\tau_{jr}} = \frac{\mathbb{1}_{jr} + a_r}{\alpha_r^K + a_r} \left(\frac{q_{jr}/M_{jr}}{-\epsilon_j} \right) - \left(\frac{Q_j/M_j}{-\epsilon_j} \right).$$

In the GH model, if everyone is politically organized, lobbies contribute but they nullify each other, with the result that there is free trade in all goods. In our model with everyone organized, $\alpha_r^K = 1$ and we get the result in (5).[13]

2.2 National Tariffs

Trade policy is determined by a process that aggregates the preferences of districts, where welfare weights capture the political influence of districts and economic actors. We represent this political process as the maximization of the weighted sum of the individual utilities of the population of factor owners:

$$\Omega \;=\; \sum_r \sum_j \Gamma_{jr}^K W_{jr}^K + \sum_r \sum_j \Gamma_{jr}^L W_{jr}^L, \tag{6}$$

where Γ_{jr}^m is the weight attached to the welfare W_{jr}^m of a type-m factor owner, $m \in \{L, K\}$, employed in producing good j in district r. Here, the weights capture the impact of the regional heterogeneity in production and factor ownership on tariff-making. As in the case of districts, the domestic price of good j is $p_j = \bar{p}_j + t_j$, where $\bar{p}_j$ is the given world price of good j (small country case assumption). The welfare W_{jr}^m of both types of factor owners are therefore functions of the (specific) tariff t_j. National welfare (6) can be expressed as the sum of its three components,

$$\Omega \;=\; \sum_r \sum_j \Gamma_{jr}^L n_{jr}^L \left(w_{0r} + \frac{T}{n} + \phi_j \right) + \sum_r \sum_j \Gamma_{jr}^K n_{jr}^K \left(\frac{\pi_{jr}}{n_{jr}^K} + \frac{T}{n} + \phi_j \right), \tag{7}$$

where $\frac{T}{n}$ is per capita tariff revenue and ϕ_j is per capita consumer surplus from the consumption of good j. Expression (7) is essentially a weighted sum of the district welfare functions. National tariffs are obtained by maximizing (7) with respect to each t_j. The resulting per-unit (specific) tariff on imports of each good j is given by:

$$t_j \;=\; -\frac{n}{M_j'} \left[\sum_r \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} \left(\frac{q_{jr}}{n_{jr}^K} \right) - \frac{D_j}{n} + \frac{M_j}{n} \right], \quad j = 1, \dots, J, \tag{8}$$

[13] Note that (5) would be the result if nobody is politically organized, as well, i.e., $\mathbb{1}_{jr} = 0$ for all j, r, and α_r^K=0. In the GH model, where the district is the nation, $\frac{q_{jr}}{M_{jr}} = \frac{Q_j}{M_j}$, and $\tau_{jr} = 0$.

where $\frac{\sum_r \Gamma_{jr}^K n_{jr}^K}{\gamma}$ is the share of the total welfare weight received by the nation's owners of specific capital employed in good j. Aggregate welfare γ is given by $\gamma = \gamma^K + \gamma^L$, where the aggregate welfare weights on non-specific (labor) and specific (capital) factors are given, respectively, by $\gamma^L = \sum_j \sum_r \Gamma_{jr}^L n_{jr}^L$ and $\gamma^K = \sum_j \sum_r \Gamma_{jr}^K n_{jr}^K$. As in the district case, $\frac{D_j}{n}$ is per capita demand for good j, $\frac{M_j}{n}$ is per capita imports of good j, and $M_j' \equiv \frac{\partial M_j}{\partial t_j} < 0$. Using good j's import demand elasticity, $\epsilon_j = M_j' \left(\frac{p_j}{M_j}\right)$, the market clearing condition $D_j = Q_j + M_j$, and defining $\tau_j = \frac{t_j}{\overline{p}_j}$, we have the following result about the ad-valorem national tariff for good j.

Proposition 2 *In terms of ad-valorem tariff, protection to good j is given by:*

$$\frac{\tau_j}{1+\tau_j} = \frac{n}{-\epsilon_j M_j}\left(\sum_{r=1}^{R} \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} \frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right) = \sum_{r=1}^{R} \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} \frac{n}{n_{jr}^K} \left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right), \tag{9}$$

where $\frac{\tau_j}{1+\tau_j} = \frac{t_j}{p_j}$.

A comparison with (the first equation in) (3) of Proposition 1 shows how the centralized tariff (9) of good j aggregates tariff preferences for good j across the R districts.[14] This is a reduced-form solution, in the sense that the bargaining procedure in the legislature that delivers the centralized solution is not modeled. We, nevertheless, interpret the welfare weights Γ_{jr}^K as the outcome of such legislative bargaining.[15]

The welfare weights Γ_{jr}^K in (9) assigned by the nation's legislature can be very different from the welfare weights Λ_{jr}^K in (3) implied by district r's tariff preference for good j. Suppose

[14]The difference between district and national tariffs (evaluated at the solution obtained when tariffs are set at the national level τ_j) is

$$\tau_{jr} - \tau_j = \frac{n}{(-\epsilon_j M_j)}\left(\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r} \frac{q_{jr}}{n_{jr}^K} - \sum_{r'=1}^{R} \frac{\Gamma_{jr'}^K n_{jr'}^K}{\gamma} \frac{q_{jr'}}{n_{jr'}^K}\right). \tag{10}$$

The sign of $(\tau_{jr} - \tau_j)$ depends on (i) the difference between the weights Λ_{jr}^K and Γ_{jr}^K, (ii) the spatial distribution of n_{jr}^K, and (iii) the production levels of good q_{jr} across all locations r. When $n_{jr}^m = 0$, $q_{jr} = 0$ since L and K are essential in the production of good j. However, to the extent that $q_{jr} > 0$, both the spatial distribution of activity *and* the scale, given by q_{jr}/n_{jr}^K, become relevant in determining tariffs and explaining the difference between τ_{jr} and τ_j. Also, even when each district r places the same weights to each sector j and group m as those chosen at the central or national level, expression (10) may still be different from zero if the allocation of production across jurisdictions is not homogeneous, i.e., n_{jr}^K differs across locations r. In other words, there will be districts that win and districts that lose just because of a non-uniform allocation of activity across space, and the legislative bargaining carried out at the national level. Moreover, if production is uniformly distributed across locations (i.e., q_{jr}/n_{jr}^K is the same for all r), district r's preferred tariff is larger than the national tariff if the weight district r attaches to specific capital in sector j is larger than the national average weight on the specific capital in sector j.

[15]The legislative bargaining models of tariffs in Gawande et al. (2023) and Gawande et al. (2024) adopt this interpretation. See *Remarks 1* below.

district r's output is concentrated in good $j = 1$, so that $q_{1r} = Q_1$. This district places no weight on sectors other than Sector 1 since they are not locally active. From (3) it follows that for $\Lambda^K_{1r} > 0$ its preferred tariff for good 1 is positive and equal to $\frac{\Lambda^K_{1r}}{\lambda_r}\left(1 - \frac{n_{1r}}{n}\right) > 0$, and zero for all other goods. However, this specific set of welfare weights may be far from those implied by the tariffs delivered by the legislature. If no district in a coalition of districts that forms the majority produces good j, the coalition will determine t_j to be zero, implying the welfare of capital owners employed in producing good j gets no weight in the national tariff determination, that is, $\Gamma^K_{jr} = 0$ for all districts. This is not as extreme a case as it appears. Appendix Figure A.1 depicts the distribution of the variable $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$ across districts for each of the twenty NAICS 3-digit industries.[16] The Lorenz curves reveal that the concentration of output in a few industries is prevalent across U.S. districts.

Remarks

1. *National tariffs as a weighted sum of district-preferred tariffs:* A legislative bargaining interpretation of national tariffs holds that, since individual districts do not have the power to impose their tariff preferences, they must form a majority coalition in the legislature to decide the national tariffs. Gawande et al. (2024) show in a legislative bargaining model with one district (district r) as the agenda setter, that the national tariff on good j in (9) linearly aggregates the district tariff preferences of a majority coalition of districts as a convex combination $\tau_j = \sum_{\iota \in C_r} s_\iota \tau_{j\iota}$.[17] Specifically, the national tariff τ_j is given by

$$\frac{\tau_j}{1+\tau_j} = \sum_{\iota \in C_r} s_\iota \frac{\tau_{j\iota}}{1+\tau_{j\iota}}, \tag{11}$$

where C_r is the winning majority coalition that includes the agenda setter r, ι indexes districts in the winning coalition and $\tau_{j\iota}$ is district ι's preferred tariff on good j. The weights satisfy $0 \leq s_\iota \leq 1$ and $\sum_{\iota \in C_r} s_\iota = 1$.Tariff preferences of districts not in the winning coalition get zero weight.[18] Thus, the centralized solution (9) may be interpreted as the aggregation of district tariff preferences (3) via legislative bargaining with an agenda setter.

[16] Data sources for constructing these variables are described in Section 4 below.

[17] Gawande et al. (2024) considers a variation of Celik et al. (2013), where districts are equally represented in the legislature. The solution depends on both the geographic concentration of economic activity and the welfare weights placed on factor owners.

[18] Gawande et al. (2024) show that the weight s_ι is a function of several variables, including the Lagrange multipliers associated with the participation constraints of the districts in the winning coalition, and each district's weight on specific capital employed in producing different goods. Districts in the winning coalition may still receive zero weight, for example, if the resulting national tariff gives higher utility to those districts. Recently Adao et al. (2023) adopt a similar approach: They use tariffs to interpret welfare weights for states in the U.S. through the lens of a revealed-preference approach.

To illustrate the plausibility that (11) is consistent with observed national protection, we use (4) to predict the vector of tariffs $\boldsymbol{\tau}_r$ for each district $r = 1, \ldots, 433$ using district-level output-to-import ratios for the year 2002, fixing the ratio $\frac{\Lambda_{jr}^K}{\Lambda_{jr}^L}$ equal to one for all $\{j, r\}$. Appendix Table A.1 compares 2002 ad valorem tariffs plus non-tariff measures (NTMs) with these predictions. The mean (taken over all districts) predicted tariff for each ISIC industry is reported in column (6) of Table A.1. The legislative bargaining solution with the national tariff vector equal to a convex combination of the tariff vector of districts in a majority coalition appears plausible, aided by the fact, displayed in column (7), that in any industry fewer than a majority of districts demand positive tariffs. Overall protection (sum of tariffs and NTMs) in 2002 was lower than the implied demand for protection by districts: the average of column (6) is 52 percent compared with the 16.6 percent average of tariffs plus NTM. The message is that district representatives had little chance of individually getting their preferred tariffs. However, a coalition C_r of districts with output-to-import ratio $\frac{q_{\iota r}/M_{\iota r}}{-\epsilon_j} > \frac{Q_j/M_j}{-\epsilon_j}$ for all $\iota \in C_r$ could be successful in obtaining at least some protection in the legislative bargain. The bargain would determine the welfare weights received by specific capital owners of districts in the winning coalition.

2. *Institutions:* The institutional setting under which U.S. tariff policymaking has unfolded in modern history lends credibility to legislative bargaining as the mechanism aggregating district preferences. Through the 1960s and 1970s, negotiating multilateral tariff cuts required each GATT member country to believe that the agreed-upon reciprocal cuts would be legislated by all their GATT trading partners (Bagwell and Staiger, 1999, Irwin, 2017). In the U.S. such credibility resulted from the authority that Congress extended to President Kennedy via the 1962 Trade Expansion Act; this statute set the scope of the tariff cuts in manufacturing and explicitly limited the liberalization of agriculture. Once the U.S. Trade Representative (USTR) completed GATT negotiations on behalf of the Executive, the President brought the proposal to Congress for a final up-or-out vote. This precedent prevailed when Congress legislated the Trade Act of 1974, and (as in the 1962 Act) granted "fast track," delegating authority to President Ford to determine the tariff cuts to be negotiated during the Tokyo Round. Fast-track, as in the Baron and Ferejohn model, was subject to a *closed* rule vote –the fast-track procedure meant the motion by the president (the agenda setter)would receive an up-or-out vote by Congress, not subject to amendment.

3. *Equal welfare weights*: Suppose welfare weights are equal for all factors, goods, and districts, so that $\Gamma_{jr}^m = \Gamma$, that is, political economy considerations do not influence the outcome. Then, tariffs are zero and there is free trade. This is not necessarily true in the

district-preferred tariff case.[19]

4. *Comparison with the Grossman-Helpman model*: Our model provides micro-foundations for the Grossman and Helpman (1994) model parameter a. Consider the GH model in which all sectors are organized as lobbies, and α^K denotes the fraction of the population that owns specific capital and whose interests lobbies represent. In our model, this fraction is $\alpha^K = n^K/n$. While a unitary government dispenses protection in the GH model, with legislatures and districts, expression (9) becomes the counterpart to GH's Proposition 2, where the tariff on good j is predicted to be

$$\frac{\tau_j}{1+\tau_j} = \frac{(1-\alpha^K)}{a+\alpha^K}\left(\frac{Q_j/M_j}{-\epsilon_j}\right). \tag{12}$$

In (12), α^K is the proportion of the population with specific capital ownership. Eliminating districts in (9) is achieved by reducing the coefficients on the $\left(\frac{q_{jr}/M_j}{-\epsilon_j}\right)$ terms to a constant. Forcing the welfare weight on specific capital owners to be invariant across (goods and) districts r "folds" our model in this manner. Suppose $\Gamma^K_{jr} = \Gamma^K$ for all j and r. Then, noting that the aggregate welfare weight to owners of specific capital $\gamma^K = \Gamma^K n^K$, (9) may be written as

$$\frac{\tau_j}{1+\tau_j} = \sum_{r=1}^{R}\frac{\Gamma^K n^K}{(\gamma^K+\gamma^L)}\frac{1}{\alpha^K}\left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right) = \left[\frac{\gamma^K}{(\gamma^K+\gamma^L)}\frac{1}{\alpha^K} - 1\right)\left(\frac{Q_j/M_j}{-\epsilon_j}\right],$$

where the first equality uses $\alpha^K = \frac{n^K}{n}$ and the second equality uses $\sum_r q_{jr} = Q_j$. Defining $\widetilde{\gamma}^K$ as the share $\widetilde{\gamma}^K = \frac{\gamma^K}{(\gamma^K+\gamma^L)}$, yields

$$\frac{\tau_j}{1+\tau_j} = \frac{(\widetilde{\gamma}^K - \alpha^K)}{\alpha^K}\left(\frac{Q_j/M_j}{-\epsilon_j}\right).$$

In the GH model (12), τ_j approaches zero as $a \to \infty$, i.e., the government becomes singularly welfare-minded. In our model, folded to simulate a unitary government, τ_j approaches zero as $\widetilde{\gamma}^K \to \alpha^K$. This is the same situation noted above where the owner of (mobile) labor and the owner of specific capital get the same welfare weights. If owners of capital and owners of labor are treated equally, the classic free trade result is obtained. The unitary government

[19]Specifically, $\gamma^m = \Gamma \sum_r \sum_s n^m_{sr} = \Gamma n^m$, $\gamma = \Gamma(n^L + n^K) = \Gamma n$, so (9) becomes

$$\frac{\tau_j}{1+\tau_j} = \frac{n}{-\epsilon_j}\left(\sum_r \frac{n^K_{jr}}{n}\frac{q_{jr}}{n^K_{jr}} - \frac{Q_j}{n}\right) = \frac{1}{-\epsilon_j}\left(\sum_r q_{jr} - Q_j\right) = 0.$$

chooses positive tariffs in the GH model if a is finite. In the folded version of our model, with no role for legislative bargaining, the reason for positive tariffs is $\widetilde{\gamma}^K > \alpha^K$. However, the reason why specific factors get a larger representation than their numbers is unclear since legislative bargaining is eliminated as an explanation. The GH framework offers an explanation based on lobbying activities.

A closer parallel with the GH model is possible by letting the weight on specific capital owners be sector-varying before folding, or $\Gamma_{jr}^K = \Gamma_j^K$ for all r. From (9),

$$\frac{\tau_j}{1+\tau_j} = \sum_{r=1}^{R} \frac{\Gamma_j^K n_j^K}{(\gamma^K + \gamma^L)} \frac{1}{\alpha_j^K} \left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right) = \frac{(\widetilde{\gamma}_j^K - \alpha_j^K)}{\alpha_j^K} \left(\frac{Q_j/M_j}{-\epsilon_j}\right).$$

Using $\alpha_j^K = \frac{n_j^K}{n}$, the fraction of specific capital owners employed in sector j yields the first equality. Defining $\widetilde{\gamma}_j^K = \frac{\Gamma_j^K n_j^K}{\gamma^K + \gamma^L}$, the share of aggregate welfare given to specific capital in sector j, yields the second equality. Thus, sector j interests are represented by the continuous variable $\frac{(\widetilde{\gamma}_j^K - \alpha_j^K)}{\alpha_j^K}$ – akin to the binary existence-of-lobbying-organization variable in the GH model – bringing our version closer to GH. The mechanism determining the national tariff in our model as a function of legislative bargaining is, however, different from GH.

With world prices exogenously determined, the influence of exporters is restricted to domestic export taxes and subsidies (which are largely absent in U.S. manufacturing – recent interest in industrial policy may result in their use in the future). Exporters can exert no influence over domestic import protection. Models of trade policy have failed to address the historical reality that exporters have been highly influential in creating institutions like the RTAA (Irwin, 2017, Irwin and Kroszner, 1999, Bailey et al., 1997). In the small country case, exporters can play a key role in legislative bargaining if the agenda setter is a free trader. The presence of export-oriented districts eases the agenda setter's problem of forming a winning coalition: exporting districts will costlessly join the free-trade coalition. However, there is a strong reason for export interests to *actively* pursue a free trade domestic agenda. In the next section, we model such a role for exporters.

3 Tariffs in a Large Open Economy: Role of Exporters

With terms of trade effects, world prices are no longer exogenous, and partner country tariffs can worsen the terms of trade of exporters by lowering world prices. Grossman and Helpman (1995) shows the terms of trade motive for tariffs, but exporters have no (domestic) tariff-reducing role in their model. Johnson (1976) conjectured such a countervailing role, aptly described in Corden's (1984) survey of Johnson's body of work (our additions in brackets):

[Johnson] came back to the logic of reciprocity in "Trade Negotiations and the New International Monetary System" (1976), where he favored an explanation of [tariff] bargaining policies in terms of a balancing of domestic effects within each country – damaging effects of extra imports on particular import-competing sectors being set against expected gains for exporters and consumers. "Further, what is influential politically is ... the number of people and managers sufficiently affected either adversely or favourably by that change to motivate them to try to influence government policy" (p. 21)... Clearly, had Harry lived he would have developed this line of thought further...

Johnson's (1953) model of escalating tariffs motivates the Bagwell and Staiger (1999) view of trade liberalizing institutions like the GATT as a commitment by countries to avoid a global race to the bottom in which countries impose terms of trade externalities on each other. In our model, the political representation of strong exporter interests, as in Johnson's conjecture, achieves the goal of trade liberalizing institutions. The political absence of countervailing exporter interests is, in our view, one of the primary reasons for the escalation of domestic tariffs. For example, President Trump's 2017 China tariffs (and Chinese retaliation) are distinguished by their occurrence in an era when U.S. manufacturing exports were diminished to the point that exporter interests were no longer in the winning trade policy coalition, a reversal of the U.S. position since China was granted MFN status around 2000.[20] We develop a two-country model in which exporters seek to influence domestic tariffs.

Model

Consider a world with two countries, US and RoW, and three types of goods: a numeraire (good 0), import goods, and export goods. US imports J goods (the M-sector) indexed by j, $j \in \mathcal{M}$, and exports G goods (the X-sector) indexed by g, $g \in \mathcal{X}$. In US the three sectors employ $n^L = n^{L^0} + n^{L^M} + n^{L^X}$ units of labor, where $n^{L^0} = \sum_r n_r^{L^0}$, $n^{L^M} = \sum_r \sum_{j \in \mathcal{M}} n_{jr}^{L^M}$, $n^{L^X} = \sum_r \sum_{g \in \mathcal{X}} n_{gr}^{L^X}$, and $n^K = n^{K^M} + n^{K^X}$ units of specific capital, where $n^{K^M} = \sum_r \sum_{j \in \mathcal{M}} n_{jr}^{K^M}$ and $n^{K^X} = \sum_r \sum_{g \in \mathcal{X}} n_{gr}^{K^X}$. Total employment is $n = n^L + n^K$.

[20]The potential retaliation by China and consequent worsening of terms of trade for U.S. exporters implied by those threats was the primary motive for exporters to support maintaining the (low) status quo tariffs in the face of opposition by import-competing producers in districts that were severely affected by the China shock. Relevant at that time, the Jackson-Vanik amendment and Title IV procedure provided Congress with a statutory basis for continuing in force or (unilaterally) withdrawing China's MFN status discussed in more detail in Section 4. The 2001 CRS Report presents back-of-the-envelope calculations of the changes in the tariff rates that would be applied to China's products if the MFN status to China were repealed (Table 1, pp. 7), and the increase on costs faced by importers if the change in tariffs resulting from that repeal (Table 2, pp. 9). The CRS Report further reports sizable losses to exporters' exports of grain, power-generating machinery, aircraft, and fertilizer products if China retaliated. The influence of exporter interests, prevalent around 2001, was less binding in 2017 when the U.S. government enacted higher tariffs on Chinese imports and was willing to tolerate retaliation from China. In comparison to 2001, import-competing interests seemingly received higher weights than exporters in 2017.

On the demand side, consumer surplus from the M and X sectors are $\phi_j = u_j(d_j) - p_j d_j$ and $\phi_g = u_g(d_g) - p_g d_g$. In the two-country world US imports of good j, M_j, are equal to exports of good j, X_j^*, by RoW. Similarly, US exports of good g, X_g, equal RoW imports of good g, M_g^*. Therefore, the market clearing conditions are $D_j - Q_j = Q_j^* - D_j^*$ (> 0), and $D_g - Q_g = Q_g^* - D_g^*$ (< 0), where asterisks refer to RoW quantities.

If US imposes an ad valorem tariff $\tau_j = \frac{p_j - \overline{p}_j}{\overline{p}_j}$ on imports of good j, the domestic price of good j in US is $p_j = (1+\tau_j)\overline{p}_j$. Tariffs generate a tariff revenue of $T = \sum_i \tau_i^M \overline{p}_i^M M_i$, where $T \geq 0$ since import subsidies are not allowed. As before, tariff revenue is distributed back to all domestic residents as a lump sum.

The world price of good j, $\overline{p}_j$, is implicitly determined by the market clearing condition, $M_j[(1+\tau_j)\overline{p}_j] - X_j^*(\overline{p}_j) = 0$, making $\overline{p}_j$ a function of τ_j. Export subsidies are disallowed, so the domestic price prevailing in RoW is simply $p_j^* = \overline{p}_j$.[21] Reciprocally, if RoW imposes tariff τ_g^* on US exports of good g, its price in RoW is $p_g^* = (1+\tau_g^*)\overline{p}_g$, where $\overline{p}_g$ is g's world price determined by market clearing, $M_g^*[(1+\tau_g^*)\overline{p}_g] - X_g(\overline{p}_g) = 0$. The price of good g in the US is the world price, $p_g = \overline{p}_g$.

Aggregate welfare in US is the sum of the welfare of owners of the mobile factor and owners of specific capital, or $\Omega = \Omega^L + \Omega^K$. Let $\Upsilon = \sum_{j\in\mathcal{M}} \phi_j^M(p_j) + \sum_{g\in\mathcal{X}} \phi_g^X(p_g^X) + \frac{T}{n}$ denote the sum of per capita consumer surplus and tariff revenue. Then, the welfare of labor and specific capital owners is given by

$$
\begin{aligned}
\Omega^L &= \Omega^{L^0} + \Omega^{L^M} + \Omega^{L^X} \\
&= \sum_r \left(\Gamma_r^{L^0} n_{0r}^{L^0} w_{0r} + \sum_{j\in\mathcal{M}} \Gamma_{jr}^{L^M} n_{jr}^{L^M} w_{0r} + \sum_{g\in\mathcal{X}} \Gamma_{gr}^{L^X} n_{gr}^{L^X} w_{0r} \right) + \gamma^L \Upsilon, \\
\Omega^K &= \Omega^{K^0} + \Omega^{K^M} + \Omega^{K^X} \\
&= \sum_r \left[\sum_{j\in\mathcal{M}} \Gamma_{jr}^{K^M} n_{jr}^{K^M} \left(\frac{\pi_{jr}^M(p_j)}{n_{jr}^{K^M}} \right) + \sum_{g\in\mathcal{X}} \Gamma_{gr}^{K^X} n_{gr}^{K^X} \left(\frac{\pi_{gr}^X(p_g^X)}{n_{gr}^{K^X}} \right) \right] + \gamma^K \Upsilon,
\end{aligned}
$$

where γ^L and γ^K are welfare weights received by the national population of the two types of factor owners, $\gamma^L = \sum_r \Gamma_r^{L^0} n_{0r}^L + \sum_r \sum_{j\in\mathcal{M}} \Gamma_{jr}^{L^M} n_{jr}^{L^M} + \sum_r \sum_{g\in\mathcal{X}} \Gamma_{gr}^{L^X} n_{gr}^{L^X}$ and $\gamma^K = \sum_r \sum_{j\in\mathcal{M}} \Gamma_{jr}^{K^M} n_{jr}^{K^M} + \sum_r \sum_{g\in\mathcal{X}} \Gamma_{gr}^{K^X} n_{gr}^{K^X}$. Their sum is the aggregate welfare weight $\gamma = \gamma^L + \gamma^K$. The welfare weights on each factor owner are distinct. In the empirical exercise, we will restrict that welfare weights in the import sector are distinct from the welfare weights in the export sectors, but they do not vary within either sector.

[21] US chooses $\tau_j \geq 0$. In RoW, $\tau_j^* = 0$ since it does not subsidize its exports of j.

Nash Bargaining

Tariffs are determined in a Nash bargaining game between US and RoW that makes explicit the possibility of a retaliatory response to a tariff. Denoting the US and RoW tariff vectors, respectively, by $\boldsymbol{\tau} = (\tau_1, ..., \tau_j, ..., \tau_J)$, and $\boldsymbol{\tau^*} = (\tau_1^*, ..., \tau_g^*, ..., \tau_G^*)$, the equilibrium tariffs $\boldsymbol{\tau}$ and $\boldsymbol{\tau^*}$ maximize $\left(\Omega^{US} - \bar{\Omega}^{US}\right)^{\sigma} \left(\Omega^{RoW} - \bar{\Omega}^{RoW}\right)^{1-\sigma}$, where $\bar{\Omega}^{US}$ and $\bar{\Omega}^{RoW}$ are the threat points welfare outcomes for US and RoW, respectively, if bargaining fails.[22] The first order conditions with respect to τ_j and τ_j^* (taking RoW tariffs and US tariffs as given) are

$$\begin{aligned} \tau_j \quad &: \quad \omega^{US} \frac{d\Omega^{US}}{d\tau_j} + \omega^{RoW} \frac{d\Omega^{RoW}}{d\tau_j} = 0, \quad j = 1, \ldots, J, \\ \tau_g^* \quad &: \quad \omega^{US} \frac{d\Omega^{US}}{d\tau_g^*} + \omega^{RoW} \frac{d\Omega^{RoW}}{d\tau_g^*} = 0, \quad g = 1, \ldots, G. \end{aligned}$$

where $\omega^{US} = \frac{\sigma}{\left(\Omega^{US} - \bar{\Omega}^{US}\right)}$, $\omega^{RoW} = \frac{(1-\sigma)}{\left(\Omega^{RoW} - \bar{\Omega}^{RoW}\right)}$, $\frac{d\Omega^{US}}{d\tau_j} = \frac{\partial\Omega^{US}}{\partial p_j}\frac{\partial p_j}{\partial \tau_j} + \frac{\partial\Omega^{US}}{\partial \tau_j}$, and $\frac{d\Omega^{US}}{d\tau_g^*} = \frac{\partial\Omega^{US}}{\partial \bar{p}_g}\frac{\partial \bar{p}_g}{\partial \tau_g^*}$. Rearranging and taking the ratio between good j and good g,

$$\frac{d\Omega^{US}}{d\tau_j} - \frac{d\Omega^{US}}{d\tau_g^*}\left[\frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*}\right] = 0. \tag{13}$$

To gain insight into (13), suppose US exports a single good g.[23] Expression (13) simply formalizes the well-known Nash-bargaining equilibrium condition in the context of this model. It states that, in equilibrium, the slopes of the reaction functions are equalized, that is, $\frac{d\Omega^{US}/d\tau_j}{d\Omega^{US}/d\tau_g^*} = \frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*}$.

Furthermore, suppose US and RoW establish a trade agreement stipulating that any US tariff increase on RoW exports of good j grants RoW the right to impose a retaliatory tariff increase on US exports of good g, to preserve RoW's pre-existing utility level. The amount by which RoW increases τ_g^* to keep Ω^{RoW} at its status quo (to compensate for the increase in τ_j) is given by $\mu_j = -\frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*}$. In other words, μ_j is the change in RoW's tariff on US exports of g in reaction to the US tariff increase, serving as an indicator of the

[22] $\bar{\Omega}^{US}$ and $\bar{\Omega}^{RoW}$ are exogenously determined. They could represent welfare levels at the prevailing *status quo* tariffs or welfare levels attained at the optimal unilateral tariffs (i.e. the national tariffs described in Section 2.2). Our empirical estimation does not rely on how the threat points are determined.

[23] The model generalizes to many export goods as shown in the Online Technical Appendix B. The counterpart to (13) is

$$\frac{d\Omega^{US}}{d\tau_j} - \left[\frac{d\Omega^{RoW}/d\tau_j}{\sum_g d\Omega^{RoW}/d\tau_g^*}\right] \sum_g \frac{d\Omega^{US}}{d\tau_g^*} = 0.$$

RoW can retaliate by potentially increasing tariffs, $\boldsymbol{\tau^*}$, on all US exports. The (negative of the) term in square brackets represents US bargaining strength with respect to τ_j, $\mu_j \equiv -\frac{d\Omega^{RoW}/d\tau_j}{\sum_g d\Omega^{RoW}/d\tau_g^*}$.

relative *bargaining strength* between US and RoW regarding tariff τ_j. The equilibrium τ_j and τ_g^* under such an agreement are determined endogenously by (13) (and the corresponding expression for RoW).[24] Note that if US is a small country, $\frac{\partial \bar{p}_j}{\partial \tau_j} = 0$, and the interaction in (13) is eliminated.

To quantify the separate influence (in the same district) of specific factor owners in the two sectors, the welfare weight on specific capital employed in import-competing sectors is distinguished from the welfare weight on specific capital employed in the export sector: their welfare weights in district r are denoted, respectively, by $\Gamma_r^{K^M}$ and $\Gamma_r^{K^X}$.

Decomposing the impact of a change in τ_j.

In the import-competing sector, a change in τ_j indirectly affects Ω^{US} through its impact on the domestic price p_j:

$$\frac{\partial \Omega^{US}}{\partial p_j} = \sum_r \Gamma_r^{K^M} n_r^{K^M} \left(\frac{q_{jr}}{n_r^{K^M}} \right) - \frac{\gamma}{n} D_j + \frac{\gamma}{n} \tau_j \bar{p}_j^M M_j', \tag{14}$$

where $n_r^{K^M}$ is employment of specific capital in the M sector in district r. The first term in (14) captures the impact of a change in p_j on producers, the second term its impact on consumer surplus, and the third term the (indirect) effect on tariff revenue $T = \tau_j \bar{p}_j M_j$. A change in τ_j also affects T, and consequently Ω^{US}, both directly and indirectly through its impact on the world price $\bar{p}_j$ as follows:

$$\frac{\partial \Omega^{US}}{\partial \tau_j} = \frac{\gamma}{n} \frac{\partial T}{\partial \tau_j} = \frac{\gamma}{n} \left(\bar{p}_j^M M_j + \frac{\gamma}{n} \tau_j M_j \frac{\partial \bar{p}_j}{\partial \tau_j} \right). \tag{15}$$

Finally, the change in tariffs by US triggers a response by RoW: RoW modifies the tariff on US exports of good g, τ_g^*, which in turn affects g's equilibrium world price. Its collective

[24] Intuitively, a rise in τ_j by US reduces RoW's utility, and the logic of the simple tit-for-tat agreement described earlier is that it allows RoW to compensate for this decline. Let $\Omega^{RoW}(\tau_j, \tau_g^*)$ denote the indirect welfare function for RoW, where $\partial \Omega^{RoW}/\partial \tau_j < 0$ and $\partial \Omega^{RoW}/\partial \tau_g^* > 0$. The agreement would state that $\widehat{\Omega}^{RoW} = \Omega^{RoW}(\tau_j, \tau_g^*)$ for an agreed-upon status quo utility $\widehat{\Omega}^{RoW}$ (and reciprocally for US). Then,

$$\frac{\partial \Omega^{RoW}}{\partial \tau_j} d\tau_j + \frac{\partial \Omega^{RoW}}{\partial \tau_g^*} d\tau_g^* = 0 \quad \Rightarrow \quad \frac{d\tau_g^*}{d\tau_j} = -\frac{\partial \Omega^{RoW}/\partial \tau_j}{\partial \Omega^{RoW}/\partial \tau_g^*}.$$

Note that $d\tau_g^*/d\tau_j$ is essentially the slope of RoW's reaction function evaluated at the equilibrium tariffs ($d\tau_g^*/d\tau_j$ is the quotient of the two expressions in the second term of (13).

impact on producers and consumers of g scattered across US districts is given by

$$\frac{\partial \Omega^{US}}{\partial \overline{p}_g} = \sum_r \Gamma_r^{K^X} n_r^{K^X} \left(\frac{q_{gr}}{n_r^{K^X}} \right) - \frac{\gamma}{n} D_g^X, \tag{16}$$

where $n_r^{K^X}$ is the employment of specific capital in the X sector in district r, $\frac{q_{gr}}{n_r^{K^X}}$ is output per unit of the specific capital, which gets a welfare weight $\Gamma_r^{K^X} n_r^{K^X}$, and $\frac{\gamma}{n}$ is the welfare weight on the representative consumer. The impact of a decrease in the world price of US exports of good g due to a (retaliatory) tariff increase by RoW is the negative of this expression. The solution to the Nash bargaining game is stated in this proposition.

Proposition 3 *The tariff on good j in the two-country bargaining game satisfies*

$$\begin{aligned} \frac{\tau_j}{1+\tau_j} \; = \; & \sum_{r=1}^{R} \frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma} \left(\frac{n}{n_r^{K^M}} \right) \left(\frac{q_{jr}/M_j}{-\delta_j} \right) + \sum_{r=1}^{R} \frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma} \left(\frac{n}{n_r^{K^X}} \right) \mu_j \theta_{jg} \left(\frac{q_{gr}/M_j}{-\delta_j} \right) \\ & - \left(\frac{Q_j/M_j}{-\delta_j} \right) + \frac{1}{1+\epsilon_j^{X^*}} - \mu_j \theta_{jg} \left(\frac{D_g/M_j}{-\delta_j} \right), \end{aligned} \tag{17}$$

where $\tau_j = \frac{(p_j - \overline{p}_j)}{\overline{p}_j}$ is the ad-valorem tariff applied to imports of good j, $\frac{\tau_j}{(1+\tau_j)} = \frac{(p_j - \overline{p}_j)}{p_j}$, $\frac{\sum_r \Gamma_r^{K^M} n_r^{K^M}}{\gamma}$ is the share of the national welfare weight received by specific capital employed in producing the nation's import-competing goods, and $\frac{\sum_r \Gamma_r^{K^X} n_r^{K^X}}{\gamma}$ is the share of the national welfare weight received by specific capital employed in producing the nation's export good. Further, $\gamma = \gamma^L + \gamma^K$, $\delta_j = \epsilon_j^M \left(\frac{1}{\epsilon_j^{X^*}} + 1 \right) < 0$, $\epsilon_j^M = \frac{\partial M_j}{\partial p_j} \frac{p_j}{M_j} < 0$, $\epsilon_j^{X^*} = \frac{\partial X_j^*}{\partial \overline{p}_j} \frac{\overline{p}_j}{X_j^*} > 0$, $\theta_{jg} = \frac{\partial \overline{p}_g / \partial \tau_g^*}{\partial p_j / \partial \tau_j} < 0$, and $\mu_j = -\frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*} > 0$.

Proof Expression (17) is obtained by substituting (14), (15), and (16) into (13), and isolating τ_j. Dividing both sides by $(1+\tau_j) = \frac{p_j}{\overline{p}_j}$ and using the definitions of the import and export elasticities, ϵ_j^M and $\epsilon_j^{X^*}$, respectively, yields (17). The expressions employ the results $\frac{\partial p_j}{\partial \tau_j} = \frac{\epsilon_j^{X^*}}{\epsilon_j^{X^*} - \epsilon_j^M} > 0$ and $\frac{\partial \overline{p}_g}{\partial \tau_g^*} = \frac{\epsilon_g^{M^*}}{\epsilon_g^X - \epsilon_g^{M^*}} < 0$ obtained by differentiating the market clearing conditions $M_j[(1+\tau_j)\overline{p}_j] - X_j^*(\overline{p}_j) = 0$ and $M_g[(1+\tau_g^*)\overline{p}_g] - X_g(\overline{p}_g) = 0$. □

The two terms on the right-hand side of the importers-only (small country) case (9) also appear in (17), except that the absolute import elasticity $-\epsilon_j^M$ is now replaced by $-\delta_j$. In the large country case, $-\delta_j$ incorporates the response along RoW's export supply function as the international price $\overline{p}_j$ changes. The tariff τ_j is lower than it would be in the small country case ($-\delta_j > -\epsilon_j^M$). Three additional terms for the large country case appear in (17).

The first term, $\sum_r \frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma} \left(\frac{n}{n_r^{K^X}}\right) \mu_j \theta_{jg} \left(\frac{q_{gr}/M_j}{-\delta_j}\right) < 0$, is the demand by specific capital owners in the export sector for a reduction in τ_j in response to the threat of retaliation by *RoW* on exports of g ($\theta_{jg} < 0$). The second term, $\frac{1}{1+\epsilon_j^{X*}}$, accounts for the impact of tariffs on the equilibrium world price of good j, and the third term, $-\mu_j \theta_{jg} \left(\frac{D_g/M_j}{-\delta_j}\right) > 0$, is the (beneficial) effect of a retaliatory tariff by *RoW* (in response to an increase in τ_j) for *U.S.* consumers of the exportable.

One goal of the paper is to use tariff (and NTM) data to empirically estimate the welfare weights of (different coalitions of) districts. In the following sections, we take our models to 2002 tariff and NTM data. The results provide new insights into coalitions that potentially determined U.S. trade policy in a defining period–the pre-China shock era.

4 Empirical Strategy and Econometric Specifications

Our empirical strategy is two-fold. First, we use Proposition 2 to estimate welfare weight shares of (coalitions of) districts. This proposition provides micro-foundations for the predictions from the small-country Grossman and Helpman (1994) model. Thus, our welfare weight estimates justify the high estimates of the parameter a in empirical studies of the GH model with U.S. data (Goldberg and Maggi, 1999, Gawande and Bandyopadhyay, 2000). These estimates implied the U.S. "government" placed considerably more weight on consumer welfare than on lobbying contributions by import-competing interests. Second, we use Proposition 3 to estimate both welfare weights on exporting interests and welfare weights on import-competing interests. The weights on exporting interests, empirically motivated by the *Johnson conjecture*, are new to the literature. Estimates of the weights on import-competing interests after conditioning on exporter interests and terms of trade externalities, that is, under the large country assumption, are also a novel contribution.

We use 2002 tariff data, a watershed year in the history of U.S. trade. On December 27, 2001, President Bush signed a proclamation establishing permanent normal trading relations (PNTR) with China, putting an end to the annual reviews of U.S.-China relations mandated by the Jackson–Vanik amendment to the Trade Act of 1974. To American manufacturers, granting MFN status to a large country like China meant that existing tariff protections were insufficient.[25] Import-competing districts mobilized, correctly perceiving China's MFN access to portend a large trade shock. The 107$^{\text{th}}$ Congress moved resolutions to terminate

[25] History had much to do with the pattern of U.S. tariffs – the Kennedy and Tokyo Rounds of tariff cuts through the 1960s and 70s were reflected in the commodity composition of U.S. tariffs in 2002 (see e.g. 2007 World Trade Report (Ch II.D) and Whalley (1985). The tariffs continued until the Trump tariffs of 2017.

China's conditional trade access to the U.S. market.[26] One such resolution, H. J. Res. 50, was referred to the Ways and Means Committee, negatively reported to the floor, and ultimately defeated by a 169-259 vote.[27] Thus, U.S. trade policy in 2002 remained rooted in reciprocal concessions negotiated under earlier GATT Rounds. The will of the legislative coalition of the time was to stay with the status quo. The answer to why the challenges by import-competing districts did not succeed is to be found in the welfare weights they received in that era's legislative bargain. Our estimates reveal districts that were influential (and not so influential) in determining tariffs in the era that presaged the China shock.

Data

As described, the year 2002 is chosen for the window it provides at the inception of the China shock, a subject of intense recent research. Ad valorem tariffs at HS 10 digits are from USTradeOnline, and based on duties collected at customs. Trade data are from the United States International Trade Commission's DataWeb.[28] Import elasticities at 6-digit HS are from Kee et al. (2008). Output and employment data from County Business Patterns (CBP) were converted to the NAICS 3-digit level, and mapped from Metropolitan Statistical Areas and Counties onto 433 congressional districts for the 107$^{\text{th}}$ Congress.[29] The share of workers in district r who own specific factors, $\frac{n_r^K}{n_r}$ is measured under the assumption that compensation to white-collar (non-production) workers are rents due to their specificity, while blue-collar (production) workers who are mobile across sectors earn wages. National manufacturing employment and the proportion of production ($\frac{n^L}{n}$) and non-production workers ($\frac{n^K}{n}$) in each NAICS industry are taken from the Census of Manufacturing. The ratio $\frac{n_r^K}{n_r}$ is computed as the average of the national proportions weighted by district r's NAICS industry employment. District-NAICS employment data are from the Geographical Area Series of the 2000 Census of Manufacturing. Alternative measures of specific factor ownership by industry based on the classification of occupations in manufacturing and services (Autor and Dorn, 2013) are similar in magnitude. These measures, however, are not available at

[26] See Congressional Research Service, CRS Report RL30225, "Most-Favored-Nation Status of the People's Republic of China," June 7, 2001–July 25, 2001: Link (accessed 1/2020).

[27] We analyzed the roll call vote on H.J. Res. 50 using a logit model. The role of exporters in defeating the resolution on the House floor was significant. Controlling for partisanship, representatives from Congressional Districts (CDs) whose employment share in the export-oriented computers (NAICS 334) industry was in the top quartile across the 435 CDs were almost twice as likely to vote "Nay" on H. J. Res. 50 as representatives from districts in the lowest quartile (odds ratio 0.54, z-stat$=-2.09$; p-value$=0.04$).

[28] See USITC DataWeb.

[29] The sample accounts for 77% of U.S. manufacturing output in 2002. Due to non-disclosure restrictions, the Census does not report any data for two of the 435 congressional districts. In other cases of non-disclosure, we impute missing district-industry output data using district-industry employment data (17 percent of the sample). See also Online Appendix C.

the district level.

4.1 Small Open Economy Case: Import Competing Interests

Specification

The small country case is the setting for the majority of empirical studies of trade protection. The building block of our empirical strategy is to estimate the welfare weight shares $\frac{\Gamma_{jr}^K n_{jr}^K}{(\gamma^K+\gamma^L)}$ using equation (9). Expressing the demand-for-protection term in (9) with district r's output-to-imports ratios $\frac{q_{jr}}{M_{jr}}$, the tariff equation can be written as:

$$\begin{aligned} \frac{\tau_j}{1+\tau_j} &= \sum_{r=1}^{R} \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} \frac{n}{n_{jr}^K} \left(\frac{q_{jr}/M_j}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right) \\ &= \sum_{r=1}^{R} \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} \frac{n_r}{n_r^K} \left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right). \end{aligned} \tag{18}$$

For the small country case, (18) provides the basis for industry-district welfare weights implied by the observed vector of tariffs. We estimate the relative welfare weights $\frac{\Gamma_{jr}^K n_{jr}^K}{\gamma}$ using the econometric specification:

$$\frac{\tau_j}{1+\tau_j} = \sum_{r=1}^{R} \beta_r \left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) + \alpha \left(\frac{Q_j/M_j}{-\epsilon_j}\right) + u_j, \tag{19}$$

with $\beta_r \geq 0$.[30] The coefficient α on the national output-import ratio scaled by absolute import elasticity is constrained to -1.

[30] In a recent paper Adao et al. (2023), following the regional structure similar to our paper (with states rather than districts), attempt to estimate the underlying welfare weights that rationalize observed decisions. Adao et al. (2023) consider trade taxes on (net) imports by sector. Both taxes and subsidies are possible on imports and exports. Our choice to focus on non-negative import tariffs is based on a historical regularity: neither export taxes nor import subsidies–negative values of the dependent variable–have been used in U.S. manufacturing in the post-WWII period (such subsidies and taxes may be incorporated in our model by admitting negative welfare weights). The crucial role of exporters, which has eluded political economy models, plays an important role in lowering tariffs on U.S. manufacturing imports in our model.

Under the assumption of no factor mobility across sectors and regions (as we also assume) Adao et al. (2023) estimate "the marginal change in the real earnings of a given individual relative to the average earnings change in the population associated with a marginal increase in the (net) imports m_g of good g", as the mechanism determining tariffs. In our model, this is the difference between district-level production and average production, which measures a range of influences and consolidates all the effects that we consider separately in our specification.

Their IV strategy follows Trefler (1993) and Goldberg and Maggi (1999) to predict trade due to forces other than trade policy. IV and OLS estimates are similar, indicating low simultaneity bias. Our identification strategy introduces new Bartik-like IVs to the literature. OLS and IV estimates differ in how the weights are distributed across sectors and regions.

The relative welfare weights are under-determined: the R parameters β_r do not uniquely determine the $2 \times (J \times R)$ industry-district welfare weights $\Gamma_{jr}^K n_{jr}^K$ and $\Gamma_{jr}^L n_{jr}^L$. We assume the welfare weights of specific capital owners have no within-region variation. That is, the welfare of specific capital owners employed in all goods j produced in district r receive the same weight, $\Gamma_{jr}^K = \Gamma_r^K$.[31] If weights were assigned based on each factor owner's voting strength, this assumption is plausible. The corresponding assumption for owners of labor, $\Gamma_{jr}^L = \Gamma_r^L$, is due to their mobility. Then, the coefficient β_r is

$$\beta_r = \frac{\Gamma_r^K n_r^K}{\gamma} \frac{n_r}{n_r^K} = \frac{\Gamma_r^K n_r^K}{\left(\sum_r \Gamma_r^K n_r^K + \sum_r \Gamma_r^L n_r^L\right)} \frac{n_r}{n_r^K}, \tag{20}$$

where $\frac{n_r}{n_r^K}$ is the inverse of the proportion of district r's population that are specific capital owners. There are $2R$ parameters, Γ_r^K and Γ_r^L, but for our purpose it is sufficient to recover $(R+1)$ parameters: R welfare weights on specific capital in each district, $\Gamma_r^K n_r^K$, and the collective economy-wide welfare weight on labor, $\gamma^L = \sum_r \Gamma_r^L n_r^L$. This is straightforward with estimates of β_r in hand.

Coalitions of Districts

The number of parameters $\{\Gamma_r^K, \Gamma_r^L\}$, $r = 1, \ldots, R$, exceeds the degrees of freedom in our sample.[32] Consistent with the idea that legislative bargaining occurs among coalitions of districts, we reduce R by aggregating districts into (stylized) coalitions. Our estimates are thus welfare weights on factors owners in each coalition. We consider two sets of coalitions founded, respectively, on (i) *political geography* reflecting the spatial clustering of industries in districts, and (ii) *purely political* coalitions based both on the competitiveness of the state in the 2000 presidential election and whether the district's election was competitive or safe for incumbent Democratic or Republican representatives. The second grouping captures the variety of electoral incentives faced by local representatives, parties, and the president. While stylized, these coalitions are nevertheless plausible. Without loss of generality, we continue to use R to denote the number of coalitions of districts, or "regions" and r to index the regions.

[31] Lobbying structure distinguishing specific capital across goods is a potential direction of future research.

[32] As described, output data for the 433 districts in the sample are most completely available at NAICS 3-digits (NAICS-332 Printing and Related Support Activities, is a non-tradable sector and is dropped) comprising twenty manufacturing industries. This is the upper bound on the number of estimable parameters.

Identification

Arguably, the regressors $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$ are endogenous: in the specification (19), shocks to the tariff τ_j can move the output-to-import ratio $\frac{q_{jr}}{M_{jr}}$ in region r. Shocks that increase the tariff can lower M_{jr} and increase q_{jr}; negative tariff shocks, by liberalizing trade, can have the opposite effect. The endogeneity can cause bias in OLS estimates of the R coefficients $\beta_r, r = 1, \ldots, R$.

Our strategy to identify coefficients on the endogenous regressors $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$ employs Bartik-like instruments (Bartik, 1991, Goldsmith-Pinkham et al., 2020). In Bartik (1991), the impact of county-level employment changes on wages is not identified because local policy (reverse causality), shifts in local labor supply (simultaneity), and unobserved local growth factors affect this relationship. Bartik isolates exogenous variation in county employment rates using the fact that national trends in manufacturing employment rates differentially impact county employment rates because of their pre-existing industrial structure. Their share of employment in manufacturing, being historically determined, remains invariant to local shocks. Blanchard et al. (1992), Card (2009), and Autor et al. (2013) are examples of the use of Bartik-like IVs with continuous treatment exposures.

Our Bartik-like IVs isolate exogenous variation in a region's output-to-import ratio for good j using the overall output-to-import ratios for each of the R regions. To construct Bartik instrumental variables (BIVs), we start by decomposing good j's overall import-to-output ratio using the accounting identity

$$\frac{M_j}{Q_j} = z_{j1}\frac{M_{j1}}{q_{j1}} + z_{j2}\frac{M_{j2}}{q_{j2}} + \ldots\ldots + z_{jR}\frac{M_{jR}}{q_{jR}},$$

where z_{jr} is region r's share of output Q_j, where for each j, $\sum_{r=1}^{r=R} z_{jr} = 1$. The weights $\{z_{jr}\}$ are constructed using output data for each regional bloc. The BIV for the endogenous variable $\frac{q_{j1}}{M_{j1}}$, that is, region 1's output-to-import ratio for good j, is constructed as follows. Rewrite the identity as

$$\frac{M_{j1}}{q_{j1}} = \frac{1}{z_{j1}}\frac{M_j}{Q_j} - \frac{z_{j2}}{z_{j1}}\frac{M_{j2}}{q_{j2}} - \ldots\ldots - \frac{z_{jR}}{z_{j1}}\frac{M_{jR}}{q_{jR}}, \tag{21}$$

and decompose region r's import penetration $\frac{M_{jr}}{q_{jr}}$ and national import penetration $\frac{M_j}{Q_j}$ as

$$\frac{M_{jr}}{q_{jr}} = \frac{M_r}{q_r} + \widetilde{\frac{M_{jr}}{q_{jr}}}, \text{ and } \frac{M_j}{Q_j} = \frac{M}{Q} + \widetilde{\frac{M_j}{Q_j}},$$

where $\frac{M_r}{q_r}$ is region r's overall import-output ratio and $\widetilde{\frac{M_{jr}}{q_{jr}}}$ is the idiosyncratic good-region component. Similarly, $\frac{M}{Q}$ is the nation's aggregate import-output ratio and $\widetilde{\frac{M_j}{Q_j}}$ the idiosyncratic component. The BIV for $\frac{M_{j1}}{q_{j1}}$ is formed by using the non-idiosyncratic components on the right-hand side of (21) as

$$\left(\frac{M_{j1}}{q_{j1}}\right)^{BIV} = \frac{1}{z_{j1}}\frac{M}{Q} - \frac{z_{j2}}{z_{j1}}\frac{M_2}{q_2} - \ldots\ldots - \frac{z_{jR}}{z_{j1}}\frac{M_R}{q_R}.$$

The general BIV for regressor $\frac{M_{jr}}{q_{jr}}$ is

$$\left(\frac{M_{jr}}{q_{jr}}\right)^{BIV} = \frac{1}{z_{jr}}\frac{M}{Q} - \sum_{d=1}^{d=R}\frac{z_{jd}}{z_{jr}}\frac{M_d}{q_d}, \tag{22}$$

where the sum is taken over $d \neq r$.

The BIV avoids the correlation between the idiosyncratic component of $\frac{M_{jr}}{q_{jr}}$ and the structural error u_j. An unobservable variable that shocks the idiosyncratic component of $\frac{M_{jr}}{q_{jr}}$ and τ_j, causing endogeneity, is eliminated (Goldsmith-Pinkham et al., 2020, p. 2593). Any simultaneity bias or reverse causality between τ_j and $\frac{M_{jr}}{q_{jr}}$ that arises from the impact of τ_j on the idiosyncratic component of $\frac{M_{jr}}{q_{jr}}$, but not on the stable component, is eliminated. The identifying assumptions may be clearly described in a model with $R = 2$ regions (Goldsmith-Pinkham et al., 2020). Then, $z_{j1} = 1 - z_{j2}$ and the BIV is

$$\left(\frac{M_{j1}}{q_{j1}}\right)^{BIV} = \frac{1}{z_{j1}}\left(\frac{M}{Q} - \frac{M_2}{q_2}\right) + \frac{M_2}{q_2}$$

The research design inherent in this 2-region case is that the (inverse) share $\frac{1}{z_{j1}}$ measures exposure to a "policy" that affects region 1, and where the difference between the national import-output ratio and region 2's import-output ratio of good j, $\left(\frac{M}{Q} - \frac{M_2}{q_2}\right)$, is the size of the "policy". Instrumenting $\frac{M_{j1}}{q_{j1}}$ in the first stage with $\left(\frac{M_{j1}}{q_{j1}}\right)^{BIV}$ achieves identification from the differential *exogenous* exposure $\frac{1}{z_{j1}}$. Strict exogeneity of the inverse share is the identifying assumption. In the 2-region example, this implies that the differential effect of higher exposure of one region affects the change in the outcome τ_j only through the endogenous variable $\frac{M_{j1}}{q_{j1}}$ and not through any confounding channel. This is consistent with the theory from which specification (19) is derived. Since the policy shock $\left(\frac{Q}{M} - \frac{q_2}{M_2}\right)$ is constant across goods j, the identifying variation comes solely from differential exposure for each region separately. In our more general case in (18), with R endogenous variables, each is associated with one BIV, and their coefficients are exactly identified.[33]

4.2 Large Open Economy Case: Exporting Interests

Specification

How significant were U.S. export interests in the minds of policymakers determining 2002 U.S. tariffs? The share of the aggregate welfare weight received by specific capital employed in producing the export good g, $\frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma}$, quantifies the impact of export interests in liberalizing trade. By estimating this expression, we contribute to the political economy of trade policy literature a new answer to this key question.

An econometric specification to estimate the relative welfare weights $\frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma}$ and $\frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma}$ based on Proposition 3 is

$$\begin{aligned} \frac{\tau_j}{1+\tau_j} \;\; &= \;\; \sum_{r=1}^{R} \beta_r \left(\frac{q_{jr}/M_{jr}}{-\delta_j}\right) + \beta^X \left(\mu_j \theta_{jg} \frac{Q_g/M_j}{-\delta_j}\right) \\ &\quad + \alpha \left(\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X^*}} + \mu_j \theta_{jg} \frac{D_g/M_j}{-\delta_j}\right) + u_j, \end{aligned} \tag{23}$$

where $\beta_r \geq 0$ and $\beta^X \geq 0$.[34] The $(R+1)$ coefficients $\beta_r = \frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma} \frac{n_r}{n_r^{K^M}}$ and $\beta^X = \frac{\Gamma^{K^X} n}{\gamma}$ are estimable with our data. Elasticity measures are from Nicita et al. (2018) (NOP). The variable $\delta_j = \epsilon_j^M \left(\frac{1}{\epsilon_j^{X^*}} + 1\right)$ is computed at HS 6-digits using NOP's estimates of the elasticity of *RoW*'s export supply of good j to the U.S., $\epsilon_j^{X^*}$, and good j's U.S. import demand elasticity, ϵ_j^M. In (17), $\frac{D_g}{M_j}$ and $\frac{q_{gr}}{M_j}$ are ratios of quantities of different goods, while their data are in values.[35] Multiplying by the price ratio $\frac{\overline{p}_g}{p_j}$ converts them to ratios of values.

Using $\frac{\partial p_j}{d\tau_j} = \frac{\epsilon_j^{X^*}}{\epsilon_j^{X^*} - \epsilon_j^M} > 0$ and $\frac{d\overline{p}_g}{d\tau_g^*} = \frac{\epsilon_g^{M^*}}{\epsilon_g^X - \epsilon_g^{M^*}} < 0$, we denote $\theta_{jg} = \frac{d\overline{p}_g/d\tau_g^*}{dp_j/d\tau_j}$. Let $\theta_{jg} = \widetilde{\theta}_{jg} \times \frac{\overline{p}_g}{p_j}$, where

$$\widetilde{\theta}_{jg} = \frac{p_j/\overline{p}_j}{p_g^*/\overline{p}_g} \times \frac{\frac{\epsilon_g^{M^*}/\epsilon_g^X}{1-\epsilon_g^{M^*}/\epsilon_g^X}}{\frac{1}{1-\epsilon_j^M/\epsilon_j^{X^*}}} < 0. \tag{24}$$

In this expression, $\epsilon_g^{M^*}$ is *RoW*'s import demand elasticity for good g and ϵ_g^X is its US export supply elasticity, and ϵ_j^M and $\epsilon_j^{X^*}$ are defined correspondingly for U.S. import good j. Note that $\widetilde{\theta}_{jg}$ is unit-free and $\frac{\overline{p}_g}{p_j}$ converts $\frac{D_g}{M_j}$ to the ratio of measurables $\frac{\overline{p}_g D_g}{p_j M_j}$.[36] We use NOP's

[33]The output-to-import ratios $\frac{q_{jr}}{M_{jr}}$ in (18) are instrumented using $\left(\frac{q_{jr}}{M_{jr}}\right)^{BIV}_{,}$ the inverse of (22).

[34]Weights are constrained to be non-negative. Import subsidies on the j-goods and export tax on good g, which can lead to negative tariffs, are both disallowed.

[35]Other ratios in (17) have the same good in the numerator and denominator.

[36]See Online Technical Appendix B for more details. The numerator is negative since $\epsilon_g^{M^*} < 0$.

estimates for ϵ_g^{M*} (RoW's import demand elasticity of good g) and ϵ_g^X (US export supply elasticity of exports of good g to RoW) to measure $\widetilde{\theta}_{jg}$.

Additionally, model (23) imposes $\alpha = -1$. In going from Proposition 3 to (23) we assume that owners of specific capital employed in producing the export good g coalesce nationally, equalizing welfare weight of every specific capital owner in the export sector, that is, $\Gamma_r^{K^X} = \Gamma^{K^X}$.[37] We will estimate the relative welfare weights $\frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma}$ and $\frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma}$ by 2SLS using the Bartik-like IVs described in Section 4.1.

5 Results: Trade Policy Influencers

Welfare weights in both models (19) and (23) are estimated for two stylized legislative coalitions: (1) geography-based coalitions, and (2) coalitions based on electoral dynamics.

5.1 Geography-Based Coalitions

Table 1 presents descriptive statistics of the variables in the small- and large-country regression models (19) and (23) with the nine ($R = 9$) geographic regional "coalitions." The first two columns show the number of districts and the employment shares in each region.

Table 1: Descriptive Statistics: Variable Means

	Small Country			Large Country
	Districts	$\frac{n_r}{n}$	$\frac{q_{jr}/M_{jr}}{-\epsilon_j}$	$\frac{q_{jr}/M_{jr}}{-\delta_j}$
New England	23	0.060	1.11	0.59
Mid-Atlantic	65	0.125	1.35	0.72
East North Central	73	0.243	1.22	0.63
West North Central	31	0.067	1.39	0.75
South Atlantic	75	0.139	1.72	0.95
East South Central	26	0.060	1.59	0.82
West South Central	47	0.096	1.39	0.73
Mountain	24	0.043	1.26	0.65
Pacific	69	0.167	1.11	0.58
$\frac{Q_j/M_j}{-\epsilon_j}$			1.33	
$\mu_j\,\theta_{jg}\,\frac{Q_g/M_j}{-\delta_j}$				−0.13
$\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X*}} + \mu_j\,\theta_{jg}\,\frac{D_g/M_j}{-\delta_j}$				0.31
N		9,454		8,735

Notes: (1) $\frac{n_r}{n}$ is the total employment shares for each region r. (2) In the Large Country case, the export sector NAICS=334 (Computers) is not in the sample, so $N = 8735$. (3) The 433 districts (out of the 435) for which we assembled output, trade, protection, and employment data are classified into nine geographical blocs according to the U.S. Census. **Division 1**: New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont). **Division 2**: Mid-Atlantic (New Jersey, New York, and Pennsylvania). **Division 3**: East North Central (Illinois, Indiana, Michigan, Ohio, and Wisconsin). **Division 4**: West North Central (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota). **Division 5**: South Atlantic (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, and West Virginia). **Division 6**: East South Central (Alabama, Kentucky, Mississippi, and Tennessee). **Division 7**: West South Central (Arkansas, Louisiana, Oklahoma, and Texas). **Division 8**: Mountain (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming). **Division 9**: Pacific (Alaska, California, Hawaii, Oregon, and Washington). The column "Districts" indicates the number of districts in each "coalition."

[37] Access to disaggregate geographic area series from the U.S. Census, which remains confidential and not publicly available, would enlarge the set of estimable parameters.

Table 2.1 reports 2SLS estimates of coefficients β_r in (19) (the small country case) and (23) (the large country case), respectively. The coefficients are constrained to be non-negative, as import subsidies and export taxes are ruled out. The small country model (19) requires the coefficient of $\frac{Q_j/M_j}{-\epsilon_j}$ to be constrained to -1, and the large country model (23) requires the same constraint on the coefficient of $\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X*}} + \mu_j\,\theta_{jg}\frac{D_g/M_j}{-\delta_j}$.

Consider, first, the *small country* case. The majority of empirical studies of protectionism have been predicated on the small country assumption, most notably the tests of the Grossman and Helpman (1994) model. The 2SLS estimates indicate positive welfare weights on specific capital employed in producing import-competing goods in eight of the nine regions (coalitions of districts).[38] One interpretation of the 2SLS coefficients is that they reveal coalitions of districts that influence tariff-making (positive coefficients) versus coalitions of districts that do not move the agenda and are expendable (zero). The new contribution of these estimates is the insight they will provide into the results of previous (small-country) tests of the Grossman-Helpman model when these estimates are translated into welfare weights on owners of specific capital in these districts.

With multiple endogenous regressors, the weak-instruments problem arises if the IVs are strongly correlated. The first-stage Kleibergen-Paap weak IV test reported in Table 2.1 shows no weak-instruments problem with the BIVs. Each BIV has independent (of other BIVs) exogenous variation. Further, the first-stage regressions reported in Table 2.2 indicate that the BIVs are able to isolate significant *individual* exogenous variation in each regressor. There is therefore a strong theoretical and empirical case for the use of Bartik-like IVs founded on heterogeneous regional structures.

[38]Errors are clustered at the HS 2-digit level of 94 goods. Evidence for clustering of the 9454 HS 8-digit tariffs at a more aggregate level is in Conconi et al. (2014) and also implied by the vast number of industry-level studies of protection. Presumably, these are administratively translated to HS 8-digit by replicating the clustered tariff at this "line level." Abadie et al. (2023) suggest that the decision to cluster and at what level be determined by both sampling and design. The HS 8-digit sample is the entire population tariff line products. Unlike field experiments which (randomly) sample micro-units from a few clusters in a population, our sample includes all clusters of the population of interest. The first step in accounting for clustering is to determine the clustering in the population. Based on the account of policymakers and the above studies, it is reasonable to suppose that tariff decisions are taken up in clusters of (the 94) HS 2-digit level product groups. That is, "assignment to treatment" by policymakers, which is unobserved, occurs at HS 2-digits. Abadie et al. (2023) suggest that the decision to cluster standard errors depends on whether this within-cluster assignment is perfectly correlated (in which case, use clustered standard errors), uncorrelated (that is, random assignment, in which case use cluster-robust standard errors) or imperfectly correlated (use the Abadie et al. (2023) bootstrap procedure). We consider the assignment within HS 2 digits to be nearly perfect (for example, within the HS 2-digit Apparel and Textile group, *all* HS 8-digit units are assigned to treatment and receive a positive tariff outcome (which may be different across the 8-digit units). This errs on the conservative side, so standard errors are overstated compared to the zero correlation or imperfect correlation cases.

Table 2.1: 2SLS Estimates of Coefficients in (19) and (23) for Geography-based Coalitions
Dependent Variable: *Applied Tariff, 2002*

	Small Country Eq. (19)	$\frac{Q_{gr}}{Q_r}$	Large Country Eq. (23)
β_1: New England	0.067 (0.027)	0.21	0
β_2: Mid-Atlantic	0.163 (0.012)	0.10	0
β_3: East North Central	0.216 (0.025)	0.04	0
β_4: West North Central	0.063 (0.009)	0.08	0.292
β_5: South Atlantic	0.140 (0.008)	0.09	0.264 (0.020)
β_6: East South Central	0.089 (0.020)	0.03	0
β_7: West South Central	0.073 (0.010)	0.12	0.060 (0.017)
β_8: Mountain	0	0.25	0
β_9: Pacific	0.214 (0.019)	0.25	0
β^X: $\mu_j \, \theta_{jg} \, \frac{Q_g/M_j}{-\delta_j}$			3.243 (0.359)
α: $\frac{Q_j/M_j}{-\epsilon_j}$	-1		
α: $\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X*}} + \mu_j \, \theta_{jg} \, \frac{D_g/M_j}{-\delta_j}$			-1
N	9454		8735
First Stage Statistics			
Anderson-Rubin χ^2(10 df)	2949.0		2010.0
Anderson-Rubin p-value	(0.00)		(0.00)
Kleibergen-Paap weak IV	102.5		937.5

Notes: (1) Standard errors in parentheses, clustered at 2-digit HS. (2) α is constrained to equal -1 required by expressions (19) and (23). (3) Expressions (19) and (23) require dropping the constant term in the regressions. (4) $\frac{Q_{gr}}{Q_r}$ is the share of the output of the export industry COMPUTER (3-digit NAICS=334) for coalition r. (5) Larger shares (blue) suggest export coalitions. (6) In the **large country case**: (i) unconstrained estimates of β_1, β_2, β_3, β_6, β_8, and β_9 are negative and constrained to zero to disallow import subsidies or export taxes. (ii) μ_j is assumed to equal 1 (equal bargaining strength) for all j. (iii) θ_{jg} is calculated as indicated in expression (24).

What do the small country 2SLS estimates imply about the distribution of welfare weights across owners of specific capital in the nine regions? Table 3 provides the answer. The welfare weight on an owner of specific capital relative to an owner of mobile labor, $\frac{\Gamma_r^K}{\Gamma_r^L}$, measures the importance granted to the interests of specific capital owners in the tariff determination process. In regions with $\frac{\Gamma_r^K}{\Gamma_r^L} > 1$, the welfare of (the pool of) specific capital owners receives a weight greater than their population share. Intuitively, their tariff preference gets more weight than the tariff preference of regions where $\frac{\Gamma_r^K}{\Gamma_r^L} \leq 1$. In five of the nine regions, specific capital receives more favorable treatment. Section 2.2 described one way of reconciling findings from empirical investigations of the Grossman-Helpman model with the small country case findings here. Previous investigations effectively found that the economy-wide estimate of $\frac{\Gamma^K}{\Gamma^L}$ was close to 1. Our model with heterogeneous districts "deconstructs" this result and finds that specific capital owners in some regions get "represented" (those with $\frac{\Gamma_r^K}{\Gamma_r^L} > 1$) while specific capital owners in regions with $\frac{\Gamma_r^K}{\Gamma_r^L} \leq 1$) do not. Another way of understanding the high estimates of the parameter a in the Grossman-Helpman model (the rate at which a dollar of welfare is traded for a dollar of contributions) is this: if specific capital owners

Table 2.2: First Stage Regressions for **Small** Country results in Tables 2.1 and 3.
Using Bartik IVs (BIV) constructed as in expression expression (22)

	Endogenous Variables: $\frac{q_{j1}/M_{j1}}{-\epsilon_j}$ Region 1 New England	$\frac{q_{j2}/M_{j2}}{-\epsilon_j}$ Region 2 Mid-Atlantic	$\frac{q_{j3}/M_{j3}}{-\epsilon_j}$ Region 3 E-N Central	$\frac{q_{j4}/M_{j4}}{-\epsilon_j}$ Region 4 W-N Central	$\frac{q_{j5}/M_{j5}}{-\epsilon_j}$ Region 5 S Atlantic	$\frac{q_{j6}/M_{j6}}{-\epsilon_j}$ Region 6 E-S Central	$\frac{q_{j7}/M_{j7}}{-\epsilon_j}$ Region 7 W-S Central	$\frac{q_{j9}/M_{j9}}{-\epsilon_j}$ Region 9 Pacific
$\frac{1}{-\epsilon_j}\cdot(q_{j1}/M_{j1})^{BIV}$	-1.616	-2.425	-1.913	-5.815	-1.61	-0.86	-3.149	-2.052
	(2.240)	(2.550)	(1.990)	(3.360)	(1.960)	(1.020)	(4.280)	(3.160)
$\frac{1}{-\epsilon_j}\cdot(q_{j2}/M_{j2})^{BIV}$	5.338	4.383	6.953	14.47	0.663	-6.719	5.075	4.824
	(1.710)	(1.000)	(1.860)	(2.200)	(0.160)	(1.090)	(1.730)	(1.760)
$\frac{1}{-\epsilon_j}\cdot(q_{j3}/M_{j3})^{BIV}$	5.683	6.957	12.03	21.93	9.779	12.26	12.85	8.411
	(2.880)	(2.640)	(4.630)	(5.640)	(3.120)	(4.140)	(4.600)	(3.840)
$\frac{1}{-\epsilon_j}\cdot(q_{j4}/M_{j4})^{BIV}$	2.361	2.696	2.804	6.338	2.386	2.183	3.256	2.985
	(3.950)	(3.260)	(3.770)	(5.150)	(2.350)	(2.550)	(4.140)	(4.120)
$\frac{1}{-\epsilon_j}\cdot(q_{j5}/M_{j5})^{BIV}$	-5.958	-8.479	-12.30	-21.00	-4.367	-6.22	-11.29	-6.915
	(2.620)	(2.630)	(4.540)	(4.730)	(1.250)	(1.860)	(3.990)	(2.840)
$\frac{1}{-\epsilon_j}\cdot(q_{j6}/M_{j6})^{BIV}$	1.099	1.612	2.338	4.221	0.92	1.18	2.164	1.291
	(2.310)	(2.440)	(4.230)	(4.650)	(1.250)	(1.750)	(3.710)	(2.520)
$\frac{1}{-\epsilon_j}\cdot(q_{j7}/M_{j7})^{BIV}$	-10.30	-9.468	-15.91	-31.53	-17.07	-13.50	-13.52	-12.53
	(4.030)	(2.540)	(4.840)	(5.810)	(4.090)	(3.810)	(3.820)	(4.160)
$\frac{1}{-\epsilon_j}\cdot(q_{j8}/M_{j8})^{BIV}$	-1.519	-1.917	0.713	-2.746	-0.831	2.278	0.0162	-1.846
	(1.570)	(1.360)	(0.400)	(1.000)	(0.740)	(1.100)	(0.010)	(2.010)
$\frac{1}{-\epsilon_j}\cdot(q_{j9}/M_{j9})^{BIV}$	14.83	12.6	11.72	37.65	17.81	7.793	5.019	17.81
	(3.380)	(1.940)	(1.740)	(3.030)	(3.510)	(1.170)	(0.890)	(3.980)
Constant	-6.288	-2.165	-1.654	-14.47	-2.532	6.016	3.508	-7.923
	(1.930)	(0.460)	(0.340)	(1.640)	(0.690)	(1.070)	(0.890)	(2.600)
N	9,454	9,454	9,454	9,454	9,454	9,454	9,454	9,454
R^2	0.516	0.454	0.587	0.547	0.769	0.508	0.529	0.443

Note: (i) t-values in parentheses. Errors clustered at HS 2-digits. (ii) Nine Bartik-like IVs for each endogenous variable $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$, $r = 1,\dots,9$ constructed as in (22) (iii) The import elasticity ϵ_j is assumed constant (exogenous), and the BIVs are scaled by $-\epsilon_j$ after they are constructed. (iv) The BIVs in (22) are constructed for M_{jr}/q_{jr}, while the endogenous variables are their inverse q_{jr}/M_{jr}. The inverse of the BIVs in (22) are therefore the Bartik-like IVs $(q_{jr}/M_{jr})^{BIV}$, $r = 1,\dots,9$, used in the 2SLS estimation (and the first stage estimates here). (v) See notes and weak-instrument statistics in Table 2.1.

Table 3: Welfare Weights on Specific Capital Owners (from 2SLS Estimates, Table 2.1)
Dependent Variable: *Applied Tariff, 2002*

Region	Small Country		Large Country			
	K_r-share (estimated)	$\frac{\Gamma_r^K}{\Gamma^L}$	K_r^M-share (estimated)	$\frac{\Gamma_r^{K^M}}{\Gamma^L}$ (imputed)	K^X-share	$\frac{\Gamma^{K^X}}{\Gamma^L}$
1. New England	0.023	1.136	0	0		
2. Mid-Atlantic	0.051	1.314	0	0		
3. East North Central	0.063	0.899	0	0		
4. West North Central	0.019	0.941	0.075	4.646		
5. South Atlantic	0.040	1.019	0.063	2.036		
6. East South Central	0.024	1.493	0	0		
7. West South Central	0.023	0.766	0.016	0.675		
8. Mountain	0	0	0	0		
9. Pacific	0.073	1.300	0	0		
Agg./Relative Weights	0.316		0.154		0.204	3.485

Notes: (1) **Small country case**: Specific capital employed in import-competing sectors determine tariffs. The proportion of non-production workers in a NAICS 3-digit industry measures the proportion of specific capital owners in the industry. The weighted average of these proportions (weights are region r's output composition across the NAICS 3-digit industries), measures the proportion of region r's population that are specific capital owners $\frac{n_r^K}{n_r}$. In the Table, (i) K_r-share is the proportion of the national weight placed on region r's specific capital owners, $\gamma_r^K = \frac{\Gamma_r^K n_r^K}{\sum_r \Gamma_r^K n_r^K + \Gamma^L n^L}$, where $n^L = \sum_r n_r^L$ and Γ^L is invariant across regions. (ii) The aggregate share of weights on specific capital $\sum_r \gamma_r$ is 0.316. The remainder, 0.682, is the aggregate weight on labor's welfare γ^L. (iii) Relative weights $\frac{\Gamma_r^K}{\Gamma^L}$ are calculated by dividing K_r-share by the aggregate labor weight share and multiplying by $\frac{n^L}{n_r^K}$. (2) **Large country case**: Specific capital employed in both import-competing and export-producing sectors. Aggregate weight on agents' welfare is $\gamma = \sum_r \Gamma_r^{K^M} n_r^{K^M} + \Gamma_r^{K^X} n_r^{K^X} + \sum_r \Gamma_r^L n_r^L$. The proportion of region r's population owning specific capital in the import-competing and export sectors $\frac{n_r^{K^M}}{n_r}$ and $\frac{n_r^{K^X}}{n_r}$, respectively, are determined similarly as in the small country case above. In the Table, (i) K_r^M-share is the proportion of the national weight placed on region r's specific capital owners employed in manufacturing import-competing goods, $\frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma}$. The welfare-weight share of specific capital employed in import-competing goods is 0.154 (in contrast to 0.316 in the small-country case). (ii) K^X-share is the share of aggregate welfare weight placed on specific capital employed in the export industry "COMPUTER," $\frac{\Gamma^{K^X} n^{K^X}}{\gamma}$, where n^{K^X} is the total employment of specific capital in "COMPUTER." From Table 2.1, $\widetilde{\beta}^X = 3.243$, the estimate for $\frac{\Gamma^{K^X} n}{\gamma}$ from (23). Multiplying by $\frac{n^{K^X}}{n} = 0.063$ yields the share 0.204 reported in the bottom row. The remainder $1 - 0.154 - 0.204 = 0.642$ is the aggregate weight share of labor. (iii) The relative weights $\frac{\Gamma_r^{K^M}}{\Gamma^L}$ are calculated as described in the small country case.

that were organized as lobbies (i.e. campaign contributors in the Grossman-Helpman model) were not in the winning legislative coalition, their demand for protection would be ignored. Thus, the legislative process blunts the impact of lobbying spending.

Whose preferences get represented and why? A legislative bargaining answer is that it takes these five regions to create a winning coalition, that is, get "represented." Specific capital owners in the Mid-Atlantic, East South Central, South Atlantic, and Pacific regions receive the most favorable treatment relative to mobile factor owners. Viewed through this lens, the median district belongs to the South Atlantic region. Adding up the number of districts from Table 1 in descending order of $\frac{\Gamma_r^K}{\Gamma_r^L}$ indicates the 218$^{\text{th}}$ district is in region 5. Districts in the remaining regions (3, 4, 7, 8) are inessential and the preferences of specific capital owners residing there are ignored. A free-trade bias in the agenda setter's tariffs is in evidence, as the populous districts in the industrial East North Central region, most in need of protection, are left out of the winning coalition.

The *large country* case featuring export interests significantly alters this picture. In the econometric specification (23), the interests of specific capital employed in the export sector - Computers industry ("COMP"), classified as NAICS 3-digit code 334 - compete with import-competing interests employed in the remaining 3-digit NAICS industries.[39] The 2SLS estimates reported in Table 2.1 are the basis for the welfare weights estimated in Table 3.[40] The "K_r^M-share" column shows that specific capital owners employed in import-competing goods in all but the three regions–West North Central, South Atlantic, and West South Central–get zero welfare weight. The countervailing effect of export interests is most deeply felt in the overall impact of import-competing interests. The share of the welfare weight to K^M owners in the aggregate drops sharply from 0.316 in the small country case to 0.154. The second significant finding is the high welfare weight share to K^X owners, equal to 0.204. Specific capital on both sides of tariff protection get a total welfare weight share equal to 0.358.[41]

A legislative bargaining interpretation of this result is that the presence of anti-protection export interests reduces the need to satisfy coalitions of protectionist districts. Thus, the agenda setter needs to add only "cheap dates" to exporter coalitions and ignore the strong demands for protection from districts in the East North Central region, which receive zero weight. From this lens, a strategy for the agenda setter is to form a majority by first including all export-oriented regions and then adding protection-seeking regions needed to get a majority in the cheapest way possible. Based on the share of the export industry COMP in the region's total manufacturing output (in the $\frac{Q_{gr}}{Q_r}$ column in Table 2.1), the export bloc consists of New England, Mountain, and Pacific, totaling 116 districts. The agenda setter only needs to satisfy the protectionist demands of regions 4 and 5 (106 more districts) for a majority. Relative to the industrial Midwest (East North Central region) where the demand for protection is the most intense, these "cheaper dates" produce a majority that puts East

[39]Our model follows the tradition of one-way trade models (Grossman and Helpman, 1994), where either the good/industry is entirely import-competing or exporting, but not both. A significant extension would model industry with two-way trade in differentiated goods (Krugman, 1981).

[40]The full first stage regressions for the large country model are in Appendix Table A.3.

[41]With exporters, even fewer specific capital owners in import-competing industries get represented (those in regions with $\Gamma_r^{K^M}/\Gamma_r^L > 1$). Exporters can be a strong force behind the high estimates of the parameter a in the Grossman-Helpman model. The impact of lobbying contributions by specific capital owners is blunted to a greater degree than in the small country case, because even fewer protection-seeking contributors are needed for a winning legislative coalition with exporters.

North Central in the losing coalition. The cheap date hypothesis plausibly explains why specific capital owners in the less populous West North Central region get a larger-than-commensurate welfare weight (their high $\frac{\Gamma_r^{K^M}}{\Gamma^L}$ weight).

The third significant finding is the large weight placed on an individual specific-factor owner in Computers relative to labor, $\frac{\Gamma^{K^X}}{\Gamma^L} = 3.485$. The implication is that the legislative bargain determining U.S. tariffs is won by export interests. They handily defeat manufacturing interests in the remaining (import-competing) industries. This representation of export interests in our model leads to a variable that is a key determinant of low U.S. tariffs, thus far absent in the literature. The missing variable can account for low overall U.S. tariffs and a large number of tariff lines (70 percent) with zero tariffs. Our results show, for example, the potentially moderating effects of exporters on the trade wars outcomes estimated by Ossa (2014).

The term $\left(\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X*}} + \mu_j \theta_{jg} \frac{D_g/M_j}{-\delta_j}\right)$ in (23), whose coefficient is constrained to -1, plays an important role in the results.[42] The three individual terms move tariffs in sometimes opposite directions. The optimal tariff, $\frac{1}{1+\epsilon_j^{X*}}$, whose values vary between 0.16 and 0.71, could potentially increase the U.S. tariff on good j by an order of magnitude. On the other hand, the harm to consumer welfare from tariffs on imports, $\frac{Q_j/M_j}{-\delta_j}$, calls for lower tariffs. In the net, the sum of the three components varies between -1.35 and 1.81 with a mean of 0.29. If its variation dominated the variation in tariffs, then the results would be driven largely by this constraint. That is, the portion of tariffs explained by import-competing special interest variables would be of second-order importance relative to concerns about consumer welfare and the optimal tariff. This is the case with U.S. tariffs and is reflected in the low weights received by special interests in the import-competing sector. Applying the model to countries with high tariffs (for instance, India before its 1990s liberalization) would more appropriately highlight the role of special interests in India's protectionism before liberalization, and the influence of export interests in the liberalization.

5.2 Coalitions Based on Electoral Dynamics

The geography-based coalitions above ignore the long-held view that the primary motive for building strong parties is to unify party-based coalitions during legislative bargaining. Electoral motives drive trade policymaking coalitions in this section. The results in this section exemplify how conflicts pitting party loyalty against constituency interests are sorted

[42] The coefficient -1 implies that: $\frac{Q_j/M_j}{|\delta_j|}$ lowers tariffs (concern for consumer welfare) on average by 0.81; $\frac{1}{1+\delta_j^{X*}}$ raises tariffs (imposition of optimal tariff) on average by 0.38 and $\frac{\mu_j\,\theta_{jg}(D_g/M_j)}{|\delta_j|}$ lowers tariffs (TOT effect of RoW retaliation) on average by 0.14.

out in the legislature. Coalitions of districts also referred to as blocs, form based on how their states voted in the 2000 presidential elections – reflecting incentives faced by the Executive Branch in the formation of trade policy – and how the districts voted the same (or in the closest) year in elections to the House of Representatives–reflecting interests of agenda setters such as House Ways and Means and other committee chairs. Districts in states where a party won more than 52 percent of the votes in the presidential election are coded as safe for the winning party; they are considered competitive otherwise. Districts in which a candidate to the House won by more than 52 percent of the vote are considered safe for the winning party; they are considered competitive in the House elections otherwise.

Table 4: Districts, by Political Blocs, Based on 2000 Election Outcomes

State-Wide Vote in Presidential Election	**Districts in House Elections** Competitive	Safe Democrat	Safe Republican	**Total**
Competitive	17 [0.03] (0.09)	72 [0.16] (0.09)	83 [0.22] (0.09)	172
Safe Democrat	8 [0.02] (0.12)	75 [0.16] (0.27)	42 [0.09] (0.15)	125
Safe Republican	5 [0.02] (0.05)	51 [0.11] (0.12)	80 [0.20] (0.06)	136
Total	30	198	205	433 [1.00] (0.11)

Notes: (1) Each cell in the 3 × 3 represents "coalition". A cell contains (i) the number of districts in the coalition, (ii) the proportion of manufacturing workforce, in brackets, and (iii) the proportion of export industry (COMPUTER) output, in parentheses.

Table 4 shows how districts were distributed across the nine blocs. In square brackets are the proportion of the nation's manufacturing workforce in each bloc. There were 205 strongly Republican districts, 198 strongly Democrat districts, and just 30 competitive districts. Our empirical analysis differs in one important respect from the previous case: we use a measure of overall protection that includes both tariffs and non-tariff measures (NTMs) as our dependent variable.[43] Kee et al. (2009*a*) define the ad-valorem equivalent (AVE) of an NTM (e.g. quota) as the uniform tariff that would have the same effect on imports as the NTMs. We use their measure of the AVE of Core NTMs and add it to ad-valorem tariffs to measure the overall protection τ_j in (23).[44]

[43] The authority to enact NTMs, as distinct from tariffs, emerges from multiple statutes. Further, granting protection through NTMs faces fewer constraints from international commitments and is more unilateral.

[44] The measure of Core NTMs includes: price controls, quantity restrictions, monopolistic measures, and technical regulations (for details see Kee et al., 2009*b*, pp. 181).

Table 5: K_r Weight Shares (from 2SLS estimates): Small Country model
Dependent Variable: *Applied Tariffs + NTMs, 2002*

State-wide Vote in Presidential Election	**Districts in House elections** Competitive	Safe Democrat	Safe Republican	Total
Competitive	0	0	0.104	0.104
	[0]	[0]	[1.560]	
Safe Democrat	0	0.093	0	0.093
	[0]	[2.100]	[0]	
Safe Republican	0	0.047	0.073	0.120
	[0]	[1.576]	[1.212]	
Total K_r share	0	0.140	0.177	0.317

Notes: (1) $N = 8210$. (2) Each cell (coalition r) reports K_r-share of total welfare weights and (in square brackets) individual $\frac{\Gamma_r^K}{\Gamma_r^L}$ ratio these shares imply. (3) See Notes to Table 2.1 for computation details.

In the *small country* setting, the pattern of estimated weights reported in Table 5 suggests an interpretation of the trade policymaking process in the 107$^{\text{th}}$ Congress in line with the model.[45] Plausibly, Representative Cliff Stearns, Chairman of the Commerce, Trade, and Consumer Protection Subcommittee of the powerful Ways and Means Committee was an agenda setter. Stearns represented the 6th CD in Florida, a Safe Republican district in the most competitive State in the 2000 Presidential elections. To form a winning coalition the agenda setter needed the support of a legislative majority drawn from the nine regional blocs. We observe that a proposal formed as in equation (11), combining the agenda setter's status quo level of (tariffs + NTMs) protection satisfied special interests in the four blocs: Safe Republican States + Safe Republican District (80); Safe Democratic State + Safe Democratic District (75); Safe Republican State + Safe Democratic District (51) and Stearns' bloc, Competitive State + Safe Republican District (83). In each of these blocs, Table 5 shows that the relative weights $\frac{\Gamma_r^{K^M}}{\Gamma_r^L}$, in square brackets, exceeded one. Our estimates suggest that such a proposal garnered the support of a super-majority in Congress (289 districts), making it presidential veto-proof.

The *large country* setting supports an interpretation of legislative bargaining over trade policy where tariffs and NTMs at home are enacted in the shadow of potential retaliation abroad, and policymakers need to internalize terms of trade resulting from changes in relative world prices. The estimated weights in Table 6 suggest that the same agenda setter, the Trade Sub-committee Chair representing the coalition of 83 Safe Republican CDs in battleground states, could propose a vector of tariffs and NTMs that would muster the support of representatives from the 80 Safe Republican CDs in Safe Republican states. The vote of the additional 55 representatives that would result in a legislative majority could be drawn from

[45]The 2SLS estimates for computing the weights are reported in Appendix Table A.3 and first-stage regressions in Appendix Table A.2).

Table 6: K_r^M and K^X Weight Shares (from 2SLS estimates): Large Country Model
Dependent Variable: *Applied Tariffs + NTMs, 2002*

State-Wide Vote in Presidential Election	**Districts in House Elections** Competitive	Safe Democrat	Safe Republican	Total
Competitive	0	0	0.081	0.081
	[0]	[0]	[1.537]	
Safe Democrat	0	0	0	0
	[0]	[0]	[0]	
Safe Republican	0	0	0.113	0.113
	[0]	[0]	[2.252]	
Total K_r^M share	0	0	0.194	0.194
Total K^X share				0.166
				[2.906]

Notes: (1) $N = 7675$ (export sector NAICS-3=334 (COMP) dropped). (2) Cells above the Total K^X share row (coalition r) report (i) share of welfare weights placed on import-competing interests K_r^M, and (ii) individual $\frac{\Gamma_r^{K^M}}{\Gamma_r^L}$ ratio in brackets. (3) The Total K^X share row reports the aggregate share of welfare weights on export sector interests and (in brackets) the individual $\frac{\Gamma^{K^X}}{\Gamma^L}$ ratio. (4) See Notes to Table 3 for computation details.

CDs with a large presence of specific capital owners in the export industry, such as those that are safely controlled by Democratic Congress members in states where the Democrat ticket carried in the 2000 presidential election. The pattern of protection through tariffs and NTMs in the data would, thus, result in a winning proposal for a majority in Congress. In the winning coalition, the relative weight on a specific factor owner employed in the import-competing sector, $\frac{\Gamma_r^{K^M}}{\Gamma_r^L}$, is 1.54 in Safe Republican Districts located in Competitive Presidential states, and 2.25 in Safe Republican Districts located in Safe Republican states.

Export interests, however, drive the coalition. They take a significant share of the welfare weight away from protection-seeking interests. Accounting for reciprocal determination of protection and the terms of trade effect, the weight on specific capital employed in the exporting industry (nation-wide) is estimated to be 16.6% of the total welfare weights, as shown in Table 6. Specific capital owners employed in import-competing industries get a 19.4% share of the total welfare weight, far less than the 31.7% in the small country case with no countervailing exporter interest.

Further, in the exporting sector, the welfare weight of a specific capital owner in the exporting sector (nationally) is estimated to be almost three times that of a mobile factor owner ($\frac{\Gamma^{K^X}}{\Gamma^L} = 2.91$). The results show U.S. exporters are highly effective in countervailing the demand for protection by domestic interests in import-competing industries. In 2002, they prevailed because the threat of retaliation they faced was internalized by trade policymaking coalitions. It is also an explanation for why U.S. trade protection remained low on average and concentrated in a few industries –facts that have eluded previous political economy models of trade policy.

Figure 1: Estimated $\frac{\Gamma_r^K}{\Gamma_r^L}$ Weights – Small Country Case

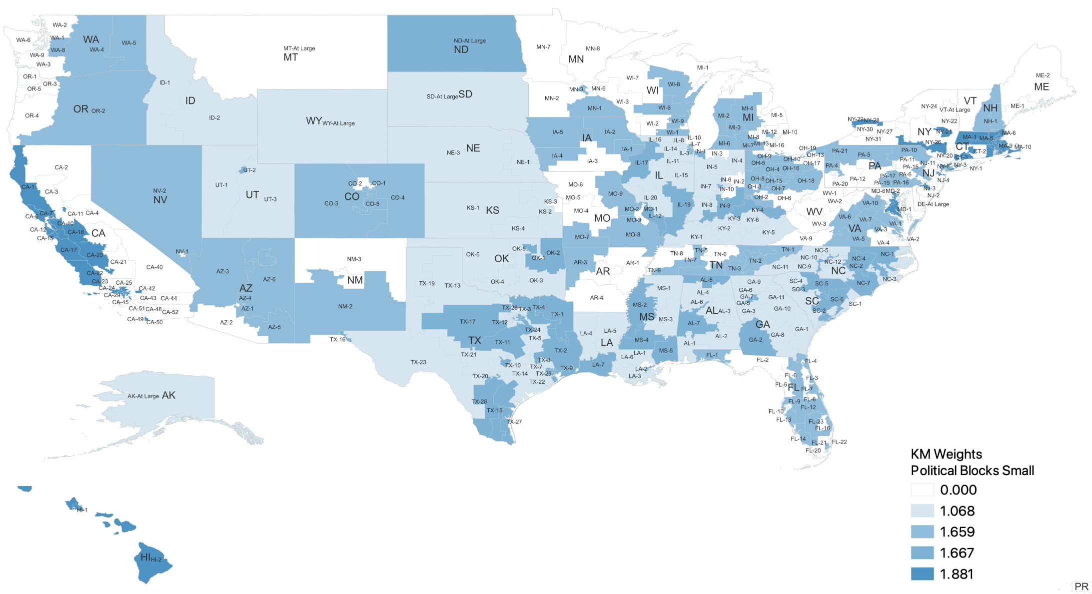
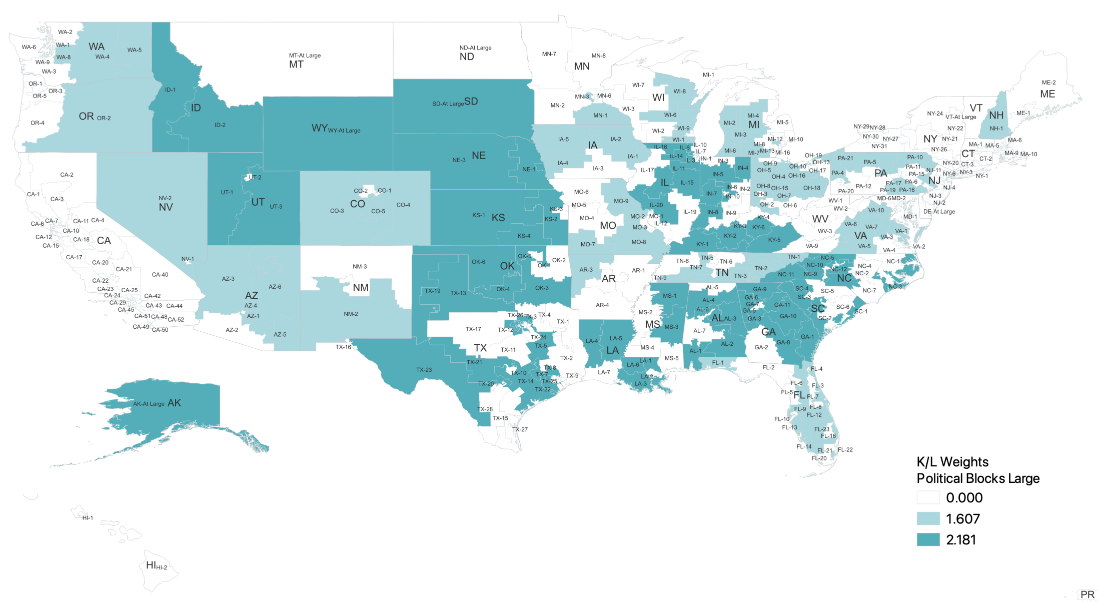


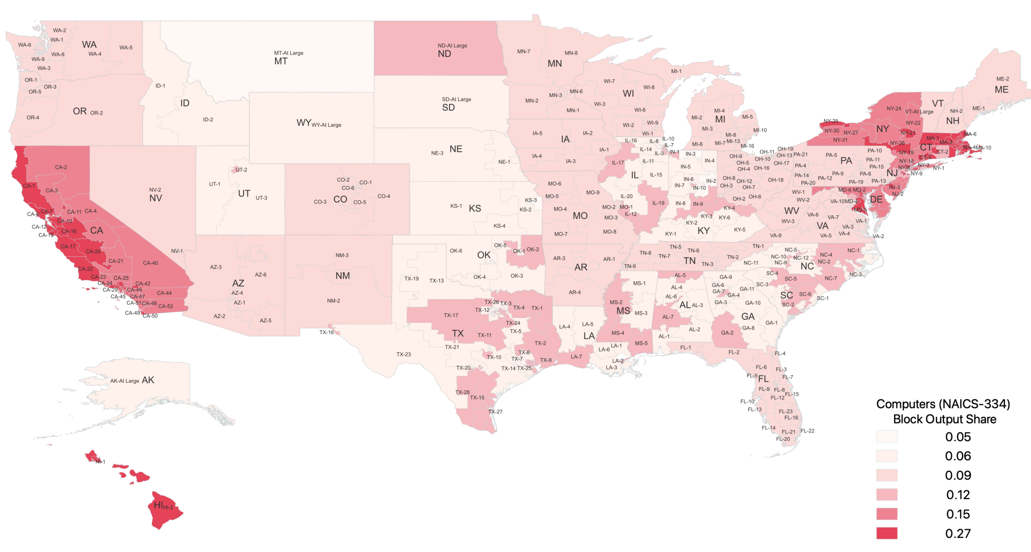
Figure 2: Estimated $\frac{\Gamma_r^K}{\Gamma_r^L}$ Weights – Large Country Case



The distribution of the winning coalitions shows that the small versus large country assumption can produce contrasting results. Figure 1 depicts the geographic distribution of the estimated relative weights $\frac{\Gamma_r^{K^M}}{\Gamma_r^L}$ under the small country assumption, where exporters cannot affect domestic protection. The estimates indicate that tariffs and NTMs observed in the 2002 data were a winning proposal, even with market access granted to manufacturing powerhouses like China. One implication is that the legislative sieve through which protection was legislated at the time (the issue of granting MFN access to China at this time is considered equivalent to legislating the level of protection) resulted in blocs that were ambivalent about protection, crowding out the blocs that strongly supported protection (denying China access) from the winning coalition. The end result was that the politically accepted protection at the national level for any district-good remained lower than any bloc's preference.

The geographic distribution of relative weights with the winning coalition driven by export interests–producers of computers–is depicted in Figure 2. In this large country case, the California districts (the Safe Democratic State + Safe Democratic District bloc) are no longer in the protectionist coalition, as they were in Figure 1. While these districts have specific capital employed in import-competing industries, their export interests dominate. Figure 3 shows the large output shares of these districts in the export sector.

Figure 3: Output Share Computers (NAICS 334) by Political Coalitions



5.3 Sensitivity Analysis

Estimates from equation (23) in the large country model (Tables 3 and 6) assumed US and RoW have equal bargaining strength, that is, $\mu = 1$. Here, we investigate the sensitivity of K^X-share, the welfare weight shares of specific capital employed in exports, to a range of μ values.[46] A smaller μ implies lower bargaining strength for the U.S. Recall from the equilibrium condition (13), given by $\frac{d\Omega^{US}}{d\tau_j} - \frac{d\Omega^{US}}{d\tau_g^*}\left[\frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*}\right] = 0$, incorporates the terms of the "agreement." Suppose, as mentioned, that the agreement allows RoW to use a retaliatory tariff in response to a unilateral US tariff increase on imports of j, which keeps RoW's welfare at the status quo. Then, the retaliatory tariff increase is given by $\frac{d\tau_g^*}{d\tau_j} = -\frac{d\Omega^{RoW}/d\tau_j}{d\Omega^{RoW}/d\tau_g^*}$. The magnitude of the retaliation $\frac{d\tau_g^*}{d\tau_j}$ characterizes U.S. bargaining strength, μ which we assume constant across goods j.[47]

Table 7: Sensitivity Analysis of Large Country Results

Bargaining strength	Geography-based coalitions		Politics-based Coalitions	
μ	K^X-share	Γ^{K^X}/Γ^L	K^X-share	Γ^{K^X}/Γ^L
0.33	0.436	11.66	0.324	7.56
0.50	0.318	6.62	0.214	4.87
0.75	0.242	4.40	0.192	3.51
1.00	0.204	3.48	0.166	2.91
1.25	0.181	2.99	0.150	2.57
1.50	0.165	2.67	0.140	2.35
3.00	0.127	1.95	0.113	1.84

Notes: Results for $\mu = 1$ correspond to estimates from Table 3 and Table 6.

In Table 7, small values of μ imply lower U.S. bargaining strength. These results indicate that when U.S. bargaining strength is low, the welfare weight on export interests is high. Export interests and RoW bargaining strength work as complements to discourage U.S. tariffs. When U.S. bargaining strength is high, the ability of the U.S. to increase welfare by imposing optimal tariffs diminishes the role of U.S. export interests. Strikingly, even when U.S. bargaining power is high ($\mu_j = 3$), the share of the total welfare weight placed on export interests remains significant, equal to 0.127 in the case of geography-based coalitions of districts and 0.113 in the case with politics-based coalitions. Quantifying welfare weights on export interests to counterfactual μ_j's is informative about the role of export interests: If it is believed that the U.S. has lower (than $\mu = 1$) bargaining strength, then export interests have even greater influence in shaping trade policy.

6 Conclusion

This paper integrates congressional districts into a political economy model of trade. This is necessary because in the U.S., and many democracies, trade policymaking is a highly

[46] In equation (23), since μ is not separately identified from the price ratio $(p_j/\overline{p}_j)/(p_g^*/\overline{p}_g)$ in equation (24), the thought experiment is to explore sensitivity to μ conditional on $(p_j/\overline{p}_j)/(p_g^*/\overline{p}_g) = 1$.

[47] Sensitivity analyses for different μ_j are also possible.

institutionalized process where elected legislative bodies play a central role. The institutional process regulating how trade policy is made in the U.S. relies on delegating "fast track" authority to the Executive branch to negotiate a bilateral or multilateral agreement. Under "fast track" the trade policy proposal negotiated by the president is subject to an up or down vote by Congress, without amendments, granting the majority party in Congress agenda-setting power over trade policy.

Closely related to our model is the protection-for-sale framework of Grossman and Helpman (1994). However, the emphasis of our approach differs: while GH models the demand for protection by special interests, our setup builds on a political geography structure to explain the supply of protection. We are, thus, able to unpack the parameter "a" in the GH model, the rate at which the government trades welfare for contribution dollars, to account for the relative influence of local interests in the formation of trade policy. Both approaches feature special interests, but our present work incorporates congressional districts and legislative bargaining, the main actors and institutions participating in the legislative processes. The relative influence of districts is ultimately reflected in the weights received by local economic actors and interests in the formation of trade policy.

The first step in our framework is to characterize the tariff vectors that each congressional district would choose if they were to set the national tariff on their own. These may be used to retrieve the otherwise unobservable local demand for protection at the industry and congressional district levels. We show that this "independent" demand for protection by districts is much larger than the protection delivered after district preferences are aggregated into national trade policy. This disparity is one explanation for the backlash against globalization. The next step is to characterize the national tariff vector as a centralized solution. We interpret it as the solution to a legislative bargain among district representatives that resolves whose tariff preference gets what weight in the determination of national tariffs. The tariff preferences of districts, in turn, reflect the heterogeneous geographic distribution of economic activity. Using district-level manufacturing data and national imports and tariff data for 2002, we estimate the welfare weights of specific and mobile factors implied by the model. We consider two stylized legislative "coalitions," one based on geography and the other on political alignments at the state and district levels. They yield substantively similar results: specific factor owners in import-competing activities located in districts that can deliver a majority in Congress receive positive welfare weights in the determination of national tariffs.

The large body of research on the political economy of protectionism addressed in the paper has largely neglected the potential influence of *exporter interests*. A key contribution of the paper is to account for the (countervailing) influence of specific factor owners in exporting sectors. We extend the model to account for terms of trade effects (the large country case). The extended model's prediction allows the estimation of a new set of welfare weights separately for specific-factor owners employed in exporting industries and import-competing industries. We find that specific-factor owners in exporting sectors receive welfare weights on par with factor owners in import-competing industries. Further, once we account for exporters, only specific factor owners located in safe Republican districts in battleground states or in states that voted Republican in the 2000 presidential elections receive positive weights. The influence of exporter interests reflects how the political process in the U.S. has internalized market access concerns in the formation of the country's trade policy. These are important and novel results that add significantly to the literature.

By formally integrating districts – whose representatives serve their local economies by bargaining in the legislature for the trade policies preferred by their constituents – into a specific factors model of trade, our paper builds a bridge between two influential bodies of literature that had remained distant from each other. The model and estimations provide theoretically motivated and empirically grounded micro-foundations for the low tariffs in the U.S. despite the growing public backlash against globalization in the face of the surge of Chinese manufacturing imports starting in the late 1990s and culminating in the "China shock."

The framework developed in the paper extends naturally in several relevant directions. While labor market effects are abstracted in our model, the paper offers a framework for integrating local labor market effects into a political economy model of trade. Second, intermediate goods are easily incorporated into the model (e.g., Gawande et al. (2012)) to take account of district tariff preferences for goods whose output is used intensively in the production of goods downstream. Third, the model may be extended to examine the role of lobbies in determining trade protection.[48] The analysis would allow for lobbies to organize not just at the sectoral level, as in previous studies, but regionally or nationally. We hope the paper paves the way for future research in this rich and important area.

[48] Online Technical Appendix B.1.3. develops an extension with lobbying *à la* Grossman and Helpman.

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Appendix A – District-level Output and Predicted Tariffs

Figure A.1: Distribution of $\frac{q_{jr}/M_{jr}}{-\epsilon_j}$ for NAICS 3-digit industries, Lorenz curve and Gini

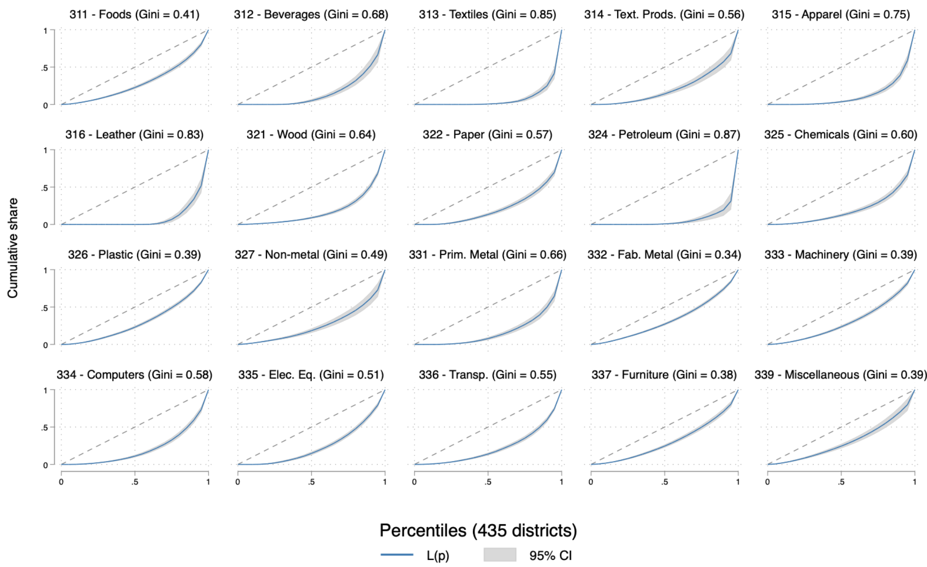

Table A.1: Average tariffs and NTMs by NAICS-3 industry

NAICS-3 Industry	Tariffs		Core NTMs		Predicted	No. of CDs
No. & Label	No. of lines	Average	No. of lines	Average	τ_{jr}	with $\tau_{jr} > 0$
311 - Foods	1,061	0.056	966	0.411	1.225	190
312 - Beverages	78	0.017	74	0.094	0.546	147
313 - Textiles	695	0.078	606	0.181	0.477	77
314 - Text. Prods.	225	0.044	211	0.234	0.276	128
315 - Apparel	588	0.092	584	0.353	0.294	111
316 - Leather	301	0.080	196	0.109	0.042	112
321 - Wood	177	0.011	143	0.172	1.357	131
322 - Paper	242	0.005	139	0.000	0.479	132
324 - Petroleum	43	0.010	19	0.000	0.295	53
325 - Chemicals	1,768	0.026	1,553	0.051	0.401	113
326 - Plastic	242	0.023	175	0.005	0.948	152
327 - Non-metal	310	0.038	292	0.001	0.850	179
331 - Prim. Metal	584	0.022	449	0.000	0.240	100
332 - Fab. Metal	441	0.024	389	0.031	0.812	169
333 - Machinery	879	0.011	819	0.041	0.232	151
334 - Computers	719	0.017	535	0.061	0.291	119
335 - Elec. Eq.	303	0.016	278	0.163	0.164	150
336 - Transp.	236	0.013	229	0.161	0.207	113
337 - Furniture	55	0.004	54	0.055	0.898	172
339 - Miscellaneous	507	0.023	499	0.029	0.354	185
Total (Average)	9,454	(0.035)	8,210	(0.131)	(0.519)	(134)

Notes: Overall averages in the last row weighted by the number of tariffs and NTM lines in columns 3 and 5. Simple average over 433 congressional districts (CDs) in columns 6 and 7. Predicted tariffs τ_{jr} in column 6 measure overall protection, and are therefore comparable to the sum of ad valorem tariffs (column 1) and ad valorem equivalent NTMs (column 3). Ad valorem equivalents of NTMs are from Kee et al. (2009a). Core NTMs includes: price controls, quantity restrictions, monopolistic measures, and technical regulations.

Table A.2: First Stage Regressions for **Large** Country results in Tables 2.1 and 3. Using Bartik IVs (BIV) constructed as in (22)

	Endogenous Variables:			
	$\frac{q_{j4}/M_{j4}}{-\delta_j}$ Region 4 W-N Central	$\frac{q_{j5}/M_{j5}}{-\delta_j}$ Region 5 S. Atlantic	$\frac{q_{j7}/M_{j7}}{-\delta_j}$ Region 7 W-S Central	$\mu_j\,\theta_{jg}\,.\,\frac{Q_g/M_j}{-\delta_j}$
$\frac{1}{-\epsilon_j}\cdot(q_{j1}/M_{j1})^{BIV}$	-8.445	-2.345	-3.933	-0.239
	(4.42)	(2.97)	(3.79)	(1.47)
$\frac{1}{-\epsilon_j}\cdot(q_{j2}/M_{j2})^{BIV}$	16.91	3.4	5.977	0.402
	(3.89)	(1.28)	(2.70)	(1.81)
$\frac{1}{-\epsilon_j}\cdot(q_{j3}/M_{j3})^{BIV}$	20.11	6.834	9.929	0.116
	(5.96)	(3.72)	(5.40)	(0.31)
$\frac{1}{-\epsilon_j}\cdot(q_{j4}/M_{j4})^{BIV}$	6.421	2.142	2.890	-0.142
	(5.08)	(2.98)	(4.31)	(1.32)
$\frac{1}{-\epsilon_j}\cdot(q_{j5}/M_{j5})^{BIV}$	0.856	2.95	-0.716	0.709
	(0.17)	(1.02)	(0.22)	(0.85)
$\frac{1}{-\epsilon_j}\cdot(q_{j6}/M_{j6})^{BIV}$	-0.879	-0.768	-0.216	-0.236
	(0.74)	(1.15)	(0.28)	(1.17)
$\frac{1}{-\epsilon_j}\cdot(q_{j7}/M_{j7})^{BIV}$	-25.94	-12.39	-9.811	0.293
	(5.55)	(4.64)	(3.88)	(1.21)
$\frac{1}{-\epsilon_j}\cdot(q_{j8}/M_{j8})^{BIV}$	-5.066	-2.016	-1.387	0.0787
	(3.22)	(2.92)	(1.49)	(0.82)
$\frac{1}{-\epsilon_j}\cdot(q_{j9}/M_{j9})^{BIV}$	32.21	14.30	5.29	-0.501
	(4.30)	(4.35)	(1.34)	(0.89)
Constant	-30.65	-9.054	-5.922	-0.677
	(3.52)	(2.46)	(1.20)	(1.08)
N	8,735	8,735	8,735	8735
R^2	0.529	0.776	0.521	0.537

Notes: (i) t-values in parentheses; errors clustered at HS 2-digits. (ii) See notes to Table 2.2 in the paper. Weak-instrument statistics are in tables containing 2SLS estimates.

Table A.3: 2SLS estimates for models (19) and (23) – Political Coalitions
Dependent Variable: *Applied Tariff + Ad-valorem NTMs* 2002

	Small Country Eq. (19)	$\frac{Q_{gr}}{Q_r}$	Large Country Eq. (23)
β_1: Competitive State, Competitive District	0	0.09	0
β_2: Competitive State, Safe (DEM) District	0	0.09	0
β_3: Competitive State, Safe (REP) District	0.350 (0.035)	0.09	0.322 (0.056)
β_4: Safe (DEM) State, Competitive District	0	0.12	0
β_5: Safe (DEM) State, Safe (DEM) District	0.261 (0.041)	0.27	0
β_6: Safe (DEM) State, Safe (REP) District	0	0.15	0
β_7: Safe (REP) State, Competitive District	0	0.05	0
β_8: Safe (REP) State, Safe (DEM) District	0.151 (0.056)	0.12	0
β_9: Safe (REP) State, Safe (REP) District	0.252 (0.035)	0.06	0.439 (0.035)
β^X: $\mu_j\ \theta_{jg} \cdot \frac{Q_g/M_j}{-\delta_j}$			2.690 (0.281)
α: $\frac{Q_j/M_j}{-\epsilon_j}$	-1		
α: $\frac{Q_j/M_j}{-\delta_j} - \frac{1}{1+\epsilon_j^{X*}} + \mu_j\ \theta_{jg} \cdot \frac{D_g/M_j}{-\delta_j}$			-1
N	8210		7675
First Stage Statistics			
Anderson-Rubin χ^2(10 df)	1099		676.4
Anderson-Rubin p-value	(0.00)		(0.00)
Kleibergen-Paap weak IV	539.2		2566

Notes: (1) Standard errors (in parentheses) clustered at 2-digit HS. (2) α is constrained to equal -1 required by (19) and (23). (3) Equations (19) and (23) require dropping the constant term in the regressions. (4) Q_{gr}/Q_r is the share of the output of export industry COMPUTER (3-digit NAICS=334) for each coalition r. Larger shares (in blue) suggest export-oriented coalitions. (6) In the large country case: (i) Unconstrained estimates of β_1, β_2, β_4, β_5, β_6, β_7 and β_8 are negative and constrained to zero to disallow import subsidies or export taxes. (ii) μ_j is assumed to equal 1 (equal bargaining strength) for all j. (iii) θ_{jg} is calculated as in (24).

Appendix B – Model Derivations and Extensions

1 Model with importing sectors

1.1 General framework

Notation. The following notation is used throughout this section:

- The economy consists of J sectors, with $j = 0, 1, ..., J$, and R regions, with $r = 1, ..., R$. There are two types of economic agents: $m = L$, owners of a non-specific factor (often defined as a mobile factor of production); $m = K$, and owners of sector-specific factors of production (often defined as sector-specific capital).

- Non-sector specific factor: Mobile across sectors, but immobile across regions.
  - L_r: units of nonspecific factors in region r.
  - n_r^L: number of type-L individuals in r.
  - $\mathbf{n}_r^L = (n_{0r}^L, n_{1r}^L, n_{2r}^L, \ldots, n_{Jr}^L)$: vector of mobile factors across sectors in district r.
  - $n^L = \sum_r n_r^L$: total number of owners of the mobile factor in the economy.

- Owners of specific factors: Immobile across sectors and regions.
  - K_r: number of owners of the specific factor of production in region r.
  - n_{jr}^K: number of type-K individuals producing in sector j in r; $n_{jr}^K \geq 0$ (not all regions are active in sector j).
  - $\mathbf{n}_r^K = (n_{1r}^K, n_{2r}^K, \ldots, n_{Jr}^K)$: distribution of the specific factor across sectors (vector); the distribution of endowments may differ across regions r.
  - $n_r^K = \sum_{i \in J} n_{ir}^K$: number of type-$K$ individuals in r.
  - $n^K = \sum_r n_r^K$: total number of specific factor owners in the economy.

- Total population in region r is $n_r = n_r^L + n_r^K$, and total population in the economy is $n = n^L + n^K$, where $n^L = \sum_r n_r^L$, $n^K = \sum_r n_r^K$.

- Welfare weights: District and national weights may differ.
  - Λ_{jr}^m: weight district r places on a type-m agent in sector j;
  - Γ_{jr}^m: weight placed at the national level on a type-m agent in sector j and district r.

- Prices:[1] Domestic prices are denoted by $p_0 = 1$, $\mathbf{p} = (p_1, ..., p_J)$, and world prices by $\overline{\mathbf{p}} = (\overline{p}_1, ..., \overline{p}_J)$.

[1]Initially, we develop a framework that does not include terms-of-trade effects (we assume that world prices are taken as exogenously given). We later extend this framework and include terms-of-trade effects.

- Tariffs: Specific tariffs are denoted by t_j, so that $p_j = \overline{p}_j + t_j$, and ad-valorem tariffs by τ_j, so that $p_j = (1+\tau_j)\overline{p}_j$.

Preferences. Following the literature on trade protection, we assume preferences are represented by a quasi-linear utility function: $u^m = x_0 + \sum_{i\in J} u_i^m(x_i)$. Good 0, the numeraire, is sold at price $p_0 = 1$. Goods x_j, the imported goods, are sold domestically at prices p_j. In general, preferences for the imported goods j may differ across types $m = L, K$.[2]

Demand for goods. Consider the utility maximization problem for a representative consumer of type m in region r, with income z_r^m: $\max_{\{x_{jr}^m, j=1,\ldots,J\}} u_r^m = z_r^m - \sum_i p_i x_{ir}^m + \sum_i u_i^m(x_{ir}^m)$. From the FOCs, $-p_j + u^{m\prime}(x_{jr}^m) = 0 \Rightarrow d_{jr}^m \equiv d_{jr}^m(p_j)$, where d_{jr}^m is the demand for good j of a representative consumer of type m in region r. Then, $n_r^m d_{jr}^m$ is the demand for good j of all consumers of type m in region r, and $D_j^m = \sum_r n_r^m d_{jr}^m$ is the aggregate demand for good j for all individuals of type m. Consumers of type m are identical across regions r, so the demand for good j for all individuals of type m is $D_j^m = \left(\sum_r n_r^m\right) d_j^m = n^m d_j^m$. Finally, aggregate demand for good j is $D_j = \sum_m D_j^m = \sum_m n^m d_j^m$.

Consumer surplus. Consumer surplus for a type-m individual from the consumption of good j is defined by $\phi_j^m(p_j) = v_j^m(d_j^m) - p_j d_j^m$, where $v_j^m(p_j) \equiv u_j^m[d_j^m(p_j)]$. Summing over all goods gives the surplus $\sum_i \phi_i^m$. Therefore, consumer surplus for type-m individuals in region r is $\phi_r^m(\mathbf{p}) = n_r^m \sum_i [v_i^m(d_i^m) - p_i d_i^m] = n_r^m \sum_i \phi_i^m = n_r^m \phi^m$, and aggregate consumer surplus for type-m individuals is $\Phi^m = \sum_r \phi_r^m = \sum_r n_r^m \sum_i \phi_i^m = n^m \phi^m$. Note that $\partial \Phi^m / \partial p_j = -n^m d_j^m = -D_j^m$. The indirect utility can be expressed as $v_r^m(\mathbf{p}, z_r^m) = z_r^m + \sum_i [v_i^m(p_i) - p_i d_i^m] = z_r^m + \sum_i \phi_i^m(p_i)$. When individuals have identical preferences, $\Phi^m = n^m \phi = n^m \sum_i \phi_i$.

Production. The production of good 0 only requires the mobile non-specific factor of production and uses a linear technology represented by $q_{0r} = w_{0r} n_{0r}^L$, where $w_{0r} > 0$. The wage received by workers in sector $\{0r\}$ is w_{0r}. Good j is produced domestically using a CRS production function $q_{jr} = F_{jr}(n_{jr}^K, n_{jr}^L) = f_{jr}(n_{jr}^L)$, where n_{jr}^K is sector-region specific (immobile across sectors and regions). We omit, to simplify notation, n_{jr}^K from the production function from now onwards.

Profits. Profits in sector-region $\{jr\}$ are $\pi_{jr} \equiv p_j f_{jr}(n_{jr}^L) - w_{jr} n_{jr}^L$, and the demand for the mobile factor in sector-region jr is defined by $p_j f_{jr}^{\prime}(n_{jr}^L) = w_{jr}$, which defines $n_{jr}^{L,D} \equiv n_{jr}^L(p_j, w_{jr})$. The profit function becomes $\pi_{jr}(p_j, w_{jr}) \equiv p_j f_{jr}(n_{jr}^{L,D}) - w_{jr} n_{jr}^{L,D}$. The production of good j in region r (using the envelope theorem) is given by $\partial \pi_{jr}(p_j, w_{jr}) / \partial p_j = q_{jr}(p_j, w_{jr})$. Aggregate production of good j is $Q_j = \sum_r q_{jr}$. Workers employed in sector $\{jr\}$ receive w_{jr}, $j = 0, 1, \ldots, J$. Since workers are perfectly mobile across sectors, $w_{0r} = w_{jr} = w_r$ in equilibrium.

[2]The analysis performed in the text assumes that agents have identical preferences.

Imports and tariff revenue Imports of good j are $M_j = D_j - Q_j$. Let $\overline{p}_j$ denote the internationally given price of good j. Revenue generated from tariff collection is $T = \sum_i t_i M_i$, where $t_i = p_i - \overline{p}_i$. Note that

$$\frac{\partial T}{\partial t_j} = M_j + t_j M_j' = M_j \left(1 + \frac{t_j}{p_j}\epsilon_j\right), \text{ where } \epsilon_j \equiv M_j' p_j / M_j.$$

Total utility. The total utility of the mobile factor in sector-region $\{jr\}$ is

$$W_{jr}^L = w_{jr} n_{jr}^L + n_{jr}^L \frac{T}{n} + n_{jr}^L \phi_r^L = w_{jr} n_{jr}^L + n_{jr}^L \frac{T}{n} + n_{jr}^L \frac{\Phi^L}{n^L}.$$

An increase in the tariff on good j affects the utility of the mobile factor as follows:

$$\frac{\partial W_{jr}^L}{\partial p_j} = \frac{n_{jr}^L}{n} \frac{\partial T}{\partial p_j} + \frac{n_{jr}^L}{n^L} \frac{\partial \Phi^L}{\partial p_j} = \frac{n_{jr}^L}{n}(M_j + t_j M_j') - n_{jr}^L \frac{D_j^L}{n^L}.$$

The total utility of specific factor owners in sector-region $\{jr\}$ is

$$W_{jr}^K = \pi_{jr} + n_{jr}^K \frac{T}{n} + n_{jr}^K \frac{\Phi^K}{n^K}.$$

Note that

$$\frac{\partial W_{jr}^K}{\partial p_j} = q_{jr} + \frac{n_{jr}^K}{n}(M_j + t_j M_j') - n_{jr}^K \frac{D_j^K}{n^K}.$$

Region r's welfare. The welfare of mobile factors in region r is $\Omega_r^L = \sum_i \Lambda_{ir}^L W_{ir}^L$, or

$$\Omega_r^L \;=\; \sum_i \Lambda_{jr}^L w_{jr} n_{jr}^L + \frac{\sum_i \Lambda_{ir}^L n_{ir}^L}{n} T + \frac{\sum_i \Lambda_{ir}^L n_{ir}^L}{n^L} \Phi^L = \lambda_r^L \left(w_r + \frac{T}{n} + \frac{\Phi^L}{n^L} \right),$$

where $\lambda_r^L = \sum_{i=0}^J \Lambda_{ir}^L n_{ir}^L$, and $\Phi^L = n^L \sum_i \phi_i^L$. The welfare of specific factor owners in region r is given by $\Omega_r^K = \sum_i \Lambda_{ir}^K W_{ir}^K$, or

$$\Omega_r^K = \sum_i \Lambda_{ir}^K \pi_{ir} + \frac{\sum_i \Lambda_{ir}^K n_{ijr}^K}{n} T + \frac{\sum_i \Lambda_{ijr}^K n_{ir}^K}{n^K} \Phi^K = \sum_i \Lambda_{ir}^K n_{ir}^K \left(\frac{\pi_{ir}}{n_{ir}^K} \right) + \lambda_r^K \left(\frac{T}{n} + \frac{\Phi^K}{n^K} \right),$$

where $\lambda_r^K = \sum_i \Lambda_{ir}^K n_{ir}^K$. For region r, welfare is given by $\Omega_r = \Omega_r^L + \Omega_r^K = \sum_i \sum_m \Lambda_{ir}^m W_{ir}^m$, or

$$\Omega_r = \lambda_r^L \left(w_r + \frac{T}{n} + \frac{\Phi^L}{n^L} \right) + \sum_i \Lambda_{ir}^K n_{ir}^K \left(\frac{\pi_{ir}}{n_{ir}^K} \right) + \lambda_r^K \left(\frac{T}{n} + \frac{\Phi^K}{n^K} \right)$$

When preferences are identical,

$$\Omega_r = \lambda_r^L w_r + \sum_i \Lambda_{ir}^K n_{ir}^K \left(\frac{\pi_{ir}}{n_{ir}^K}\right) + \lambda_r \left(\frac{T}{n} + \phi\right),$$

where $\lambda_r = \lambda_r^L + \lambda_r^K$, and and $\Phi = n\phi = n\sum_i \phi_i$.

Aggregate welfare. National total welfare is $\Omega = \sum_r \sum_i \sum_m \Gamma_{ir}^m W_{ir}^m$, or

$$\Omega = \sum_r w_r \sum_i \Gamma_{ir}^L n_{ir}^L + \gamma^L \left(\frac{T}{n} + \frac{\Phi^L}{n^L}\right) + \sum_r \sum_i \Gamma_{ir}^K n_{ir}^K \left(\frac{\pi_{ir}}{n_{ir}^K}\right) + \gamma^K \left(\frac{T}{n} + \frac{\Phi^K}{n^K}\right),$$

where $\gamma^m = \sum_r \sum_i \Gamma_{ir}^m n_{ir}^m$. Note that the weights used at the national level, Γ_{jr}^m, may not coincide with those considered at the district level, Λ_{jr}^K. When preferences are identical

$$\Omega = \sum_r w_r \sum_i \Gamma_{ir}^L n_{ir}^L + \sum_r \sum_i \Gamma_{ir}^K n_{ir}^K \left(\frac{\pi_{ir}}{n_{ir}^K}\right) + \gamma \left(\frac{T}{n} + \frac{\Phi}{n}\right),$$

where $\gamma = \gamma^L + \gamma^K$, and $\Phi = n\phi = n\sum_i \phi_i$.

1.2 Tariffs

District specific tariffs. Consider the case of specific tariffs with no terms-of-trade effects, i.e. $p_j = \overline{p}_j + t_j$, where $\overline{p}_j$ is taken as exogenously given, so that $\partial p_j / \partial t_j = 1$. The tariff vector that maximizes the total welfare of region r, Ω_r, is determined by the following FOCs:

$$\frac{\partial \Omega_r}{\partial p_j} \equiv \lambda_r^L \left[\frac{1}{n}\left(M_j + t_j M_j'\right) - \frac{D_j^L}{n^L}\right] + \Lambda_{jr}^K n_{jr}^K \left(\frac{q_{jr}}{n_{jr}^K}\right) + \lambda_r^K \left[\frac{1}{n}\left(M_j + t_j M_j'\right) - \frac{D_j^K}{n^K}\right] = 0,$$

for $j = 1, ..., J$, where $D_j^m = n^m d_j^m$. Isolating t_{jr} gives

$$t_{jr} = -\frac{n}{M_j'}\left[\underbrace{\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K}}_{(i)} - \underbrace{\left(\frac{\lambda_r^L}{\lambda_r}\frac{D_j^L}{n^L} + \frac{\lambda_r^K}{\lambda_r}\frac{D_j^K}{n^K}\right)}_{(ii)} + \underbrace{\frac{M_j}{n}}_{(iii)}\right] \tag{1}$$

where $\lambda_r = \lambda_r^L + \lambda_r^K$. Expression (i) in (1) captures the effect of tariff t_j on domestic producers of good j in region r. This effect would tend to rise t_j. Expression (ii) captures the impact of the tariff on consumer surplus. The effect is different for the different groups of individuals L and K. This term tends to put downward pressure on t_j. Finally, expression (iii) captures the impact of the tariff on tariff revenue. Since domestic residents benefit from tariff revenue, this term would tend to increase t_j.

Note that expression (i) reflects the impact of the tariff on the returns to the specific factors, in this case, owners of specific factors in sector j. Given that the model assumes the nonspecific factor is perfectly mobile across sectors within region r (but not across regions), $w_r = w_{jr}$ for all j

in region r. Changes in tariffs do not have an impact on the income of the mobile factor because w_r does not depend on t_j.[3]

When agents have identical preferences i.e., $D_j^L/n^L = D_j^K/n^K = D_j/n$, expression (1) can written as

$$t_{jr} = -\frac{n}{M_j'}\left(\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K} - \frac{n_j^K}{n}\frac{Q_j}{n_j^K}\right). \tag{2}$$

Moreover, if $\Lambda_{jr}^L = \Lambda_{jr}^K = \Lambda_r$,

$$t_{jr} \quad = \quad -\frac{n}{M_j'}\left(\frac{n_{jr}^K}{n_r}\frac{q_{jr}}{n_{jr}^K} - \frac{n_j^K}{n}\frac{Q_j}{n_j^K}\right).$$

Then, $t_{jr} > 0$ if and only if $(n_{jr}^K/n_r)(q_{jr}/n_{jr}^K) > (n_j^K/n)(Q_j/n_j^K)$, or $q_{jr}/n_r > Q_j/n$.

National tariffs. The tariff that maximizes aggregate welfare satisfies

$$\frac{\partial \Omega}{\partial p_j} \quad = \quad \sum_r \Gamma_{jr}^K n_{jr}^K \frac{q_{jr}}{n_{jr}^K} + t_j \gamma \frac{M_j'}{n} - \left(\gamma^L \frac{D_j^L}{n^L} + \gamma^K \frac{D_j^K}{n^K} - \gamma \frac{M_j}{n}\right),$$

where $\gamma = \gamma^L + \gamma^K$. Isolating t_j gives

$$t_j = -\frac{n}{M_j'}\left[\sum_r \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma}\frac{q_{jr}}{n_{jr}^K} - \left(\frac{\gamma^L}{\gamma}\frac{D_j^L}{n^L} + \frac{\gamma^K}{\gamma}\frac{D_j^K}{n^K}\right) + \frac{M_j}{n}\right]. \tag{3}$$

If preferences are identical across groups, then

$$t_j = -\frac{n}{M_j'}\left(\sum_r \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right). \tag{4}$$

Ad-valorem Tariffs Suppose, as before, that world prices are fixed (i.e., there are no terms-of-trade effects), but tariffs are now ad-valorem. Specifically, $p_j = (1+\tau_j)\overline{p}_j$. This means that $\partial p_j/\partial \tau_j = \overline{p}_j$. Note that $\tau_j = (p_j - \overline{p}_j)/\overline{p}_j$, which means that $\tau_j/(1+\tau_j) = (p_j - \overline{p}_j)/p_j$. When agents have identical preferences i.e., $D_j^L/n^L = D_j^K/n^K = D_j/n$. Then, the district-preferred and national ad-valorem tariffs can be expressed, respectively as

$$\frac{\tau_{jr}}{1+\tau_{jr}} = \frac{n}{-\epsilon_j M_j}\left[\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right], \quad \frac{\tau_j}{1+\tau_j} = \frac{n}{-\epsilon_j M_j}\left[\sum_r \frac{\Gamma_{jr}^K n_{jr}^K}{\gamma}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right], \tag{5}$$

where $\epsilon_j \equiv M_j' p_j / M_j < 0$.

[3] If the mobile factor were completely immobile across sectors (also sector-specific), then changes in tariffs would have a differential effect on wages across sectors as well.

1.3 Tariffs and Lobbying

Suppose lobbying is organized at the national level and owners of the specific factors (sectors) are in charge of deciding the level of political contributions. Moreover, lobbying is decided at the sectoral level. Specifically, a subset of sectors $\mathcal{O} \subset J$ are organized and engaged in lobbying, and the "central authority" chooses the tariff vector $\mathbf{t} \equiv \{t_1, \ldots, t_J\}$ that maximizes $(C + a\Omega)$, where C are campaign contributions, Ω aggregate welfare, and a captures the trade-off between welfare and contribution dollars (as in GH). The latter is equivalent to maximizing $\mathcal{U} = \sum_{i \in \mathcal{O}} W_i^K + a\Omega$ w.r.t. $\mathbf{t}$, or

$$\max_{\{t_1,\ldots,t_J\}} \mathcal{U} \quad = \quad a \sum_r \sum_i \Gamma_r^L W_{ir}^L + a \sum_r \sum_{i \in J \backslash \mathcal{O}} \Gamma_{ir}^K W_{ir}^K + \sum_r \sum_{i \in \mathcal{O}} (1 + a\Gamma_{ir}^K) W_{ir}^K .$$

For organized sectors $j \in \mathcal{O}$, the specific tariff becomes

$$t_j^{\mathcal{O}} = -A \frac{n}{M_j'} \left\{ \sum_r \left(\frac{\Gamma_{jr}^K n_{jr}^K}{\gamma} + \frac{n_{jr}^K}{a\gamma} \right) \frac{q_{jr}}{n_{jr}^K} - \left[\frac{\gamma^L}{\gamma} \frac{D_j^L}{n^L} + \left(\frac{\gamma^K}{\gamma} + \frac{n_j^K}{a\gamma} \right) \frac{D_j^K}{n^K} \right] + \frac{1}{A} \frac{M_j}{n} \right\},$$

where $A \equiv a\gamma/(a\gamma + n_j^K)$. For sectors that are not organized (i.e., $j \in J \backslash \mathcal{O}$), the tariff t_j is the same as before.

Comparing tariffs How do the (specific) tariffs change if a sector becomes organized and lobbies for protection? We now compare the tariff t_j derived earlier in (3) to $t_j^{\mathcal{O}}$. Specifically,

$$t_j^{\mathcal{O}} - t_j \quad = \quad \frac{n_j^K}{\left(a\gamma + n_j^K\right)} \left[\frac{n}{M_j'} \left(\frac{D_j^K}{n^K} - \frac{Q_j}{n_j^K} - \frac{M_j}{n} \right) - t_j \right].$$

As $a \to \infty$, $A \to 1$, and $(t_j^{\mathcal{U}} - t_j) \to 0$; this means that tariffs are exactly the same. If $a = 0$, then the tariff for sector j becomes $t_j^{\mathcal{U}} = (n/M_j')[(D_j^K/n^K) - (Q_j/n_j^K) - (M_j/n)]$. Note that in this case, the tariff does not depend on Γ_{jr}^m.

2 Model with importing and exporting sectors

Suppose now that there are two countries: country *US* (or the domestic country), and country *RoW* (the foreign country, or, the rest of the world). We will the symbol "$*$" to denote variables referring to *RoW*. We also incorporate into the present framework terms of trade (TOT) effects, so that tariffs imposed by an individual country may affect equilibrium world prices.

Notation. From the perspective of the domestic country *US*, the economy can be described as follows. There are three types of goods: a numeraire good 0, or sector 0, importable goods: $i = 1, ..., \langle j \rangle, ..., J$, or sector M (exportable sector for *RoW* or M^*), and exportable goods: $g = 1, ..., \langle s \rangle, ..., G$, or sector X (importable sector for *RoW*, or X^*). Factors of production are allocated across sectors as follows: $n^L = n^{L^0} + n^{L^M} + n^{L^X}$, $n^L = n^{L^0} + n^{L^M} + n^{L^X}$, and $n = n^L + n^K$, where $n^{L^0} = \sum_r n_r^{L^0}, n^{L^M} = \sum_r \sum_i n_{ir}^{L^M}, n^{L^X} = \sum_r \sum_g n_{gr}^{L^X}$, $n^{K^M} = \sum_r \sum_i n_{ir}^{K^M}, n^{K^X} = \sum_r \sum_g n_{gr}^{K^X}$. Moreover, since there are only two "countries" (*US* and *RoW*), the set of importable goods for *US* is equal to the set of exportable goods for RoW, and the set of exportable goods for US is equal to the set of importable goods for RoW. Additionally, the market clearing conditions are given by $D_j^M - Q_j^M = Q_j^{M^*} - D_j^{M^*}$, and $D_s^X - Q_s^X = Q_s^{X^*} - D_s^{X^*}$.

Ad-valorem tariffs. Suppose that countries set ad-valorem tariffs on importable goods, but they cannot use export subsidies. Specifically, country US sets tariffs on importable goods from RoW, τ_j^M, and country RoW sets tariffs on importable goods from country US, $\tau_s^{X^*}$. The domestic price of good j in country US (p_j^M) and the foreign country RoW ($\overline{p}_j^M$) are, respectively,

$$p_j^M = (1 + \tau_j^M)\overline{p}_j^M, \quad p_j^{M*} = \overline{p}_j^M, \tag{6}$$

$$p_s^X = \overline{p}_s^X, \quad p_s^{X^*} = (1 + \tau_s^{X^*})\overline{p}_s^X. \tag{7}$$

where $\overline{p}_j^M$ is the international (world) price of good j, and $\overline{p}_s^X$ is the international (world) price of good s.[4] Note that $\tau_j = (p_j^M - \overline{p}_j^M)/\overline{p}_j^M$, and $(1+\tau_j) = p_j^M/\overline{p}_j^M$, so that $\tau_j/(1+\tau_j) = (p_j^M - \overline{p}_j^M)/p_j^M$. This is the wedge between domestic and world price as a proportion of the **domestic price** p_j^M.

Given the tariffs, the equilibrium prices are determined by the following equations (from the perspective of country US):

$$M_j(p_j^M) = X_j^*(\overline{p}_j^M), \quad \text{market for importable goods,} \tag{8}$$

$$X_s(\overline{p}_s^X) = M_s^*(p_s^{X^*}), \quad \text{market for exportable goods.} \tag{9}$$

It follows from (6) and (8) that $p_j^M(\tau_j^M)$ and $\overline{p}_j^M(\tau_j^M)$. Similarly, from (7) and (9), $p_s^{X^*}(\tau_s^{X^*})$ and $\overline{p}_s^{X^*}(\tau_s^{X^*})$.

Comparative static analysis: Domestic country US. Consider good j imported by country US. Differentiating the system of equations (6) and (8) with respect to τ_j^M gives

$$\frac{\partial \overline{p}_j^M}{\partial \tau_j^M} = \frac{\overline{p}_j^M M_j'(p_j^M)}{X_j^{*\prime}(\overline{p}_j^M) - (1 + \tau_j^M)M_j'(p_j^M)} < 0, \frac{\partial p_j^M}{\partial \tau_j^M} = \frac{\overline{p}_j^M X_j^{*\prime}(\overline{p}_j^M)}{X_j^{*\prime}(\overline{p}_j^M) - (1 + \tau_j^M)M_j'(p_j^M)} > 0.$$

We define elasticities as

$$\epsilon_j^M = \frac{\partial M_j}{\partial p_j^M}\frac{p_j^M}{M_j}, \quad \epsilon_j^{X^*} = \frac{\partial X_j^*}{\partial \overline{p}_j^M}\frac{\overline{p}_j^M}{X_j^*}, \quad \epsilon_{\tau_j^M}^{p^M} = \frac{\partial p_j^M}{\partial \tau_j^M}\frac{\tau_j^M}{p_j^M}, \quad \epsilon_{\tau_j^M}^{\overline{p}^M} = \frac{\partial \overline{p}_j^M}{\partial \tau_j^M}\frac{\tau_j^M}{\overline{p}_j^M}.$$

Rewriting the comparative static results in terms of elasticities:

$$\frac{\partial \overline{p}_j^M}{\partial \tau_j^M} = \frac{\overline{p}_j^M}{(1 + \tau_j^M)}\frac{\epsilon_j^M}{(\epsilon_j^{X^*} - \epsilon_j^M)}, \quad \frac{\partial p_j^M}{\partial \tau_j^M} = \overline{p}_j^M\frac{\epsilon_j^{X^*}}{(\epsilon_j^{X^*} - \epsilon_j^M)},$$

[4] Since good j is imported by country US, then country US chooses $\tau_j^M \geq 0$. For the foreign country RoW, $\tau_j^{M*} = 0$, i.e., RoW does not subsidize exports of good j.

or

$$\epsilon^{\overline{p}_j^M}_{\tau_j^M} = \frac{\tau_j^M}{(1+\tau_j^M)} \frac{\epsilon_j^M}{(\epsilon_j^{X^*} - \epsilon_j^M)}, \quad \epsilon^{p_j^M}_{\tau_j^M} = \frac{\tau_j^M}{(1+\tau_j^M)} \frac{\epsilon_j^{X^*}}{(\epsilon_j^{X^*} - \epsilon_j^M)} \quad \Rightarrow \quad \frac{\epsilon^{\overline{p}_j^M}_{\tau_j^M}}{\epsilon^{p_j^M}_{\tau_j^M}} = \frac{\epsilon_j^M}{\epsilon_j^{X^*}}.$$

Note that

$$\frac{\partial \overline{p}_j^M / \partial \tau_j^M}{\partial p_j^M / \partial \tau_j^M} = \frac{M_j'}{X_j^{*\prime}} = \frac{1}{(1+\tau_j^M)} \frac{\epsilon_j^M}{\epsilon_j^{X^*}}, \quad \text{and} \quad \frac{\overline{p}_j^M}{\partial p_j^M / \partial \tau_j^M} = 1 - \frac{\epsilon_j^M}{\epsilon_j^{X^*}}.$$

Comparative statics: Foreign country RoW. Differentiating the system of equations (7) and (9) with respect to $\tau_s^{X^*}$ gives

$$\frac{\partial \overline{p}_s^X}{\partial \tau_s^{X^*}} = \frac{\overline{p}_s^X M_s^{*\prime}(p_s^{X^*})}{X_s{}'(\overline{p}_s^X) - (1+\tau_s^{X^*}) M_s^{*\prime}(p_s^{X^*})} < 0, \frac{\partial p_s^{X^*}}{\partial \tau_s^{X^*}} = \frac{\overline{p}_s^X X_s'(\overline{p}_s^X)}{X_s{}'(\overline{p}_s^X) - (1+\tau_s^{X^*}) M_s^{*\prime}(p_s^{X^*})} > 0.$$

Using elasticities,

$$\frac{\partial \overline{p}_s^X}{\partial \tau_s^{X^*}} = \frac{\overline{p}_s^X}{(1+\tau_s^{X^*})} \frac{\epsilon_s^{M^*}}{(\epsilon_s^X - \epsilon_s^{M^*})} = \frac{(\overline{p}_s^X)^2}{p_s^{X^*}} \frac{\epsilon_s^{M^*}}{(\epsilon_s^X - \epsilon_s^{M^*})}, \quad \frac{\partial p_s^{X^*}}{\partial \tau_s^{X^*}} = \overline{p}_s^X \frac{\epsilon_s^X}{(\epsilon_s^X - \epsilon_s^{M^*})},$$

or

$$\epsilon^{\overline{p}_s^X}_{\tau_s^{X^*}} = \frac{\tau_s^{X^*}}{(1+\tau_s^{X^*})} \frac{\epsilon_s^{M^*}}{(\epsilon_s^X - \epsilon_s^{M^*})}, \quad \epsilon^{p_s^{X^*}}_{\tau_s^X} = \frac{\tau_s^{X^*}}{(1+\tau_s^{X^*})} \frac{\epsilon_s^X}{(\epsilon_s^X - \epsilon_s^{M^*})},$$

where ϵ_s^X is the elasticity of exports of good s from the domestic country US, and $\epsilon_s^{M^*}$ is elasticity of imports of good s by the foreign country RoW.

Tariff revenue. Using ad-valorem tariffs, the tariff revenue is given by $T = \sum_i \tau_i^M \overline{p}_i^M M_i$. Note that $T \geq 0$, since export subsidies are not allowed in our model. Differentiating T with respect to τ_j^M:

$$\frac{dT}{d\tau_j^M} = \frac{\partial T}{\partial \tau_j^M} + \frac{\partial T}{\partial p_j^M} \frac{\partial p_j^M}{\partial \tau_j^M} = \overline{p}_j^M M_j + \frac{\tau_j^M}{(1+\tau_j^M)} M_j \delta_j \frac{\partial p_j^M}{\partial \tau_j^M},$$

where $\delta_j = \epsilon_j^M \left(\frac{1+\epsilon_j^{X^*}}{\epsilon_j^{X^*}} \right) < 0$. Note that in the absence of TOT effects, $\delta_j = \epsilon_j^M$.

Total welfare. The aggregate welfare (in both countries) includes the welfare of both owners of the mobile factor and owners of the specific factors across all sectors: $\Omega = \Omega^L + \Omega^K = \Omega^{L^0} + \Omega^{L^M} +$

$\Omega^{L^X} + \Omega^{K^M} + \Omega^{K^X}$, where[5]

$$\Omega^L = \sum_r \left(\Gamma_r^{L^0} n_{0r}^{L^0} w_{0r} + \sum_i \Gamma_{ir}^{L^M} n_{ir}^{L^M} w_r + \sum_g \Gamma_{gr}^{L^X} n_{gr}^{L^X} w_r \right) + \gamma^L \Upsilon,$$

$$\Omega^K = \sum_r \left[\sum_i \Gamma_{ir}^{K^M} n_{ir}^{K^M} \left(\frac{\pi_{ir}^M(p_i^M)}{n_{ir}^{K^M}} \right) + \sum_g \Gamma_{gr}^{K^X} n_{gr}^{K^X} \left(\frac{\pi_{gr}^X(p_g^X)}{n_{gr}^{K^X}} \right) \right] + \gamma^K \Upsilon,$$

$$\Upsilon = \sum_i \phi_i^M(p_i^M) + \sum_g \phi_g^X(p_g^X) + \frac{T}{n},$$

$$\gamma^L = \sum_r \left(\Gamma_r^{L^0} n_{0r}^L + \sum_i \Gamma_{ir}^{L^M} n_{ir}^{L^M} + \sum_g \Gamma_{gr}^{L^X} n_{gr}^{L^X} \right),$$

$$\gamma^K = \sum_r \left(\sum_i \Gamma_{ir}^{K^M} n_{ir}^{K^M} + \sum_g \Gamma_{gr}^{K^X} n_{gr}^{K^X} \right).$$

Suppose that $\Gamma_r^{L^0} = \Gamma_{jr}^{L,M} = \Gamma_{sr}^{L,X} = \Gamma_r^L$, and $\Gamma_{jr}^{K^M} = \Gamma_{sr}^{K^X} = \Gamma_r^K$ for all j, s. Then, $\gamma^L = \sum_r \Gamma_r^L n_r^L$, and $\gamma^K = \sum_r \Gamma_r^K n_r^K$.

2.1 Nash Bargaining

Tariffs are the outcome of the following Nash Bargaining game between the domestic country US and the RoW: choose the vectors of tariffs $\{\tau^M, \tau^{X^*}\}$ that maximize

$$N = \left(\Omega^{US} - \overline{\Omega}^{US}\right)^{\sigma} \left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)^{(1-\sigma)},$$

taking the tariffs of the other country as given. Equivalently, the tariffs are the solution to the problem: $\max_{\{\tau^M, \tau^{X^*}\}} N = \sigma Log\left(\Omega^{US} - \overline{\Omega}^{US}\right) + (1-\sigma) Log\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)$, where $\tau^M = (\tau_1^M, ..., \tau_j^M, ..., \tau_J^M)$, and $\tau^{X^*} = (\tau_1^{X^*}, ..., \tau_s^{X^*}, ..., \tau_G^{X^*})$. The FOCs with respect to each τ_j^M (chosen by the domestic country) and $\tau_s^{X^*}$ (chosen by the foreign country) are given by:[6]

$$\tau_j^M \quad : \quad \frac{\sigma}{\left(\Omega^{US} - \overline{\Omega}^{US}\right)} \frac{d\Omega^{US}}{d\tau_j^M} + \frac{(1-\sigma)}{\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)} \frac{d\Omega^{RoW}}{d\tau_j^M} = 0, \tag{10}$$

$$\tau_s^{X^*} \quad : \quad \frac{\sigma}{\left(\Omega^{US} - \overline{\Omega}^{US}\right)} \frac{d\Omega^{US}}{d\tau_s^{X^*}} + \frac{(1-\sigma)}{\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)} \frac{d\Omega^{RoW}}{d\tau_s^{X^*}} = 0. \tag{11}$$

Intuition from a two-good model. Suppose that country US produces one importable good j and one exportable good s (this means that the foreign country exports the good j and imports the good s). Rearranging (10) and (11) gives

$$\frac{d\Omega^{US}/d\tau_j^M}{d\Omega^{US}/d\tau_s^{X^*}} = \frac{d\Omega^{RoW}/d\tau_j^M}{d\Omega^{RoW}/d\tau_s^{X^*}} \quad \Rightarrow \quad \frac{d\Omega^{US}}{d\tau_j^M} - \left[\frac{d\Omega^{RoW}/d\tau_j^M}{d\Omega^{RoW}/d\tau_s^{X^*}}\right] \frac{d\Omega^{US}}{d\tau_s^{X^*}} = 0. \tag{12}$$

[5] We assume identical preferences for the two types of agents.

[6] Remember that countries only choose import tariffs, i.e., countries cannot subsidy exports.

Consider the following interpretation of expression (12). Suppose that the agreement between countries U and RoW is such that when a country US raises the tariff on exports from country RoW, RoW is "entitled" to increase the tariff on exports from U such that the utility in RoW is unchanged (similarly if RoW is the country raising the tariff). In other words, $\frac{d\Omega^{RoW}/d\tau_j^M}{d\Omega^{RoW}/d\tau_s^{X^*}} = \frac{d\tau_s^{X^*}}{d\tau_j^M}$, because RoW increases its tariff so that Ω^{RoW} remains constant. In this case, the expression between $[\cdot]$ in (12) would represent the increase in the tariff by country RoW in response to an increase in the tariff by country US "authorized" by the agreement in place. Now, this increase in $\tau_s^{X^*}$ would negatively affect country US's (net) welfare because a higher $\tau_s^{X^*}$ lowers the price received by exporters from US.[7]

General case. Now, assume country US (RoW) imports (exports) J goods and exports (imports) G goods. The analysis below focuses on the determination of tariffs from the perspective of the domestic country US. From (10):

$$\frac{d\Omega^{US}}{d\tau_j^M} + \left[\frac{(1-\sigma)/\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)}{\sigma/\left(\Omega^{US} - \overline{\Omega}^{US}\right)}\right]\frac{d\Omega^{RoW}}{d\tau_j^M} = 0. \tag{13}$$

We want to derive an expression for $[\cdot]$ in (13) above. Summing (11) over all goods exported (imported) by country US (RoW):

$$\frac{\sigma}{\left(\Omega^{US} - \overline{\Omega}^{US}\right)}\sum_g \frac{d\Omega^{US}}{d\tau_g^{X^*}} + \frac{(1-\sigma)}{\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)}\sum_g \frac{d\Omega^{RoW}}{d\tau_g^{X^*}} = 0. \tag{14}$$

Isolating $[\cdot]$ from the previous expression gives

$$\left[\frac{(1-\sigma)/\left(\Omega^{RoW} - \overline{\Omega}^{RoW}\right)}{\sigma/\left(\Omega^{US} - \overline{\Omega}^{US}\right)}\right] = -\frac{\sum_g d\Omega^{US}/d\tau_g^{X^*}}{\sum_g d\Omega^{RoW}/d\tau_g^{X^*}}. \tag{15}$$

Substituting (15) into (13) and rearranging, we obtain

$$\frac{d\Omega^{US}}{d\tau_j^M} - \left[\frac{d\Omega^{RoW}/d\tau_j^M}{\sum_g d\Omega^{RoW}/d\tau_g^{X^*}}\right]\sum_g \frac{d\Omega^{US}}{d\tau_g^{X^*}} = 0. \tag{16}$$

where

$$\frac{d\Omega^{US}}{d\tau_j^M} = \frac{\partial\Omega^{US}}{\partial p_j^M}\frac{\partial p_j^M}{\partial\tau_j^M} + \frac{\partial\Omega^{US}}{\partial\tau_j^M}, \quad \text{and} \quad \frac{d\Omega^{US}}{d\tau_s^{X^*}} = \frac{\partial\Omega^{US}}{\partial\overline{p}_s^X}\frac{\partial\overline{p}_s^X}{\partial\tau_s^{X^*}}. \tag{17}$$

Note that in the previous expression $\partial\Omega^{US}/\partial\tau_s^{X^*} = 0$, since the impact of $\tau_s^{X^*}$ on the welfare of country US only takes place through the TOT effects, and for ad-valorem tariffs, $\partial p_j^M/\partial\tau_j^M = \overline{p}_j^M + \tau_j^M\frac{\partial\overline{p}_j^M}{\partial\tau_j^M}$.

[7] We say "net" because the lower price would benefit consumers of the exportable good s in US.

Interpretation of the term between $[\cdot]$ in (16). When country US increases τ_j^M, it affects RoW because τ_j^M has a negative impact on $\overline{p}_j^M$. This effect is captured by $d\Omega^{RoW}/d\tau_j^M$. The increase in τ_j^M "triggers" a response by country RoW, which reacts by raising potentially all tariffs in $\mathbf{t}^{X^*}$.[8] This increase ultimately affects producers and consumers of the exportable goods in country US (because $\tau_s^{X^*}$ negatively affects $\overline{p}_s^X$).

Suppose country US is "small" relative to RoW. In this case, $\partial\overline{p}_j^M/\partial\tau_j^M = 0$ and $d\Omega^{US}/d\tau_j^M = \partial\Omega^{US}/\partial\tau_j^M$, which is the same expression we obtained earlier when only importable goods are considered. However, if $\partial\overline{p}_j^M/\partial\tau_j^M = 0$, then $d\Omega^{RoW}/d\tau_j^M = 0$, so there is no interaction between US and RoW.

2.2 Effect of changes in prices and tariffs on welfare

Impact of a change in $\overline{p}_s^X$. What is the impact on the welfare of US of a change in the international price of exports (due to a change in tariffs by the foreign country RoW)? A change in $\overline{p}_s^X$ (a decrease in $\overline{p}_s^X$ when country RoW imposes a higher import tariff on good s) affects both producers and consumers of good s in US. Producers of good s are active in different regions r in the domestic country. Therefore, the impact of a change in $\overline{p}_s^X$ is spread across all (active) regions in country US affecting welfare in U as follows:

$$\frac{\partial\Omega^{US}}{\partial\overline{p}_s^X} = \sum_r \Gamma_{sr}^{K^X} n_{sr}^{K^X} \left(\frac{q_{sr}^X}{n_{sr}^{K^X}}\right) - \frac{\gamma}{n} D_s^X.$$

However, country RoW chooses a vector of tariffs τ^{X^*} that affect all prices received by domestic producers of exportable goods, $\overline{p}_g^X$. The impact of such change on the domestic country US is

$$\sum_g \frac{\partial\Omega^{US}}{\partial\overline{p}_g^X} = \sum_r \sum_g \Gamma_{gr}^{K^X} n_{gr}^{K^X} \left(\frac{q_{gr}^X}{n_{gr}^{K^X}}\right) - \frac{\gamma}{n} \sum_g D_g^X.$$

Impact of change in p_j^M. The direct impact of changes in domestic prices on the domestic country's welfare (the first term of (17)) is given by

$$\frac{\partial\Omega^{US}}{\partial p_j^M} = \sum_r \Gamma_{jr}^{K^M} n_{jr}^{K^M} \left(\frac{q_{jr}^M}{n_{jr}^{K^M}}\right) + \frac{\gamma}{n}(\tau_j^M \overline{p}_j^M M_j' - D_j).$$

Direct impact of a change in τ_j^M. A change in τ_j^M also affects Ω^{US} by affecting tariff revenue T directly and through its impact on the equilibrium world price $\overline{p}_j^M$:

$$\frac{\partial\Omega^{US}}{\partial\tau_j^M} = \frac{\gamma}{n}\left(\overline{p}_j^M + \tau_j^M \frac{\partial\overline{p}_j}{\partial\tau_j^M}\right) M_j.$$

[8]Note that this is a simultaneous decision.

2.3 Solution - Ad-valorem tariffs

Suppose the weights placed on fixed factors producing importable (exportable) goods is the same across sectors j (g). Specifically, $\Gamma_{jr}^{K^M} = \Gamma_r^{K^M}$, $\Gamma_{sr}^{K^X} = \Gamma_r^{K^X}$. Substituting the previous expressions into (16), gives

$$\left[\sum_r \Gamma_r^{K^M} n_r^{K^M} \left(\frac{q_{jr}^M}{n_r^{K^M}}\right) + \frac{\tau_j^M}{1+\tau_j^M}\frac{\gamma M_j \delta_j}{n} - \frac{\gamma D_j^M}{n}\right]\frac{\partial p_j^M}{\partial \tau_j^M} = -\frac{\gamma \overline{p}_j^M M_j}{n} - \mu_j^{MF}\sum_g \frac{d\Omega^{US}}{dt_g^{X^*}}.$$

Isolating $\tau_j^M/(1+\tau_j^M)$ gives

$$\begin{aligned}\frac{\tau_j^M}{1+\tau_j^M} \quad = \quad & -\frac{1}{\delta_j}\sum_r \left[\frac{\Gamma_r^{K^M} n_r^{K^M}}{\gamma}\left(\frac{n_r}{n_r^{K^M}}\right)\left(\frac{q_{jr}^M}{M_{jr}}\right)\right] \\ & -\frac{1}{\delta_j}\sum_r \left[\frac{\Gamma_r^{K^X} n_r^{K^X}}{\gamma}\left(\frac{n_r}{n_r^{K^X}}\right)\mu_j^{MF}\sum_g \theta_{jg}\left(\frac{q_{gr}^X}{M_{jr}}\right)\right] \\ & +\frac{1}{\delta_j}\left[\frac{\epsilon_j^M}{\epsilon_{X^*}} + \frac{Q_j^M}{M_j} + \mu_j^{MF}\sum_g \theta_{jg}\left(\frac{D_g^X}{M_j}\right)\right], \end{aligned} \tag{18}$$

where $\gamma^L = \sum_r \left(\Gamma_r^{L^0} n_{0r}^L + \Gamma_r^{L^M} n_r^{L^M} + \Gamma_r^{L^X} n_r^{L^X}\right)$, $\gamma^K = \sum_r \left(\Gamma_r^{K^M} n_r^{K^M} + \Gamma_r^{K^X} n_r^{K^X}\right)$, $\gamma = \gamma^L + \gamma^K$, $D_j^M = Q_j^M + M_j$, $M_{jr} = M_j(n_r/n)$, and

$$\delta_j = \epsilon_j^M \frac{(1+\epsilon_j^{X^*})}{\epsilon_j^{X^*}} < 0,\ \theta_{jg} = \frac{\partial \overline{p}_g^X/\partial \tau_g^{X^*}}{\partial p_j^M/\partial \tau_j^M} < 0,\ \mu_j^{MF} = -\frac{d\Omega^{RoW}/d\tau_j^M}{\sum_g d\Omega^{RoW}/d\tau_g^{X^*}} > 0.$$

Expression $\theta_{jg}\left(\frac{D_g}{M_j}\right)$ can be rewritten as $\theta_{jg}\frac{D_g}{M_j} = \widetilde{\theta}_{jg}\frac{\overline{p}_g^X D_g}{p_j^M M_j}$ where

$$\widetilde{\theta}_{jg} = \frac{(p_j^M/\overline{p}_j^M)}{(p_g^{X^*}/\overline{p}_g^X)}\frac{\frac{\epsilon_g^{M^*}}{(\epsilon_g^X - \epsilon_g^{M^*})}}{\frac{\epsilon_j^{X^*}}{(\epsilon_j^{X^*} - \epsilon_j^M)}} < 0.$$

Appendix C – Congressional District Data

Employment Data

Source: Bureau of Labor Statistics. **File names:** 2002_qtrly_by_industry

Data Source: BLS Employment Data

1. Employment by State S and industry IND (E^S_{IND}).
2. Employment by State S for all the manufacturing sector (E^S_{MANUF}).
3. Employment by County C and industry IND (E^C_{IND}): there are non-disclosed observations at this level; however, these values represent a small proportion of total observations (less than 17% of the data).
4. Despite data being reported at the state level, there are a number of non-disclosed observations. In some instances, we use data available at the county level to impute the aggregate as follows:
   (a) Output per worker: $\bar{A}_i = \frac{Employment_i}{RealSectoralOutput_i}$,
   (b) Re-scaled output per worker: $A_i = n\frac{\bar{A}_{ind}}{\sum_{ind \in I} \bar{A}_{ind}}$.

GDP Data

Source: Bureau of Economic Analysis (BEA). **Files names:** SAGDP2N and CAGDP2

Data Source: BEA Output Data

1. GDP by State S and industry IND, for all industries (Y^S_{IND}): these data are dissaggregated for most industries, except for $Y^S_{311-312} = Y^S_{311} + Y^S_{312}$; $Y^S_{313-314} = Y^S_{313} + Y^S_{314}$; and $Y^S_{315-316} = Y^S_{315} + Y^S_{316}$.
   We impute Y^S_{311}, Y^S_{312}, Y^S_{313}, Y^S_{314}, Y^S_{315}, Y^S_{316}, as follows:
   (a) Estimate weights using employment data calculated above:
   $\phi^S_{311} = \frac{N^S_{311}}{N^S_{311}+N^S_{312}}$; $\phi^S_{312} = \frac{N^S_{312}}{N^S_{311}+N^S_{312}}$; $\phi^S_{313} = \frac{N^S_{313}}{N^S_{313}+N^S_{314}}$; $\phi^S_{314} = \frac{N^S_{314}}{N^S_{313}+N^S_{314}}$; $\phi^S_{315} = \frac{N^S_{315}}{N^S_{315}+N^S_{316}}$; and $\phi^S_{316} = \frac{N^S_{316}}{N^S_{315}+N^S_{316}}$
   (b) Calculate Y^S_{311}, Y^S_{312}, Y^S_{313}, Y^S_{314}, Y^S_{315} and Y^S_{316} as:
   $Y^S_{311} = \phi^S_{311} * Y^S_{311-312}$; $Y^S_{312} = \phi^S_{312} * Y^S_{311-312}$; $Y^S_{313} = \phi^S_{313} * Y^S_{313-314}$; $Y^S_{314} = \phi^S_{314} * Y^S_{313-314}$; $Y^S_{315} = \phi^S_{315} * Y^S_{315-316}$; and $Y^S_{316} = \phi^S_{316} * Y^S_{315-316}$
2. GDP by county C and industry IND (Y^C_{IND}): In contrast to state level data, county GDP data are only available at the aggregated level of total manufacturing (and also durables, and non-durables). We construct Y^C_{IND} as follows:
   Calculate employment weights: $\phi^C_{31} = \frac{N^C_{31}}{N^C_{31}+N^C_{32}+N^C_{33}}$; $\phi^C_{32} = \frac{N^C_{32}}{N^C_{31}+N^C_{32}+N^C_{33}}$; $\phi^C_{33} = \frac{N^C_{33}}{N^C_{31}+N^C_{32}+N^C_{33}}$, and impute $Y^C_{31} = \phi^C_{31} * Y^C_{Manuf}$; $Y^C_{32} = \phi^C_{32} * Y^C_{Manuf}$; $Y^C_{33} = \phi^C_{33} * Y^C_{Manuf}$. We proceed similarly to construct each Y^C_{IND}.