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District Heterogeneity, Legislative Bargaining, and Trade Policy

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Abstract

The diverse economic structures of Congressional Districts generate heterogeneous trade policy preferences. The crucial role of these district-level interests in determining trade policy in Congress is largely absent from canonical political economy models of trade (e.g. Grossman and Helpman, 1994). We address this gap by modeling the aggregation of district preferences into national trade policy through legislative bargaining. This supply-side explanation of trade policy builds on the legislative bargaining framework of Baron and Ferejohn (1989) and Celik, Karabay and McLaren (2013). The model yields a unified account of trade policy formation in which institutional design, economic and political geography, and bargaining in the presence of an agenda setter jointly determine the equilibrium level of protection.

Keywords: Trade Policy, Political Economy, Districts, Legislative Bargaining.

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The legislature, were it possible that its deliberations could be always directed, not by the clamorous importunity of partial interests, but by an extensive view of the general good. Smith (1776, p. 472).

1 Introduction

Adam Smith articulates a normative ideal: that legislative deliberations be guided by an extensive view of the general good. In practice, however, the general good might not always find its way into trade policy outcomes. Political economy models of trade explain deviations from free trade as equilibrium outcomes of competing interests within an economy. A central strand of this literature focuses on the demand side of protection, where organized interests influence a policy-maker's objective function through contributions (e.g., Grossman and Helpman, 1994, Magee et al., 1989, Hillman, 1982, Bhagwati and Feenstra, 1982, Tovar, 2011).[1] Grossman and Helpman (1994) provides a demand-for-protection framework in which a unitary government maximizes a weighted sum of aggregate welfare and political contributions, with a parameter measuring the marginal weight placed on citizens' welfare relative to political support.[2]

Classical empirical estimates for the United States imply that this weight is high: in general, organized interests appear to have limited influence on tariff outcomes (Goldberg and Maggi, 1999, Gawande and Bandyopadhyay, 2000, Kee et al., 2007, Eldes et al., 2025). This motivates the need for a supply-side theory of trade policy–how heterogeneous interests are aggregated into collective policy choices that would explain the limited impact of interest groups (see Magee et al., 1989, Mayer, 1984, Dutt and Mitra, 2002, Grossman and Helpman, 2005, Conconi et al., 2014, Goldstein and Gulotty, 2021). The most institutionally important actors in the supply-side of the tariff game, legislators, are muted in these models (Rodrik, 1995, Conconi et al., 2014, Goldstein and Gulotty, 2014, 2021, Grossman and Helpman, 2005). We, therefore, formalize the supply side of trade politics by modeling trade policymaking as a process of legislative bargaining among representatives of heterogeneous districts. In this framework, districts differ in their production structure–determined by the sector of employment of specific factors–and the welfare weights placed on different economic

[1] Seminal papers in this area include the role of interest groups (Magee et al., 1989); political support from producers and consumers (Hillman, 1982); competing lobbies (Bhagwati and Feenstra, 1982, Findlay and Wellisz, 1982, Bombardini, 2008, Kim, 2017); and balancing domestic and foreign policy motivations (Hillman and Ursprung, 1988, Mansfield and Busch, 1995).

[2] Specifically, in Grossman and Helpman (1994), a centralized decision-maker chooses the tariffs that maximize welfare $\Omega = a\,W + C$, where W is aggregate welfare, C campaign contributions, and the parameter a measures the weight the government places on a dollar of citizens' welfare relative to contributions from organized interests.

actors; district representatives carry those preferences to Congress to bargain over national tariffs that determine the relative prices of domestic goods.

The goal of the paper is to provide a unified and tractable analytical framework that integrates political and economic geography, contributing to existing literature (McGillivray, 2004, Redding, 2022, Rodden, 2010, Ma et al., 2026). This approach connects the theory of legislative bargaining, the subject of a large body of research in political science built around the seminal work of Riker (1962) and formalized by Baron and Ferejohn (1989), to the determination of trade policy.[3] In the canonical Baron and Ferejohn (1989) model, an agenda setter proposes a division of a fixed resource among homogeneous agents (see Diermeier et al., 2008, Eraslan and Evdokimov, 2019, for a review of this literature). In our setting, the resource subject to bargaining is real consumption, which is affected by trade policy choices: the tariff vector shifts sectoral relative prices and thus the distribution of welfare across economic activities and districts. The legislature aggregates the heterogeneous tariff preferences of its members through a bargaining process in which an agenda setter proposes a tariff vector and a minimal winning coalition determines whether to adopt it under majority rule (Riker, 1962, Ma et al., 2026).

We replace the unitary government of Grossman and Helpman (1994) with a legislature composed of R districts, where each district produces a subset of the J goods produced nationwide. Our approach consists of first deriving district-preferred tariffs that depend on local economic structure and subsequently aggregating these preferences to characterize a national tariff vector that reflects both economic geography and the underlying political influence of districts, or bargaining weights. Modeling trade policymaking as a process of preference aggregation and bargaining thus "completes" the Grossman-Helpman model (see Rodrik, 1995). By embedding legislative bargaining within a specific factors model of trade, we endogenize how district preferences are aggregated into national tariffs. This framework, thus, provides a tractable structure for estimating district tariff preferences and the welfare and bargaining weights implied by the legislative process (see Gawande et al. (2023)).[4]

[3]Related work by Celik et al. (2013, 2020) extends the legislative-bargaining approach to institutional choices about delegation authority and trade agreements, showing how Congress uses fast-track authority to manage distributive conflict over trade policy.

[4]Gawande et al. (2023) develops a political economy model that endogenizes national tariff-setting by aggregating the heterogeneous trade preferences of congressional districts. The paper estimates the implicit welfare weights placed on specific-factor owners in import-competing and export-oriented sectors that would rationalize observed national tariffs. These weights are interpreted as reflecting the political influence of sectors and districts. In the present paper, however, we provide a theoretical foundation for the factors determining such weights. Specifically, we view them as the outcome of legislative bargaining among districts representing competing interests. Therefore, we see the present paper as complementing Gawande et al. (2023).

Our analysis is related to Celik et al. (2013), which, to our knowledge, is the first attempt to apply the Baron and Ferejohn (1989) legislative bargaining model to trade policy. However, we expand their framework to account for the interplay of economic and political geography in a number of ways. First, we allow districts to exhibit heterogeneous production patterns and possibly produce multiple goods, determined by the spatial allocation of specific factors. Complete specialization, considered in Celik et al. (2013), arises as a special case of our framework.

Second, when a district is not uniquely identified with the production of a single good, its representative may assign different welfare weights to factors and sectors. We therefore allow for flexible welfare weights across specific and mobile-factor owners to capture the differential political influence of these groups at the district level.

Third, each district's unilateral (or unconditional) preferred tariff schedule arises from a welfare-maximization problem micro-founded in economic and political incentives. Under specific assumptions, the analysis yields closed-form solutions in observables, specifically, output-to-import ratios in each sector and their import-demand elasticities. We use this result to derive how district-level tariff preferences, typically unobserved, might look like.

Fourth, the legislative bargaining solution, i.e., the tariff enacted by the winning coalition, can be expressed as a convex combination of the preferred tariffs of coalition members, with bargaining weights determined by participation constraints of coalition members, and by the distance between their preferred tariffs and the status quo. We perform comparative statics on coalition composition and bargaining power, and derive an explicit rule that the agenda setter can use to rank coalitions.

Fifth, we characterize the trade policy formation both in a one-shot game and in a dynamic bargaining environment. In the one-shot game, each district's participation constraint is evaluated at an exogenous reservation utility. In the dynamic game, the reservation utility corresponds to an endogenous continuation value determined by the expected payoffs from future bargaining rounds.

Sixth, we focus primarily on the three-district case to isolate the mechanisms through which economic geography shapes tariffs. However, we also discuss how our conclusions extend to multi-region settings ($R > 3$). Despite the substantial increase in complexity, we numerically show that for $R = 5$, the winning coalition's composition remains a function of the spatial distribution of production.

While the framework yields several implications, two are central. First, the geographic concentration of production determines political influence in legislative bargaining. When production is highly specialized across districts, tariff preferences diverge sharply, and districts with limited tradable production–or fully specialized in the non-tradable good–can become pivotal coalition partners. As production becomes more diversified, preferences converge, coalitions among districts producing tradable goods become easier to sustain, and the influence of districts not producing those tradable goods declines.

Second, comparing the one-shot and dynamic versions of the game shows that continuation values are generally below the static reservation benchmark in our quantitative exercises. In the dynamic setting, participation constraints are relaxed, allowing agenda setters to implement policies closer to their ideal tariffs.

Adding the supply side of protection to a political economy model of trade helps resolve the findings that, despite substantial contributions, the weight on a dollar of welfare relative to a dollar of money contributions is extremely high in the U.S.; that is, interest groups and contributions do not move tariffs as much as expected from the demand-side model of policymaking (see Gawande et al., 2023). In other democracies, on the other hand, where institutions for aggregating the disparate preferences of their constituents are–intentionally or otherwise–weak, money contributions could more easily move tariffs toward particularized interests. The model could provide a framework for explaining the institutional origins of the China shock in the U.S. According to this model, that era's legislative bargaining game can be viewed as one where a pro-free-trade majority formed a winning coalition that excluded the districts most harmed by the deluge of manufacturing imports from China. Given this institutional structure, national policy reflected the interests of the winning majority while leaving the specific protectionist preferences of the losing districts outside the political equilibrium (see Gawande et al., 2023).

2 District Tariff Preferences

The legislative bargaining model requires as input each district's preferred tariff vector. Consider the counterfactual in which a single district sets national trade policy. What tariffs would it choose? We derive the district's preferred tariff vector and illustrate the result in a three-district economy.

2.1 Model

We consider trade policymaking in a small open economy, which takes prices as exogenously given. Two groups of economic agents populate the economy: owners of capital K_j that is specific to the production of good $j = 1, \ldots, J$, and owners of a mobile factor L that is used in the production of all goods. An agent owns one unit of either L or K_j. While the

J goods are produced nationally, their production is dispersed across R districts with equal political representation in the legislature. We model the case of $R = 3$ districts to show the mechanism transparently, and later show how to extend the analysis to more districts.

Factor owners are immobile across the districts, so a district is a local labor market (Topel, 1986, Moretti, 2011, Autor et al., 2013, 2014). The non-specific factor (labor) is mobile across goods, while specific capital owners, by definition, are immobile outside the sector in which they are employed. The population of district r is $n_r = n_r^L + n_r^K = \sum_{j=0}^{J} n_{jr}^L + \sum_{j=1}^{J} n_{jr}^K$, where n_{jr}^K specific factor owners in district r are employed in producing good j. The aggregate population is $n = \sum_{\ell=1}^{R} n_\ell$, where R is the number of districts in the economy.[5]

Goods $j = 1, ..., J$ are tradable at exogenously given world prices (small country assumption). There are no transport costs, and goods are delivered to consumers at domestic prices. Domestic prices are determined by raising or lowering tariffs. These tariff-induced price changes affect domestic production and consumption of goods, and hence affect the welfare of specific factor owners.

Production in districts. Each district produces a non-tradable numeraire good 0 using only the mobile factor (labor) with linear technology. We assume labor is equally productive in the numeraire good regardless of location, which fixes labor's wage in all districts at a uniform national rate, $w_r = w > 0$, regardless of the sector of employment. Units are chosen so that the price of the numeraire good (nationally) is $p_0 = 1$. The price p_j of good $j = 1, ..., J$ is expressed in these units, and $\mathbf{p}$ is the vector of the J domestic prices.

Good j is produced with CRS technology. In district r, the technology combines n_{jr}^L units of labor and (the fixed endowment of) n_{jr}^K units of specific capital. Specific factors earn the indirect profit function $\pi_{jr}(p_j)$, and labor earns a wage w_r regardless of its sector (good) of employment.[6] The output of good j in district r is $q_{jr}(p_j) = \pi'_{jr}(p_j) > 0$ and its aggregate output is $Q_j(p_j) = \sum_\ell q_{j\ell}(p_j)$. A district need not produce all goods. If region r does not produce good j, we assume $n_{jr}^K = n_{jr}^L = 0$ and $\pi_{jr} = 0$.

Preferences. Preferences are homogeneous across individuals in groups L and K, 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 individual. The indirect utility of an individual who spends y on consumption is $y + \sum_j \phi_j(p_j)$, where $\phi_j(p_j) = v_j(p_j) - p_j\, d_j(p_j)$ is the consumer

[5]The subscript j is used to sum over goods (indexed by j) and the subscript ℓ is used to sum over districts (indexed by r).

[6]In the simplified model of Section 4, output per unit of specific capital is denoted σ_{jr}, so that $q_{jr} = \sigma_{jr} n_{jr}^K$.

surplus from good j.[7] The total per capita consumer surplus of the consumption of goods $j = 1, ..., J$ is $\phi(\mathbf{p}) = \sum_j \phi_j(p_j)$. 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. Import demand for good j, M_j, is given by $M_j(p_j) = D_j(p_j) - Q_j(p_j)$. Policy-makers impose a specific per unit tariff t_j on the import of goods j, $j = 1, \ldots, J$. This paper models the determination of these tariffs as the outcome of legislative bargaining. Total revenue generated by the tariffs is $T(\mathbf{p}) = \sum_j (p_j - \overline{p}_j)(D_j(p_j) - Q_j(p_j))$ $= \sum_j (p_j - \overline{p}_j)M_j(p_j)$, where $\overline{p}_j$ is the world price and $t_j = p_j - \overline{p}_j$. Since world prices are fixed, the wedge $(p_j - \overline{p}_j)$ can either be expressed as a specific tariff t_j, or ad valorem tariff $\frac{t_j}{p_j}$.[8] 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 labor owners employed in sector j in district $\{jr\}$ is $W_{jr}^L = n_{jr}^L \left(w_r + \frac{T}{n} + \phi\right)$, and the total utility of specific factor owners in good-district $\{jr\}$ is $W_{jr}^K = n_{jr}^K \left(\frac{\pi_{jr}}{n_{jr}^K} + \frac{T}{n} + \phi\right)$. Both groups share a common per capita tariff revenue, $\frac{T}{n}$, and per capita consumer surplus, ϕ. The expressions differ in the income each agent receives. While a higher tariff increases p_j and lowers ϕ, it raises the return $\frac{\pi_{jr}}{n_{jr}^K}$ to a specific capital owner. These capital owners, therefore, have an interest in demanding a tariff on imports of j.

2.2 District preferred tariff

Tariffs are decided at the national level, and the goal of the paper is to present a model of how a policymaking body comprising representatives from each district – like the U.S. House of Representatives – arrives at the national tariffs. This requires answers to two questions. If individual districts were granted authority to choose tariffs for the entire nation, what would their preferred tariffs be? How are these district preferences aggregated into national tariffs? This section answers the first question.

A representative of district r chooses (national) tariffs to maximize the district's welfare, defined as a weighted sum of the welfare of each factor owner in the district. Welfare weights on the two groups of factor owners are allowed to differ across districts and sectors (goods) (see Gawande et al., 2023). In district r, a unit of a specific factor employed in producing

[7] The index r is dropped from the demand functions because prices are nationally determined and so demand functions do not change across districts.

[8] Let $\hat{\tau}_j$ denote an ad valorem tariff such that $(1 + \hat{\tau}_j)\overline{p}_j = p_j$. Then, $\hat{\tau}_j\overline{p}_j = p_j - \overline{p}_j$, and $t_j = \hat{\tau}_j\overline{p}_j$. Additionally, note that $\tau_j \equiv \frac{\hat{\tau}_j}{1+\hat{\tau}_j} = \frac{t_j}{p_j}$. Tariffs can take either positive or negative values (representing import subsidies). If we assume non-negative tariffs, as observed in the U.S., the results require minor adjustments, but the primary conclusions from the analysis remain valid.

good j gets welfare weight Λ_{jr}^K and a unit of labor in good j gets welfare weight Λ_{jr}^L. Our model allows for general welfare weights.[9] 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 $\mathbf{p} = (p_1, ..., p_J)$. The small open economy assumption implies a one-to-one relationship between the tariff t_j and price p_j (the world price $\overline{p}_j$ is exogenous), and total welfare W_{jr}^m for the two types of factors are functions of tariffs.

District r's aggregate welfare may be decomposed as

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

The first parenthesis decomposes welfare for a non-specific factor owner (labor) producing good j as the sum of wage, per capita tariff revenue, and consumer surplus. The second parenthesis decomposes welfare for a specific factor owner producing good j as the sum of per capita returns to owners of good j-specific factors, $\frac{\pi_{jr}}{n_{jr}^K}$, per capita tariff revenue, and consumer surplus. District r's total welfare Ω_r is the aggregate welfare-weighted sum of the two components.

Noting that T, ϕ and π_{jr} are functions of the tariff $t_j, j = 1, \ldots, J$, district r's unconstrained preferred tariffs are obtained by maximizing (1) for each t_j. The term unconstrained refers to the fact that these tariffs would be unilaterally chosen by district r, considering only their impact on the district's welfare. Denote the aggregate welfare weights on specific capital owners in district r as $\lambda_r^K = \sum_{j=1}^J \lambda_{jr}^K$ and on owners of labor in district r as $\lambda_r^L = \sum_{j=0}^J \lambda_{jr}^L$, where $\lambda_{jr}^m = \Lambda_{jr}^m n_{jr}^m$. Let $\lambda_r = \lambda_r^L + \lambda_r^K$ denote the total welfare of factor owners in district r. The following proposition answers the question posed at the beginning of the section. It describes district r's preferred ad valorem tariff on good j, $\tau_j = \frac{t_j}{p_j}$.

Proposition 1. *Given the small open economy assumptions and the welfare weights defined in equation* (1)*, district r's most preferred national tariff protection on good j is equal to*

$$\tau_{jr} = \frac{\Lambda_{jr}^K n}{\lambda_r} \left(\frac{q_{jr}/M_j}{-\epsilon_j} \right) - \left(\frac{Q_j/M_j}{-\epsilon_j} \right), \tag{2}$$

[9] These weights may be endogenized or determined by specifying an underlying political economy structure.

where $\tau_{jr} = \frac{t_{jr}}{p_j}$ *is the ad valorem tariff on good* j*, and* $\epsilon_j = M_j' \left(\frac{p_j}{M_j}\right)$.

Proof. From the FOC with respect to t_{jr} and using the market clearing condition $D_j = Q_j + M_j$, t_{jr} is (implicitly) defined by:

$$t_{jr} = \frac{n}{-M_j'}\left[\frac{\lambda_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right], \quad \text{or} \quad \tau_j \equiv \frac{t_j}{p_j} = \frac{n}{-\epsilon_j M_j}\left[\frac{\lambda_{jr}^K}{\lambda_r}\frac{q_{jr}}{n_{jr}^K} - \frac{Q_j}{n}\right]. \tag{3}$$

Note that the variables M_j', q_{jr}, Q_j and ϵ_j are all evaluated at t_{jr}. The expression on the right uses good j's import demand elasticity $\epsilon_j = M_j' \left(\frac{p_j}{M_j}\right)$. □

Equation (2) captures producers' interests in district r, aggregate consumer surplus, and government revenue. District r's preferred tariff on good j is influenced by three variables: the tariff on good j increases with the district's output-to-import ratio of good j (rents from the higher output accruing to specific factor owners in the district); the tariff decreases with the good's national output-to-import ratio (reduced consumer surplus); and, the tariff decreases with the good's absolute import demand elasticity (Ramsey pricing).

Assuming $M_{jr} = M_j \times \left(\frac{n_r}{n}\right)$, we can rewrite equation (2) as

$$\tau_j = \frac{\Lambda_{jr}^K n_r}{\lambda_r}\left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right) - \left(\frac{Q_j/M_j}{-\epsilon_j}\right), \tag{4}$$

This expression predicts tariffs with district output-to-import ratios under the assumption that M_j is distributed according to district population, so district r's imports of j, M_{jr}, equals $M_j \times \left(\frac{n_r}{n}\right)$.[10]

An institutional interpretation of (4) is as follows. District r 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 specific factors are represented via $\frac{\Lambda_{jr}^K n_r^K}{\lambda_r}\left(\frac{q_{jr}/M_{jr}}{-\epsilon_j}\right)$. The nation's interest is the opposite – the reduction of consumer surplus and lower tariff revenue as imports fall – as captured by $\frac{Q_j/M_j}{-\epsilon_j}$. In a majoritarian electoral system such as the U.S., a representative of a Congressional District is incentivized to choose national trade policy to be τ_j defined by (2), which maximizes the welfare (1) of the economic interests in the district the member of Congress represents.[11]

[10] The assumption is $M_{jr} = M_j(n_r/n)$ is imposed because district-level imports are unobserved. This may attenuate within-industry heterogeneity in district import exposure.

[11] We assume that tariff revenue is distributed across districts on a per capita basis, and that preferences are the same across districts.

2.3 Estimating District Level Tariff Preferences

The mapping in (4) translates unobservable district-specific tariff preference into primitive inputs needed for the legislative bargaining model in Section 3 below. To reiterate, these counterfactual district tariffs are model-based measures of underlying demand for protection driven by local economic interests that the legislative bargaining process must later reconcile into national tariffs. Here, we quantify this unobserved demand for protection by districts using the prediction for τ_{jr} given by (4). To construct the counterfactual measures, we compile a spatial data set combining industry-district output (q_{jr}), imports (M_j), import demand elasticities (ϵ_j), and ad valorem tariffs (τ_j) from the sources detailed below.

Data and sources. Output and employment data are from the Census Bureau (County Business Patterns (CBP), 2002); these data 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 (the year 2002).[12] The year 2002 is chosen also for the window it provides at the inception of the "China's shock," the subject of intense recent research.[13] Import and tariff data are from the United States International Trade Commission's DataWeb.[14] Ad valorem tariffs, from USTradeOnline, are based on duties collected at customs and measured at HS 10 digits. Import elasticities at 6-digit HS are from Kee et al. (2008). The share of workers in district r who own specific capital in any sector, $\frac{n_r^K}{n_r}$, is based on the ratio of non-production to production workers.[15] District r's sectoral manufacturing employment is from the 2000 County Business Patterns, in turn, from the Geographical Area Series of the 2000 Census of Manufacturing.

District preferred tariff estimates. For the counterfactual exercise, we fix the ratio $\frac{\Lambda_{jr}^K}{\Lambda_{jr}^L}$ equal to one (equal weights) for all j, r, and predict the vector of tariffs $\boldsymbol{\tau}_r$ for district $r = 1, \ldots, 433$. Table 1 reports the average observed tariffs, observed (tariff-equivalents of) non-tariff measures (NTMs), and model-predicted district-level tariffs and NTMs for the twenty NAICS-3 industries. Consistent with (4), the preferred tariff in each district increases

[12] Due to non-disclosure restrictions we lose data for two of the 435 congressional districts. In other cases (approximately 17% of the sample), we can impute missing district-industry output data using available district-industry employment data.

[13] The implications of these results for research on the China shock are in a companion paper (Gawande et al., 2023).

[14] See USITC DataWeb.

[15] The Census of Manufacturing provides data on national manufacturing employment and the proportion of production $\frac{n^L}{n}$ and non-production workers $\frac{n^K}{n}$ in each NAICS industry. The ratio $\frac{n_r^K}{n_r}$ is computed as the average of the national proportions using district r's sectoral manufacturing employment as weights. Alternative measures based on the classification of occupations in manufacturing and services (Autor and Dorn, 2013) have ratios similar to those used in our estimations, but are not available at the district level.

with the district's output-to-import ratio for a good, and decreases with the *national* output-to-import ratio as well as the (absolute) import-demand elasticity. Predicted district tariffs are typically higher than observed tariffs: while mean statutory tariffs and NTMs are modest (3.5 percent for tariffs and 13 percent for ad valorem equivalent NTMs), the model predicts greater district demand. The demand for protection is especially high for industries that are geographically concentrated. The simple average of predicted tariffs across 433 congressional districts (Column 6) reveals considerable industry heterogeneity. Sectors such as food processing, wood, non-metallic minerals, and furniture exhibit the highest implied protection because they combine low import elasticities and geographically concentrated output. The last column lists the number of districts with positive predicted tariffs, indicating that only a minority of districts–on average, about one-third–would demand positive protection even in these industries.

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

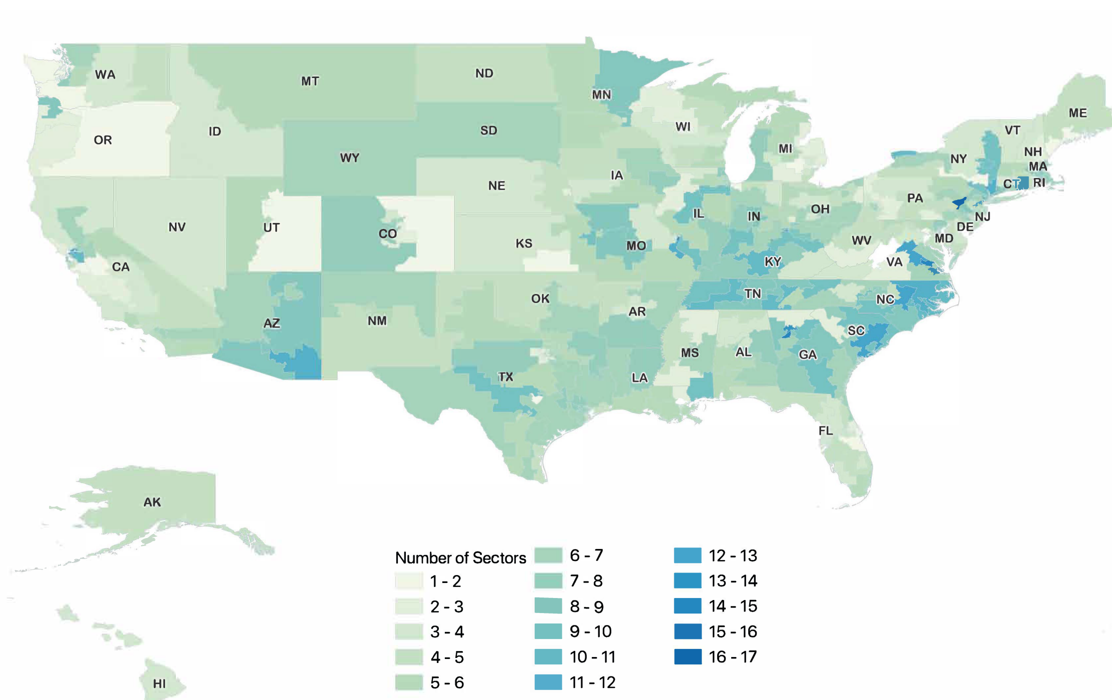
NAICS-3 Industry	Tariffs		Core NTMs		Predicted	No. of CDs
No. & Label	No. of lines	Average	No. of lines	Average	τ_{jr}	with $\tau_{jr} > 0$
311 - Foods	1,061	0.056	966	0.411	1.225	190
312 - Beverages	78	0.017	74	0.094	0.546	147
313 - Textiles	695	0.078	606	0.181	0.477	77
314 - Text. Prods.	225	0.044	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. (2008). Core NTMs include: price controls, quantity restrictions, monopolistic measures, and technical regulations.

These district-level tariff preferences can be thought of as constituting the primitive inputs of the legislative bargaining model developed in Section 3.

Figure 1 maps the number of three-digit industries for which each congressional district is predicted to demand positive tariffs. The map suggests that the distribution of district-level demand for protection, τ_{jr}, varies widely across districts and industries. Although predicted industry-district tariffs can be large, the overwhelming majority of predicted industry-district tariffs are zero, as shown in the last column of Table 1. That is, a few industry-district tariffs account for the high averages in the table. Districts in the industrial Midwest, the South, and parts of the Pacific Northwest appear to have the highest counts of sectors with predicted tariffs greater than zero, reflecting the concentration of manufacturing industries in these districts. In contrast, coastal and service-oriented districts display few or no positive tariff preferences. The geographic pattern illustrates the model's central implication that tariff and NTM preferences are highly uneven, shaped by the spatial distribution of specific-factor ownership. Importantly, in districts with positive tariffs, the implied demand for protection far exceeds the protection actually granted to the industry in 2002 as reflected in Table 1. The primary reason is the institution of legislative bargaining that drives the aggregation of those preferences.

Figure 1: Number of NAICS 3-digit industries with positive predicted district-level tariffs



A message from this counterfactual exercise is that district representatives have little chance of getting their preferred tariffs. For an individual district, $\frac{q_{jr}/M_{jr}}{-\epsilon_j} > \frac{Q_j/M_j}{-\epsilon_j}$ only if the output of j is concentrated relative to the rest of the districts. A coalition C of districts with output-to-import ratio $\frac{q_{jr}/M_{jr}}{-\epsilon_j} > \frac{Q_j/M_j}{-\epsilon_j}$ for all $r \in C$ has a better chance of obtaining at least some protection (than if each r went alone) in the legislative bargain over the national tariff schedule. The bargain ultimately determines the welfare that the winning coalition earns for specific factors in their districts and sectors relative to other coalitions. The bargaining process of aggregation of district preferences into national tariffs is the subject of the remainder of the paper.

3 National Tariffs: A Legislative Bargaining Solution

How are the tariff preferences of each of the three districts characterized in Proposition 1 aggregated into a national tariff for good j? To answer this question, the focus of our paper, we draw on the legislative bargaining literature (Baron and Ferejohn, 1989, Eraslan and Evdokimov, 2019, Celik et al., 2013). The canonical Baron-Ferejohn model considers the problem of distributing a fixed amount of money A among n (homogeneous) districts.[16] The Baron-Ferejohn model predicts the distribution of gains in a legislature under different voting rules. An agenda-setter proposes a distribution of A across districts, with the motion holding if a majority of the districts vote in favor. Under closed rule voting, the session terminates if the proposal by the agenda setter is rejected. We model a legislative bargaining game that aggregates heterogeneous tariff preferences of districts into national tariffs. We use a variation of Celik et al. (2013) with the important difference that, in our solution, tariffs determined by the winning coalition depend not only on the geographic concentration of economic activity but also reflect welfare weights on specific capital owners and mobile factor across districts, and mobile factor owners nationally, implied by the bargaining process.[17] To gain intuition, we begin by presenting a one-period model of aggregating district tariff preferences for good j, t_{jr}, for $R = 3$, into the national tariff t_j. We later extend the analysis and consider infinite rounds of bargaining.[18]

[16]See Eraslan and Evdokimov (2019) for a review of this literature.

[17]The model allows for weights on mobile factors to vary across districts; see Gawande, Pinto and Pinto (2023)

[18]While our framework is closely related to Celik et al. (2013), our analysis and focus depart in significant ways. First, in Celik et al. (2013), districts fully specialize in producing a single good. In our setup, districts may produce several goods, so complete specialization is a special case. This is relevant because in our framework, the spatial allocation of specific factors across districts is a key determinant of the type of coalitions that may arise in equilibrium (see Gawande et al., 2023). Second, Celik et al. (2013) uses a utilitarian welfare function, where different types of production factors receive equal weights, and assumes identical productivity across sectors (and therefore districts). Our setup allows, in general, different welfare weights and different productivities across both sectors and districts. Finally, while in Celik et al. (2013), the size of the district is relevant in determining the majority coalition, the outcomes in the present model depend on the concentration of sectoral production across districts.

3.1 The Model: One-Shot Game

In Section 2, we showed that district r would choose the tariff described by (2) if it could impose its preferences over the other districts. However, it takes a majority of districts to legislate tariffs. Therefore, individual districts will bargain and form a majority coalition to determine national tariffs. We assume the national tariff must be decided in one round of bargaining among the three districts.[19] The population in each district is denoted by n_r. We will later assume that districts have the same number of residents $n_r = n_o$ (equal national representation), so $n = Rn_o$. Suppose district a is randomly selected to be the agenda setter.[20] Since $R = 3$, a's proposal is implemented if at least one other district, district r, joins to form a majority coalition. The objective of the agenda setter is to attract one other district to the coalition at the minimum possible cost to a.[21] We solve the problem in two stages.

First stage. In the first stage, the agenda setter proposes a vector of (specific) tariffs $\mathbf{t} = \{t_1, \ldots, t_j, \ldots, t_J\} \geq 0$ to r that maximizes district a's welfare $\Omega_a(\mathbf{t})$ subject r's participation constraint (PC), $\Omega_r(\mathbf{t}) \geq \overline{\Omega}_r$, where $\overline{\Omega}_r \equiv \Omega_r(\overline{\mathbf{t}})$ is r's utility evaluated at $\overline{\mathbf{t}}$, the vector of existing (or status quo) tariffs.[22] The proposal must give higher utility than the status quo for the agenda setter as well (must satisfy individual rationality), which implies that $\Omega_a(\mathbf{t}_a^r) \geq \overline{\Omega}_a$. This condition is verified in the second stage. The solution tariff vector for each r is denoted by $\mathbf{t}_a^r$, and district a receives utility $\Omega_a(\mathbf{t}_a^r)$. Specifically, district a maximizes the Lagrangian $\mathscr{L}_a = \Omega_a(\mathbf{t}) + \rho_a^r[\Omega_r(\mathbf{t}) - \overline{\Omega}_r]$ with respect to $\mathbf{t}$, where $\rho_a^r \geq 0$ denotes the Lagrange multiplier for each $r \neq a$.

When the constraint binds, $\Omega_r(\mathbf{t}) = \overline{\Omega}_r$ and $\rho_a^r = -\frac{\partial \Omega_a / \partial t_j}{\partial \Omega_r / \partial t_j} > 0$ for at least one good j. To satisfy $\rho_a^r > 0$, the numerator and denominator must have opposite signs: conceding a higher t_j to satisfy r lowers a's welfare. The size of ρ_a^r depends on the rate of this trade-off at the constrained maximum. If both the utility of the agenda setter Ω_a and the utility of the other district in the coalition Ω_r change in the same direction as t_j gets higher, and this

[19] Theoretically, a high discount rate limits the bargaining to one period. As described below, this assumption is consistent with how actual tariffs are institutionally determined.

[20] We assume each district is selected as the agenda setter with equal probability $1/R$. Non-uniform probabilities (reflecting, for instance, committee chairmanships) would alter the weights on each district's preferred tariff in the dynamic equilibrium.

[21] In general, the agenda setter a would need to offer tariff concessions to another district r in the economy, resulting in a tariff vector that in general does not coincide with the agenda setter's unconstrained most preferred tariff vector.

[22] To clarify the notation, we let $\overline{\Omega}_r$ denote the reservation utility in the static (one-shot) bargaining game at the existing status quo tariffs $\overline{\mathbf{t}}$. In our benchmark specifications, we assume a "free-trade" status quo such that $\overline{\Omega}_r = \Omega_r(\mathbf{0})$ (i.e., $\overline{\mathbf{t}} = \mathbf{0}$). In the dynamic extension of the model, the reservation utility is given by the endogenous continuation value, denoted by d_r.

holds for all goods, then the constraint will likely not bind and $\rho_a^r = 0$. For instance, if both $\frac{\partial \Omega_a}{\partial t_j} > 0$ and $\frac{\partial \Omega_r}{\partial t_j} > 0$, then raising t_j increases Ω_a and Ω_r relaxing the constraint so that $\Omega_r(\mathbf{t}_a) > \overline{\Omega}_r$. In this scenario, a higher t_j aligns the interests of the coalition members.

The solution to this problem gives the vector of specific tariffs that district a would propose to district r, *conditional* on being accepted by district r (i.e., they satisfy district r's participation constraint). For each $j = 1, \ldots, J$, the solution tariff, denoted by t_{ja}^r, can be (implicitly) characterized by

$$t_{ja}^r = \frac{n}{-M_j'(t_{ja}^r)} \left[\alpha_a^r(t_{ja}^r) \frac{\lambda_{ja}^K}{\lambda_a} \frac{q_{ja}(t_{ja}^r)}{n_{ja}^K} + [1 - \alpha_a^r(t_{ja}^r)] \frac{\lambda_{jr}^K}{\lambda_r} \frac{q_{jr}(t_{ja}^r)}{n_{jr}^K} - \frac{Q_j(t_{ja}^r)}{n} \right], \tag{5}$$

where the bargaining weight $\alpha_a^r(t_{ja}^r) \equiv \frac{\lambda_a}{\lambda_a + \rho_a^r(t_{ja}^r)\lambda_r} \geq 0$.[23] Note that the endogenous variables M_j, M_j',$\epsilon_j, q_{j\ell}, Q_j$, including α_a^r, are all evaluated at t_{ja}^r. The following proposition summarizes the result with ad valorem tariffs, $\tau_{jr} = \frac{t_{jr}}{p_j}$.

Proposition 2. *Assume quasi-linear and additive separable preferences. Then, the ad valorem tariff on good j proposed by the agenda setter to district r that would be accepted by r is given by*

$$\tau_{ja}^r = \frac{n}{-\epsilon_j(\tau_{ja}^r) M_j(\tau_{ja}^r)} \left[\alpha_a^r(\tau_{ja}^r) \frac{\lambda_{ja}^K}{\lambda_a} \frac{q_{ja}(\tau_{ja}^r)}{n_{ja}^K} + [1 - \alpha_a^r(\tau_{ja}^r)] \frac{\lambda_{jr}^K}{\lambda_r} \frac{q_{jr}(\tau_{ja}^r)}{n_{jr}^K} - \frac{Q_j(\tau_{ja}^r)}{n} \right], \tag{6}$$

where $\lambda_{jr}^K = \Lambda_{jr}^K n_{jr}^K$ is the aggregate welfare weight placed on special interests in district r, $\lambda_r = \Lambda_{0r}^L n_{0r}^L + \sum_m \sum_j \Lambda_{jr}^m n_{jr}^m$ is the aggregate welfare weight on the district ℓ's population (similarly for district a), and the weight $\alpha_a^r(\tau_{ja}^r) = \frac{\lambda_a}{\lambda_a + \rho_a^r(\tau_{ja}^r)\lambda_r} \in [0,1]$ is a function of the Lagrange multiplier ρ_a^r.

Proof. See Appendix Appendix A. □

Under standard concavity assumptions (single-peaked welfare in each tariff), the constrained tariff τ_{ja}^r will be between the unconstrained preferred tariffs τ_{ja} and τ_{jr}, as established in Proposition 3 below.

Proposition 3. *Consider good j and let τ denote its ad valorem tariff (ignoring the subscript j). Let each district $\ell = a, r$ have welfare $\Omega_\ell(\tau)$ that is twice continuously differentiable, strictly concave, and single-peaked with unique maximizer $\tau_{j\ell}$, district ℓ's unconstrained preferred tariff. Let $\overline{\Omega}_r = \Omega_r(\tau_0)$ denote district r's outside option for some tariff τ_0. Define*

[23] This weight will be restated under different assumptions in Sections 4 and 5.

the acceptance set (PC) for district r as $\mathcal{A}_r(\tau_0) = \{\tau : \Omega_r(\tau) \geq \Omega_r(\tau_0)\}$. Suppose that $\overline{\Omega}_r \leq \max_\tau \Omega_r(\tau) = \Omega_r(\tau_{jr})$, so that $\mathcal{A}_r(\tau_0) \neq \emptyset$. The agenda setter a chooses τ to maximize $\Omega_a(\tau)$ subject to $\tau \in \mathcal{A}_r(\tau_0)$. Let τ_{ja}^r denote the solution to this problem. Then, $\min\{\tau_{jr}, \tau_{ja}\} \leq \tau_{ja}^r \leq \max\{\tau_{jr}, \tau_{ja}\}$. That is, the constrained tariff for good j lies between the unconstrained preferred tariffs of districts a and r.

Proof. See Appendix Appendix B. □

The tightening of the participation constraint (higher ρ_a^r) tends to shift the negotiated tariff τ_{ja}^r from the agenda setter's unconstrained preferred tariff toward r's preferred tariff. Specifically, when the constraint does not bind and $\rho_a^r = 0$, $\alpha_a^r = 1$, so $\tau_{ja}^r = \tau_{ja}$; and when $\rho_a^r \to \infty$, $\alpha_a^r \to 0$, so $\tau_{ja}^r = \tau_{jr}$.

Under slightly stronger conditions, the RHS of equation (5) does not depend on t_{ja}^r. Consequently, we can express t_{ja}^r as a convex combination of the unconstrained tariffs, i.e., the constrained tariff τ_{ja}^r lies between the unconstrained preferred tariffs τ_{ja} and τ_{jr}.[24]

Corollary 1. *Suppose that (i) the supply of good j in district r is fixed, and (ii) M_j' is constant (linear import demand). Then, when t_{ja}, t_{jr}, ρ_a^r are positive, the tariff proposed by a to r in (5) is a weighted average of district tariff preferences,*

$$t_{ja}^r = \alpha_a^r t_{ja} + (1 - \alpha_a^r) t_{jr}. \tag{7}$$

Using the definition of ad valorem tariff $\tau_{ja}^r = \frac{t_{ja}^r}{p_j}$, the proposal may be expressed in ad valorem terms as the weighted average

$$\tau_{ja}^r = \alpha_a^r \tau_{ja} + (1 - \alpha_a^r) \tau_{jr}. \tag{8}$$

Here, α_a^r is primarily a function of $\overline{\Omega}_r$. We will later illustrate this result assuming specific functional forms.

Second stage. In the second stage, the agenda setter a solves for the optimal coalition. Specifically, a chooses to form a coalition with district r and implement the tariff vector $\mathbf{t}_a^r$ that gives a the highest utility and also satisfies a's PC, i.e., (i) $\Omega_a(\mathbf{t}_a^r) \geq \Omega_a(\mathbf{t}_a^{r'})$, and (ii) $\Omega_a(\mathbf{t}_a^r) \geq \overline{\Omega}_a$. We denote by $m(a)$ district a's partner in the optimal coalition for a. More precisely, $m(a) = \arg\max_{\ell \in \{r, r'\}} \{\Omega_a(\mathbf{t}_a^\ell) : \Omega_a(\mathbf{t}_a^\ell) \geq \overline{\Omega}_a\}$. If $\overline{\Omega}_a > \max_\ell \Omega_a(\mathbf{t}_a^\ell)$, the agenda setter prefers to maintain the status quo tariffs, or $m(a) = \emptyset$.

[24] Celik et al. (2013) adopt functional forms that satisfy the conditions stated in Corollary 1. In order to derive additional results, we will make similar assumptions in Section 4.

When $R = 3$, eight possible coalition profiles may arise in equilibrium, one for each agenda setter a and potential partner $\{r, r'\}$. The equilibrium coalition profile is a list $\{a, m(a)\}$ for each a, where $m(a) \in \{r, r', \emptyset\}$, and $a \neq \{r, r'\}$.

The tariff on good j to emerge from this bargaining process is the tariff proposed by district a and accepted by district r, which may be characterized as a weighted average of per capita specific factor output in districts a and r, as in the general case (6), or as a convex combination of the unconstrained tariffs preferred by districts a and r, as in (7) or (8), where the weights are determined by the legislative bargaining process. This property of the proposed tariffs extends naturally to the more general cases with multiple bargaining rounds and additional districts.

Two features of status quo tariffs, which we will characterize further in the following sections, are notable. The first concerns how much lower the status quo utility for district r is relative to its utility under a's proposal. When the status quo utility is relatively low, the Lagrange multiplier ρ_a^r tends to zero. That is, it is "cheap" for district a to attract r to the coalition. Since the bargaining weight $\alpha_a^r(t_{ja}^r) = \frac{\lambda_a}{\lambda_a + \rho_a^r(t_{ja}^r)\lambda_r}$ (Proposition 2), in the limit as ρ_a^r tends to zero, α_a^r approaches 1, and a proposes a vector of tariffs that is the same as its preferred tariff vector (5), which r accepts. If, on the other hand, $\rho_a^r > 0$ and the constraint for r is binding, then $0 < \alpha_a^r < 1$ and the agenda setter's proposal must place positive welfare weight on specific factors in district r.

The second concerns the distance of a's utility at the status quo tariff $\bar{t}_j$ from its constrained utility at the tariff proposed to r, t_{ja}^r, a key consideration in the second stage. A tariff t_{ja}^r that gives more weight to r's preferred tariff entails a large utility cost for the agenda setter a. If district r has a relatively high status quo utility level compared to the other district (and its participation constraint is likely to bind strongly), then it is more costly to attract. Such a district has a larger multiplier ρ_a^r, and larger bargaining weight $(1 - \alpha_a^r)$. Since this adversely affects a's welfare $\Omega_a(\mathbf{t}_a^r)$, in the second step the agenda setter is pushed to coalesce with the other district, less constrained by the status quo.[25]

While the preceding analysis characterizes equilibrium properties of the one-shot game, we next introduce a simplified version of the model to derive explicit closed-form solutions and offer a clearer intuition regarding the national tariff determination process. This framework is particularly useful when we later extend the model to a dynamic setting with multiple rounds of bargaining, as it provides the analytical tractability required to examine how the possibility of repeated negotiations affects each district's influence in the legislative process.

[25] While the characterization of the winning coalitions could be quite complicated, we attempt to underscore the fact that the resulting tariff scheme would follow expressions (8) or (15).

4 A Simplified Framework

To derive analytical results, we apply specific functional forms for preferences and production, consistent with the assumptions stated in Corollary 1, to the general framework developed in Section 2. In this way, we can obtain closed-form solutions for preferred and constrained tariffs, allowing us to characterize the level of trade protection chosen by districts with heterogeneous productive structures.

Suppose the utility of a representative consumer in region r is $u = x_0 + \sum_j (a_j x_j - b_j x_j^2/2)$, with $a_j > p_j$, $b_j > 0$. Demand is $d_j \equiv d_j(p_j) = (a_j - p_j)/b_j$, $D_j = nd_j$, and consumer surplus is $\phi(\mathbf{p}) = \sum_j (a_j - p_j)^2/2b_j = \sum_j d_j^2/2$.[26] On the production side, a unit of specific capital is used to produce σ_{jr} units of good j in region r. Then region r produces $q_{jr} = \sigma_{jr} n_{jr}^K$ units, and the aggregate output of good j is $Q_j = \sum_\ell q_{j\ell}$ (output is assumed inelastic).[27] Finally, aggregate imports of good j are $M_j = D_j - Q_j$, and tariff revenue from these imports are $T_j = \sum_j t_j(D_j - Q_j)$. In this case, $M_j' = D_j' = -n/b_j$, and import demand elasticity is $\epsilon_j = M_j'(p_j/M_j) = -(n/b_j)(p_j/M_j)$. To simplify the exposition, we assume $b_j = 1$ hereafter. Note that the model assumptions are consistent with the conditions established in Corollary 1.

4.1 General Weights

Total welfare of (the population of) district r is $\Omega_r = \Omega_r^L + \Omega_r^K = \sum_j \Lambda_{jr}^L n_{jr}^L \omega_{jr}^L + \sum_j \Lambda_{jr}^K n_{jr}^K \omega_{jr}^K$, where $\omega_{jr}^L = 1 + \phi + \frac{T}{n}$, and $\omega_{jr}^K = p_j \sigma_{jr} + \phi + \frac{T}{n}$. Then, for any tariff vector $\mathbf{t}$, district r's welfare can be expressed as

$$\Omega_r(\mathbf{t}) = \underbrace{\lambda_r \phi(\bar{\mathbf{p}}) + \lambda_r^L + \sum_j \lambda_{jr}^K \bar{p}_j \sigma_{jr}}_{\Omega_r(0)} + \sum_j \left(\lambda_{jr}^K \sigma_{jr} - \lambda_r \frac{Q_j}{n}\right) t_j - \frac{\lambda_r}{2} \sum_j t_j^2. \tag{9}$$

Note that the first three terms capture district r's welfare at $\mathbf{t} = 0$ ("free trade"), denoted by $\Omega_r(0)$.[28]

[26] Similar functional forms are used by Celik et al. (2013).

[27] To be more specific, consider a Leontief production function $q_{jr} = \min\{\sigma_{jr} n_{jr}^K, \sigma_{jr}^L n_{jr}^L\}$. Under cost minimization: $\sigma_{jr} n_{jr}^K = \sigma_{jr}^L n_{jr}^L \Rightarrow n_{jr}^L = \frac{\sigma_{jr}}{\sigma_{jr}^L} n_{jr}^K$. Using the production function, $q_{jr} = \sigma_{jr} n_{jr}^K$, since n_{jr}^K is fixed and the firm adjusts labor accordingly, paying w per unit of n_{jr}^L. Therefore, the total rent of the fixed factor is $\left(t_j + \bar{p}_j - \frac{w}{\sigma_{jr}^L}\right) \sigma_{jr} n_{jr}^K$. In the present setup, $\bar{p}_j$, σ_{jr}^L, and w are all parameters. We assume $\overline{p}_j^n = \overline{p}_j - \frac{w}{\sigma_{jr}^L}$, and $\widetilde{p}_j = t_j + \overline{p}_j^n$. When $\overline{p}_j^n > 0$, it is profitable to produce good j even when $t_j = 0$.

[28] We will later conveniently use $\Omega_r(0)$ as the reservation welfare in the constrained problem.

Unconstrained tariffs. District r's unconstrained preferred (specific) tariff on good j is

$$t_{jr} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \sum_{\ell=1}^{R} \frac{n_{j\ell}^K}{n}\sigma_{j\ell} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n}, \tag{10}$$

where $\lambda_{jr}^K = \Lambda_{jr}^K n_{jr}^K$ is the aggregate welfare weight placed on specific capital owners (the special interests) in district r, $\lambda_r = \Lambda_{0r}^L n_{0r}^L + \sum_m \sum_j \Lambda_{jr}^m n_{jr}^m$ is the aggregate welfare weight on the district r's population, with $m \in \{L, K\}$, and $\frac{Q_j}{n} = \sum_\ell \frac{n_{j\ell}^K}{n}\sigma_{j\ell}$. The unconstrained preferred tariff for good j when r does not produce good j is $t_{jr} = -\frac{Q_j}{n} < 0$.

Let $\mathbf{t}_r \in \mathbb{R}^J$ denote the vector of unconstrained preferred tariffs for district r. Substituting into (9), gives

$$\Omega_r(\mathbf{t}_r) = \Omega_r(0) + \frac{\lambda_r}{2}\sum_{j=1}^{J}\Bigg(\underbrace{\frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n}}_{t_{jr}}\Bigg)^2, \tag{11}$$

Using this expression, we can write the welfare function (9) as

$$\Omega_r(\mathbf{t}) = \Omega_r(\mathbf{t}_r) - \frac{\lambda_r}{2}\left\|\mathbf{t} - \mathbf{t}_r\right\|^2, \tag{12}$$

where $\|\mathbf{t} - \mathbf{t}_r\|^2$ is the squared Euclidean distance from the district's preferred tariff vector. Equation 12 makes it clear that the "cost" for district r of a national protection policy $\mathbf{t}$ is proportional to how far it deviates from the district's unconstrained preferred vector. Let

$$S_r \equiv \frac{1}{2}\sum_j (t_{jr})^2 = \frac{1}{2}\|\mathbf{t}_r\|^2, \tag{13}$$

represent the intensity of r's preferred trade policy. Here, $\|\mathbf{t}_r\|^2$ is the squared Euclidean norm of $\mathbf{t}_r$. Therefore, welfare at the unconstrained optimum can be expressed as

$$\Omega_r(\mathbf{t}_r) = \Omega_r(\mathbf{0}) + \frac{\lambda_r}{2}\|\mathbf{t}_r\|^2 = \Omega_r(\mathbf{0}) + \lambda_r S_r, \tag{14}$$

where $\Omega_r(0)$ is r's welfare when $\mathbf{t} = 0$ ("free trade").

Districts may place different weights on the owners of the local production factors (i.e., Λ_{jr}^m may differ across r). Note that for any two districts r, r',

$$t_{jr} - t_{jr'} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{\lambda_{jr'}^K}{\lambda_{r'}}\sigma_{jr'}.$$

This implies that even two districts with the same amount of specific factors and identical productivity in sector j may still prefer different tariffs. This can occur because, conditional on being active (i.e., producing a positive output), districts assign different weights to the welfare of the specific factors employed in sector j. For future reference, we define

$$S_r^{r'} \equiv \frac{1}{2}\sum_{j=1}^{J}\left(t_{jr} - t_{jr'}\right)^2 = \frac{1}{2}\|\mathbf{t}_r - \mathbf{t}_{r'}\|^2,$$

represent the degree of trade policy misalignment between the two regions r and r'. Note that this indicator is symmetric, i.e., $S_r^{r'} = S_{r'}^{r}$.

Constrained tariffs. The tariff on good j that district a, the agenda setter, proposes to district r under the present assumptions is

$$t_{ja}^r = \alpha_a^r \frac{\lambda_{ja}^K}{\lambda_a}\sigma_{ja} + (1-\alpha_a^r)\frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n} = \alpha_a^r t_{ja} + (1-\alpha_a^r)t_{jr}, \tag{15}$$

where $\alpha_a^r = \frac{\lambda_a}{\lambda_a + \rho_a^r \lambda_r}$, $\rho_a^r \geq 0$, and $0 \leq \alpha_a^r \leq 1$. Note that expression (15) explicitly characterizes the constrained preferred tariff t_{ja}^r, since the conditions established in Corollary 1 are satisfied in this case.[29] The constrained tariff proposed to r when the agenda setter a does not produce good j $t_{ja}^r = (1-\alpha_a^r)\frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n}$.

In general,

$$\mathbf{t}_a^r = \alpha_a^r\,\mathbf{t}_a + (1-\alpha_a^r)\,\mathbf{t}_r, \qquad \alpha_a^r \in [0,1], \tag{16}$$

where $\mathbf{t}_r$ is the vector of unconstrained preferred tariffs. Equation (15) can be expressed in ad valorem terms as $\tau_{ja}^r = \alpha_a^r \tau_{ja} + (1-\alpha_a^r)\tau_{jr}$.

4.1.1 Properties and implications of the solutions

We next characterize the solutions and highlight several key properties, implications, and comparative statics results that emerge from the solutions.

First, note that under the specific functional forms, we can explicitly solve for ρ_a^r, and consequently for α_a^r. These solutions have the following properties.

1. The solution of the Lagrange multiplier $\rho_a^r \geq 0$ on district r's PC is

$$\rho_a^r = max\left\{0, \frac{\lambda_a}{\lambda_r}\left(\frac{1}{\sqrt{1-s_r}}\frac{\|\mathbf{t}_r - \mathbf{t}_a\|}{\|\mathbf{t}_r\|} - 1\right)\right\}, \tag{17}$$

[29] The weight α_a^r depends on the Lagrange multiplier ρ_a^r, but, as shown below, it is possible to solve explicitly for ρ_a^r in this case.

where

$$s_r = \frac{\overline{\Omega}_r - \Omega_r(0)}{\Omega_r(\mathbf{t}_r) - \Omega_r(0)} \in [0,1],$$

and $\overline{\Omega}_r$ and $\Omega_r(0) \leq \overline{\Omega}_r \leq \Omega_r(\mathbf{t}_r)$. The factor $(1 - s_r)$ represents the ratio of r's actual utility gain of trade protection relative to its reservation utility and the potential utility maximum relative to the utility at zero tariffs. We can interpret $\rho_a^r > 0$ as a normalized misalignment index for district r in relation to the agenda setter a. Therefore, the multiplier is larger when a's ideal vector $\mathbf{t}_a$ is farther from r's ideal $\mathbf{t}_r$ relative to the intensity of r's preferences, given by $\|\mathbf{t}_r\|/2 = S_r$. Everything else equal, the district whose preferences are more "orthogonal" to the agenda setter's and/or smaller in intensity is costlier to bring into the coalition, resulting in a higher shadow cost ρ_a^r.

2. When the constraint binds and $\rho_a^r > 0$, $\frac{\partial \rho_a^r}{\partial \overline{\Omega}_r} > 0$ and $\frac{\partial \alpha_a^r}{\partial \overline{\Omega}_r} < 0$.[30] In other words, when the status quo is more desirable for r, the agenda setter gives more weight to r's preferred tariff t_{jr}. This result requires the constraint $\overline{\Omega}_r$ to be sufficiently small: $\overline{\Omega}_r$ cannot exceed the unconstrained maximum utility level $\Omega_r(\mathbf{t}_r)$, i.e., $\Omega_r(\mathbf{t}_r) > \overline{\Omega}_r$ as stated earlier. Moreover, $sign\left\{\frac{\partial t_{ja}^r}{\partial \overline{\Omega}_r}\right\} = sign\left\{t_{jr} - t_{ja}\right\}$. Suppose that both t_{ja} and t_{jr} are positive. Then, if r's status quo utility increases, the tariff proposed by a to r will rise (fall) if r's unconstrained preferred tariff is greater (smaller) than a's unconstrained preferred tariff. Finally, if the constraint is not binding, that is, $\Omega_r(\mathbf{t}_a^r) > \overline{\Omega}_r$ and $\rho_a^r = 0$, district a's unconstrained preference carries, so $t_{ja}^r = t_{ja}$.[31]

3. Replacing the solution ρ_a^r into the weight $\alpha_a^r = \frac{\lambda_a}{\lambda_a + \rho_a^r \lambda_r}$, we obtain

$$\alpha_a^r = \min\left\{1, \sqrt{\frac{n_r D_r}{\lambda_r S_a^r}}\right\}, \quad \text{where } D_r \equiv \frac{\Omega_r(\mathbf{t}_r) - \overline{\Omega}_r}{n_r} \geq 0, \tag{18}$$

given that $\Omega_r(\mathbf{t}_r) \geq \overline{\Omega}_r$. Consider an interior value of α_a^r, $\alpha_a^r = \sqrt{\frac{n_r D_r}{\lambda_r S_a^r}}$. Since $\Omega_r(\mathbf{t}_r) - \Omega_r(0) = \frac{\lambda_r}{2}\sum_j (t_{jr})^2 = \lambda_r S_r$, it follows that $\Omega_r(\mathbf{t}_r) - \overline{\Omega}_r = \lambda_r\, S_r(1 - s_r)$, which means that we can write

$$\alpha_a^r = \sqrt{\frac{(1 - s_r)\, S_r}{S_a^r}} = \sqrt{(1 - s_r)}\frac{\|\mathbf{t}_r\|}{\|\mathbf{t}_r - \mathbf{t}_a\|}. \tag{19}$$

The second equality in (19) used $S_a^r = \|\mathbf{t}_r - \mathbf{t}_a\|^2/2$ and $S_r = \|\mathbf{t}_r\|^2/2$. In an equilibrium

[30]See Appendix Appendix C.
[31]All the derivations are included in Appendix E.

where the PC binds (so that $\rho_a^r > 0$ and $0 < \alpha_a^r < 1$), it follows that $(1 - s_r)S_r < S_a^r$. Under the benchmark assumption $\overline{\Omega}_r = \Omega_r(0)$ (i.e., $s_r = 0$), the equilibrium satisfies $S_r < S_a^r$.

4. Using the symmetry $S_a^r = S_r^a$, we obtain

$$\frac{\alpha_a^r}{\alpha_r^a} = \sqrt{\frac{(1 - s_r)\, S_r}{(1 - s_a)S_a}} \iff \alpha_a^r = \alpha_r^a \sqrt{\frac{(1 - s_r)S_r}{(1 - s_a)S_a}}.$$

5. From (19), it follows that for the two coalition partners r, r'

$$\alpha_a^r > \alpha_a^{r'} \iff \sqrt{(1 - s_r)}\frac{\|\mathbf{t}_r\|}{\|\mathbf{t}_r - \mathbf{t}_a\|} > \sqrt{(1 - s_{r'})}\frac{\|\mathbf{t}_{r'}\|}{\|\mathbf{t}_{r'} - \mathbf{t}_a\|}. \tag{20}$$

   Thus, α_a^r is larger than $\alpha_a^{r'}$ when (i) r's reservation is looser (s_r is smaller than $s_{r'}$), (ii) the vectors $\mathbf{t}_r$ and $\mathbf{t}_a$ are better aligned, and/or (iii) district r has larger policy intensity. If the reservation welfare $\overline{\Omega}_r$ is the free trade welfare $\Omega_r(0)$, then $s_r = 0$, and

$$\alpha_a^r > \alpha_a^{r'} \iff \frac{S_r}{S_a^r} > \frac{S_{r'}}{S_a^{r'}}.$$

Second, using the previous results, it is also straightforward to characterize r's utility at any tariff vector $\mathbf{t}$:

$$\Omega_r(\mathbf{t}) = \Omega_r(\mathbf{t}_r) - \frac{\lambda_r}{2}\|\mathbf{t} - \mathbf{t}_r\|^2 = \Omega_r(\mathbf{0}) + \frac{\lambda_r}{2}\left(\|\mathbf{t}_r\|^2 - \|\mathbf{t} - \mathbf{t}_r\|^2\right). \tag{21}$$

Consider now, agenda setter a and potential coalition partner r. From (16), it follows that $\mathbf{t}_a^r - \mathbf{t}_a = (1 - \alpha_a^r)(\mathbf{t}_r - \mathbf{t}_a)$. Then, the agenda setter's utility at the constrained optimum can be expressed as

$$\begin{aligned}
\Omega_a(\mathbf{t}_a^r) &= \Omega_a(\mathbf{t}_a) - \frac{\lambda_a}{2}\,\|\mathbf{t}_a^r - \mathbf{t}_a\|^2, \\
&= \Omega_a(\mathbf{t}_a) - \lambda_a(1 - \alpha_a^r)^2 S_a^r, \\
&= \Omega_a(\mathbf{0}) + \lambda_a\Big[S_a - (1 - \alpha_a^r)^2 S_a^r\Big].
\end{aligned} \tag{22}$$

If the constraint is slack, $\rho_a^r = 0$, $\alpha_a^r = 1$, and $\Omega_a(\mathbf{t}_a^r) = \Omega_a(\mathbf{t}_a) = \Omega_a(0) + \lambda_a S_a$, which is the utility district a attains at its unconstrained preferred tariffs. In general, the welfare at the constrained tariffs $\Omega_a(\mathbf{t}_a^r)$ depends on α_a^r, the trade policy intensity term S_a, and the tariff misalignment term S_a^r. Ceteris paribus, $\Omega_a(\mathbf{t}_a^r)$ increases as s_a increase, α_a^r approaches 1, or

S_a^r becomes smaller. In general, when $\rho_a^r \geq 0$, $\Omega_a(\mathbf{t}_a^r) = \Omega_a(\mathbf{t}_a) - \lambda_a \left(\frac{\rho_a^r \lambda_r}{\lambda_a + \rho_a^r \lambda_r}\right)^2 S_a^r$. However, as noted earlier, α_a^r depends on the terms S_a and S_a^r.

Ranking of coalitions. We can now identify the agenda setter a's optimal partner by comparing a' welfare $\Omega_a(\mathbf{t}_a^r)$ across districts. The following proposition characterizes the decision rule followed by a.

Proposition 4.1. *The agenda setter a selects a coalition partner r to minimize $H_a^r \equiv (1 - \alpha_a^r)^2 S_a^r$, where $\lambda_a H_a^r$ is the welfare loss relative to a's first-best. When r's PC is binding, then $H_a^r = \left(\sqrt{S_a^r} - \sqrt{(1-s_r)S_r}\right)^2$. In other words, let $\{r, r'\}$ denote two possible coalition partners. Then, the agenda setter a prefers district r over r' if and only if $H_a^r < H_a^{r'}$.*

Proof. The agenda setter a chooses the partner r that gives the largest $\Delta\Omega_a(\mathbf{t}_a^r) = \Omega_a(\mathbf{t}_a^r) - \Omega_a(\mathbf{0}) = \lambda_a \left[S_a - (1-\alpha_a^r)^2 S_a^r\right] = \lambda_a(S_a - H_a^r)$. Therefore,

$$\Delta\Omega_a(\mathbf{t}_a^r) > \Delta\Omega_a(\mathbf{t}_a^{r'}) \iff (1-\alpha_a^r)^2 S_a^r < (1-\alpha_a^{r'})^2\, S_a^{r'} \iff H_a^r < H_a^{r'}. \tag{23}$$

When the r's PC does not bind, $\alpha_a^r = 1$, and $H_a^r = 0$.

Note that since $\mathbf{t}_a^r - \mathbf{t}_r = \alpha_a^r(\mathbf{t}_a - \mathbf{t}_r)$, r's utility at $\mathbf{t}_a^r$ can be written as $\Omega_r(\mathbf{t}_a^r) - \Omega_r(\mathbf{t}_r)$ $= -\lambda_r(\alpha_a^r)^2 S_a^r$, where $\Omega_r(\mathbf{t}_r) = \Omega_r(\mathbf{0}) + \lambda_r S_r$. If r's participation constraint binds (so that $0 < \alpha_a^r < 1$), then $\overline{\Omega}_r = \Omega_r(\mathbf{t}_a^r)$, and $\overline{\Omega}_r - \Omega_r(0) = \lambda_r S_r - \lambda_r(\alpha_a^r)^2 S_a^r$. Hence, $s_r = 1 - \frac{(\alpha_a^r)^2 S_a^r}{S_r}$, or

$$1 - s_r = \frac{(\alpha_a^r)^2 S_a^r}{S_r} \quad \Rightarrow \quad (1-s_r)S_r = (\alpha_a^r)^2 S_a^r \quad \Rightarrow \quad \sqrt{(1-s_r)S_r} = \alpha_a^r \sqrt{S_a^r}.$$

Then, we can write

$$\begin{aligned} H_a^r &\equiv S_a^r(1-\alpha_a^r)^2 \\ &= \left(\sqrt{S_a^r}\right)^2 (1-\alpha_a^r)^2 = \left(\sqrt{S_a^r}(1-\alpha_a^r)\right)^2 = \left(\sqrt{S_a^r} - \alpha_a^r\sqrt{S_a^r}\right)^2 = \left(\sqrt{S_a^r} - \sqrt{(\alpha_a^r)^2 S_a^r}\right)^2. \end{aligned}$$

Replacing $(\alpha_a^r)^2 S_a^r = (1-s_r)S_r$, we obtain $H_a^r \equiv \left(\sqrt{S_a^r} - \sqrt{(1-s_r)S_r}\right)^2$. □

This condition implies that the partner selected by a depends on the welfare loss the agenda setter must incur, $H_a^r \equiv (1-\alpha_a^r)^2 S_a^r$, to satisfy a potential partner's requirements. In the general case, this loss depends on both α_a^r and S_a^r. When district r's PC binds, this loss depends on the difference between policy misalignment, $\sqrt{S_a^r}$, and the intensity term, $\sqrt{(1-s_r)S_r}$. A district is a more attractive partner when this difference is small.

Moreover, when if $s_r = 0$ ($\overline{\Omega}_r = \Omega_r(0)$), $\Delta\Omega_a(\mathbf{t}_a^r) = S_a - \left(\sqrt{S_a^r} - \sqrt{S_r}\right)^2$. For two partners

r, r', $\Omega_a(\mathbf{t}_a^r) > \Omega_a(\mathbf{t}_a^{r'})$ if and only if $\left(\sqrt{S_a^r} - \sqrt{S_r}\right)^2 < \left(\sqrt{S_a^{r'}} - \sqrt{S_{r'}}\right)^2$. So the ranking of partners for the agenda setter a when both PCs bind is determined by the partner with the smaller squared gap. However, in general, one or more PCs may not bind. There are three possibilities to consider:

1. Both PCs bind. In this case $S_r/S_a^r < 1$ and $S_{r'}/S_a^{r'} < 1$. Then, agenda setter a prefers a coalition with r when $\Omega_a(\mathbf{t}_a^r) > \Omega_a(\mathbf{t}_a^{r'})$, or when

$$\begin{aligned} H_a^r < H_a^{r'} &\iff \left(\sqrt{S_a^r} - \sqrt{S_r}\right)^2 < \left(\sqrt{S_a^{r'}} - \sqrt{S_{r'}}\right)^2 \\ &\iff \sqrt{S_a^r} - \sqrt{S_r} < \sqrt{S_a^{r'}} - \sqrt{S_{r'}}. \end{aligned} \tag{24}$$

   Let $g_a^{r,r'} \equiv \left(\sqrt{S_a^r} - \sqrt{S_r}\right) - \left(\sqrt{S_a^{r'}} - \sqrt{S_{r'}}\right)$. Then, a prefers to form a coalition with r if $g_a^{r,r'} < 0$, and with r' if $g_a^{r,r'} > 0$.

2. One PC is slack, and the other one binds. For example, suppose $S_r/S_a^r \geq 1$ and $S_{r'}/S_a^{r'} < 1$. Then, $\alpha_a^r = 1$, and $0 < \alpha_a^{r'} < 1$, so that $H_a^r = 0$ and $H_{r'} > 0$. This means that

$$\Delta\Omega_a(\mathbf{t}_a^r) = \lambda_a S_a > \lambda_a \left[S_a - \left(\sqrt{S_a^{r'}} - \sqrt{S_{r'}}\right)^2\right] = \Delta\Omega_a(\mathbf{t}_a^{r'}),$$

   where the inequality holds strictly except at the boundary $S_r/S_a^r = 1$. In this case, a always prefers a coalition with r, the partner whose PC is slack.

3. Both PCs are slack. Suppose $S_r/S_a^r \geq 1$ and $S_{r'}/S_a^{r'} \geq 1$. Then, $\alpha_a^r = \alpha_a^{r'} = 1$, $H_a^r = H_a^{r'} = 0$, and $\Omega_a(\mathbf{t}_a^r) = \Omega_a(\mathbf{t}_a^{r'}) = \Omega_a(\mathbf{t}_a)$, so that a is indifferent between the two partners.

4.2 Equal Weights

We will consider later examples in which both types of factor owners get equal welfare weights, regardless of the sector of employment and region. Specifically, $\Lambda_{jr}^m = 1$ for all j, r, and $m \in \{L, K\}$. In this case, the district's preferred tariff vector is directly a function of its specific production patterns.

Under equal weights, r's unconstrained preferred tariff on good j is

$$t_{jr} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \frac{Q_j}{n} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \sum_{\ell=1}^{R} \frac{n_{j\ell}^K}{n}\sigma_{j\ell} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \sum_{\ell=1}^{R} \frac{n_\ell}{n}\frac{n_{j\ell}^K}{n_\ell}\sigma_{j\ell}.$$

Constrained tariffs, as stated earlier, are given by $t_{ja}^r = \alpha_a^r t_{ja} + (1 - \alpha_a^r)t_{jr}$, where $\alpha_a^r =$

$\frac{n_a}{(n_a+n_r\rho_a^r)}$ (since $\lambda_r = n_r$ in this case), and ρ_a^r is the Lagrange multiplier associated with the district r''s participation constraint.

In addition to the properties described for the case with general weights, the equal-weights assumption gives further results. First, the difference between the preferred tariff vectors of any two districts is $\mathbf{t}_r - \mathbf{t}_{r'} = \frac{1}{n_r}\mathbf{n}_r^K \boldsymbol{\sigma}_r - \frac{1}{n_{r'}}\mathbf{n}_{r'}^K \boldsymbol{\sigma}_{r'}$ where $\mathbf{n}_r$ is a $J \times 1$ vector with elements n_{jr}^K, and $\boldsymbol{\sigma}_r$ is a $J \times 1$ vector with elements σ_{jr}. These terms are determined by the spatial allocation of production across districts.

Second, note that t_{jr} is simply the deviation of $\frac{n_{jr}^K}{n_r}\sigma_{jr}$ from the nation's weighted average $\sum_{\ell=1}^R \frac{n_\ell}{n}\frac{n_{j\ell}^K}{n_\ell}\sigma_{j\ell}$. The unconstrained district-preferred tariffs on each good j are not independent. As stated in Proposition 3 in Appendix E, $\sum_{\ell=1}^R \frac{n_\ell}{n} t_{j\ell} = 0$. So if $t_{jr} > 0$ for one r, then, $t_{jr'} < 0$ for at least another $r' \neq r$. In other words, the district-preferred tariffs for a specific good j can be zero for all r, but they cannot all be strictly positive simultaneously. If the preferred tariffs for good j of two districts r and r' are strictly positive (negative), then the preferred tariff for the other district r'' is strictly negative (positive).

Finally, note that aggregate welfare $\sum_\ell \Omega_\ell$ is maximized at $\mathbf{t} = 0$.[32]

5 Tariffs and the Spatial Distribution of Production

The analysis thus far underscores that the spatial distribution of production across districts is a key determinant of tariff preferences. Districts with a high concentration of production in a particular good tend to favor higher tariffs on that good to protect local producers from foreign competition. In contrast, districts with limited production in import-competing sectors and greater reliance on imported consumption tend to favor lower tariffs. This setting gives rise to bargaining over tariffs in the legislature among districts with opposing interests. Moreover, the geographic distribution of economic activities creates the scope for a variety of coalitions to emerge. For instance, districts specializing in different goods may still find common cause in supporting protection for their respective industries. Thus, local production patterns shape both the distribution of economic power and the coalition dynamics that ultimately determine tariff policy.

We now explore these possibilities in greater detail by analyzing equilibrium outcomes under alternative spatial configurations of production. For concreteness, we focus on the case of three regions: A, B, and C.[33] Consider a configuration in which one region does

[32] See Appendix E for additional properties under uniform and equal weights, including Proposition 4, which proves this statement.

[33] Appendix F considers several additional examples, including the case of complete specialization, similar to the model developed by Celik et al. (2013).

not produce any importable goods: region A produces neither good, region B specializes in the production of good 1, and region C produces both goods 1 and 2. In particular, let $n_{1C}^K = \theta n_C^K$ and $n_{2C}^K = (1-\theta)n_C^K$, with $0 \le \theta \le 1$ capturing different spatial configurations of production. The parameter θ is crucial in the analysis as it formalizes the distribution of capital within district C. By allowing θ to vary between 0 and 1, we can systematically analyze how changes in the local specialization in district C (the relative size of the import-competing good 1 sector versus the import-competing good 2 sector) shift the national spatial configuration of production, which in turn affects the ideal tariff preferences of all districts. Furthermore, varying θ enables us to explore a wide range of national spatial configurations, from complete specialization across districts to cases where multiple districts produce the same good.[34]

Unconstrained tariffs. In this case, the unconstrained preferred tariff vectors $\mathbf{t}_r = (t_{1r}, t_{2r})$ are

$$\mathbf{t}_A = \left(-\frac{Q_1}{n}, -\frac{Q_2}{n}\right), \mathbf{t}_B = \left(\frac{n_B^K \sigma_{1B}}{n_B} - \frac{Q_1}{n}, -\frac{Q_2}{n}\right), \mathbf{t}_C = \left(\frac{\theta n_C^K \sigma_{1C}}{n_C} - \frac{Q_1}{n}, \frac{(1-\theta)n_C^K \sigma_{2C}}{n_C} - \frac{Q_2}{n}\right),$$

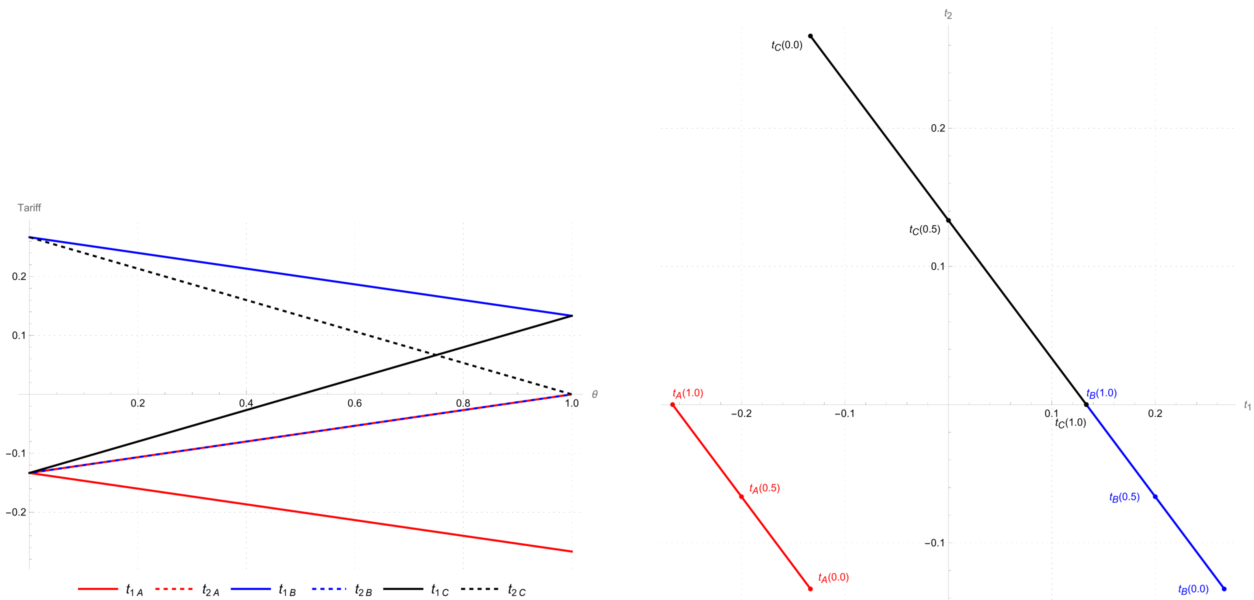
where $\frac{Q_1}{n} = \frac{\left(n_{1B}^K \sigma_{1B} + \theta n_C^K \sigma_{1C}\right)}{n}$, and $\frac{Q_2}{n} = \frac{(1-\theta)n_C^K \sigma_{2C}}{n}$. Note that when the good 2 is not produced in the country (i.e., $\theta = 1$), then all regions prefer a zero tariff on 2. It follows that A's preferred tariffs and B's preferred tariff for good 2 are non-positive ($t_{2A} = t_{2B} < 0$).

To simplify the exposition and isolate the role of the spatial distribution of activity across districts on tariffs, we consider a country where districts are of equal size, $n_r = 1$ (so $n = 3$), the allocation of fixed factors across districts is described by $n_{1A}^K = n_{2A}^K = 0$, $n_{1B}^K = k$, $n_{2B}^K = 0$, $n_{1C}^K = \theta k$, $n_{2C}^K = (1-\theta)k$, and the production of goods 1 and 2 assumes the same σ_{jr} in both districts B and C, i.e., $\sigma_{1B} = \sigma_{1C} = \sigma_{2C} = \sigma$. It follows that $Q_1 = (1+\theta)k\sigma$, $Q_2 = (1-\theta)k\sigma$ and $Q_1 + Q_2 = 2k\sigma$, so it does not depend on θ.

Figure 2 below illustrates this example. The graphs show how the spatial allocation of production, as parameterized by θ, determines the unconstrained tariff preferences for each region. Figure 2a plots the individual tariffs (t_{1r}, t_{2r}) for each good as a function of θ. Figure 2b shows the tariff vectors $\mathbf{t}_r \in \Re^2$ and illustrates how the preferred tariffs move in two-dimensional space as θ changes. For instance, note that A's unconstrained preferred tariff vector moves along the red line as θ increases from 0 to 1. This line satisfies $t_{1A} + t_{2A} = -\frac{2}{3}k\sigma$. Similarly, for districts B and C, the vectors $\mathbf{t}_B(\theta)$ and $\mathbf{t}_C(\theta)$ trace the same line $t_{1r} + t_{2r} = \frac{1}{3}k\sigma$. This implies that, for all districts, the "average preferred level of

[34] When $\theta = 0$, there is complete specialization in the production of goods 1 and 2; when $\theta = 1$, both regions B and C produce good 1, and good 2 is not produced domestically.

protection" does not change with θ. This observation–that the average preferred tariff does not depend on the spatial distribution parameter θ–has implications later, when we consider the constrained tariffs for the coalitions that include B and C.



(a) Unconstrained tariffs as a function of θ

(b) Unconstrained tariff vectors as a function of θ

Figure 2: Unconstrained tariff vectors.

Parameters: $a_j = 2$, $b_j = 1$, $\bar{p}_j = 1$, $n_r = 1$, $\sigma_{ir} = 1$, $n^K_{1B} = k$, $n^K_{1C} = \theta k$, $n^K_{2C} = (1-\theta)k$, $k = 2/5$, $s_r = 0$.

Constrained tariffs. We next characterize the constrained solutions for each agenda setter. For any pair $a \neq r \in \{A, B, C\}$, $\mathbf{t}^r_a = \alpha^r_a \mathbf{t}_a + \left(1 - \alpha^r_a\right)\mathbf{t}_r$. Moreover, suppose $s_r = 0$ (a zero tariff status quo) so that $\alpha^r_a = \min\left\{1, \sqrt{\frac{S_r}{S^r_a}}\right\}$, as shown earlier. This means that if $\frac{S_r}{S^r_a} < 1$, the PC binds and $\alpha^r_a < 1$. Once $\frac{S_r}{S^r_a} \geq 1$, the PC is slack and $\alpha^r_a = 1$, so the proposer receives $\Omega_a(\mathbf{t}_a)$. Also, $\alpha^r_a > \alpha^{r'}_a$ if and only if $\frac{S_r}{S^r_a} > \frac{S_{r'}}{S^{r'}_a}$. The solutions $\mathbf{t}^r_a$ as a function of α^r_a and θ, together with their detailed derivations, are reported in equation (56) in Appendix F.

Continuing with our previous example, first notice that since $t_{2A} = t_{2B} = -\frac{Q_2}{n}$, then $t^B_{2A} = t^C_{2B} = -\frac{Q_2}{n}$. Next, the S_r and S^r_a are given in this case by (note that $\sigma^2 k^2$ cancels)

$$S_A = \frac{1+\theta^2}{9}, \quad S_B = \frac{5 - 6\theta + 2\theta^2}{18}, \qquad S_C = \frac{8\theta^2 - 12\theta + 5}{18},$$
$$S^B_A = \frac{1}{2}, \qquad S^C_A = \frac{1}{2}(1 - 2\theta + 2\theta^2), \quad S^C_B = (1-\theta)^2,$$

where $S^A_B = S^B_A$, $S^A_C = S^C_A$, $S^B_C = S^C_B$. Note that policy intensity is strictly positive for all $\theta \in [0, 1]$, i.e., $S_r > 0$. Moreover, except for the coalitions BC and CB and $\theta = 1$, there is always tariff misalignment, i.e., $S_a^r > 0$.[35]

When are the PC binding? In other words, is $\frac{S_r}{S_a^r} \leq 1$ on $\theta \in [0,1]$? Consider each agenda setter $a = A, B, C$.

- $a = A$:

$$\frac{S_B}{S_A^B} = \frac{5 - 6\theta + 2\theta^2}{9} < 1, \quad \frac{S_C}{S_A^C} = \frac{8\theta^2 - 12\theta + 5}{9(1 - 2\theta + 2\theta^2)} < 1 \quad \text{for all } \theta \in [0,1].$$

  Then, AB and AC always bind: $\alpha_A^B < 1$, $\alpha_A^C < 1$.

- $a = B$:

$$\frac{S_A}{S_B^A} = \frac{2(1+\theta^2)}{9} < 1, \quad \text{for all } \theta \in [0,1],$$
$$\frac{S_C}{S_B^C} = \frac{8\theta^2 - 12\theta + 5}{18(1-\theta)^2} \leq 1 \iff 10\theta^2 - 24\theta + 13 \geq 0.$$

  Then, BA always binds. For $\theta \in [0,1]$, $\frac{S_C}{S_B^C} \leq 1$ for $\theta \leq 0.8258$, $\frac{S_C}{S_B^C} > 1$ for $0.8258 < \theta \leq 1$. This means that BC binds for $\theta \leq 0.8258$ and is slack ($\alpha_B^C = 1$) for $0.8258 < \theta \leq 1$. In the latter case, $\mathbf{t}_B^C = \mathbf{t}_B$.

- $a = C$:

$$\frac{S_A}{S_C^A} = \frac{2(1+\theta^2)}{9(1 - 2\theta + 2\theta^2)} < 1, \quad \text{for all } \theta \in [0,1],$$
$$\frac{S_B}{S_C^B} = \frac{5 - 6\theta + 2\theta^2}{18(1-\theta)^2} \leq 1 \iff 16\theta^2 - 30\theta + 13 \geq 0.$$

  Then, CA always binds. For $\theta \in [0,1]$, $\frac{S_B}{S_C^B} \leq 1$ for $\theta \leq 0.6798$, and $\frac{S_B}{S_C^B} > 1$ for $0.6798 < \theta \leq 1$. CB binds for $0 \leq \theta \leq 0.6798$ and is slack ($\alpha_C^B = 1$) for $0.6798 < \theta \leq 1$. In the latter case, $\mathbf{t}_C^B = \mathbf{t}_C$.

In sum, only the BC and CB coalitions slack for some range of values $\theta \in [0,1]$; in all other cases, the PC binds. Figure 3 shows the constrained tariffs $\mathbf{t}_a^r$, constructed using the corresponding values of α_a^r.

[35] In Figure 2b, the vectors $\mathbf{t}_B$ and $\mathbf{t}_C$ overlap at $\theta = 1$.

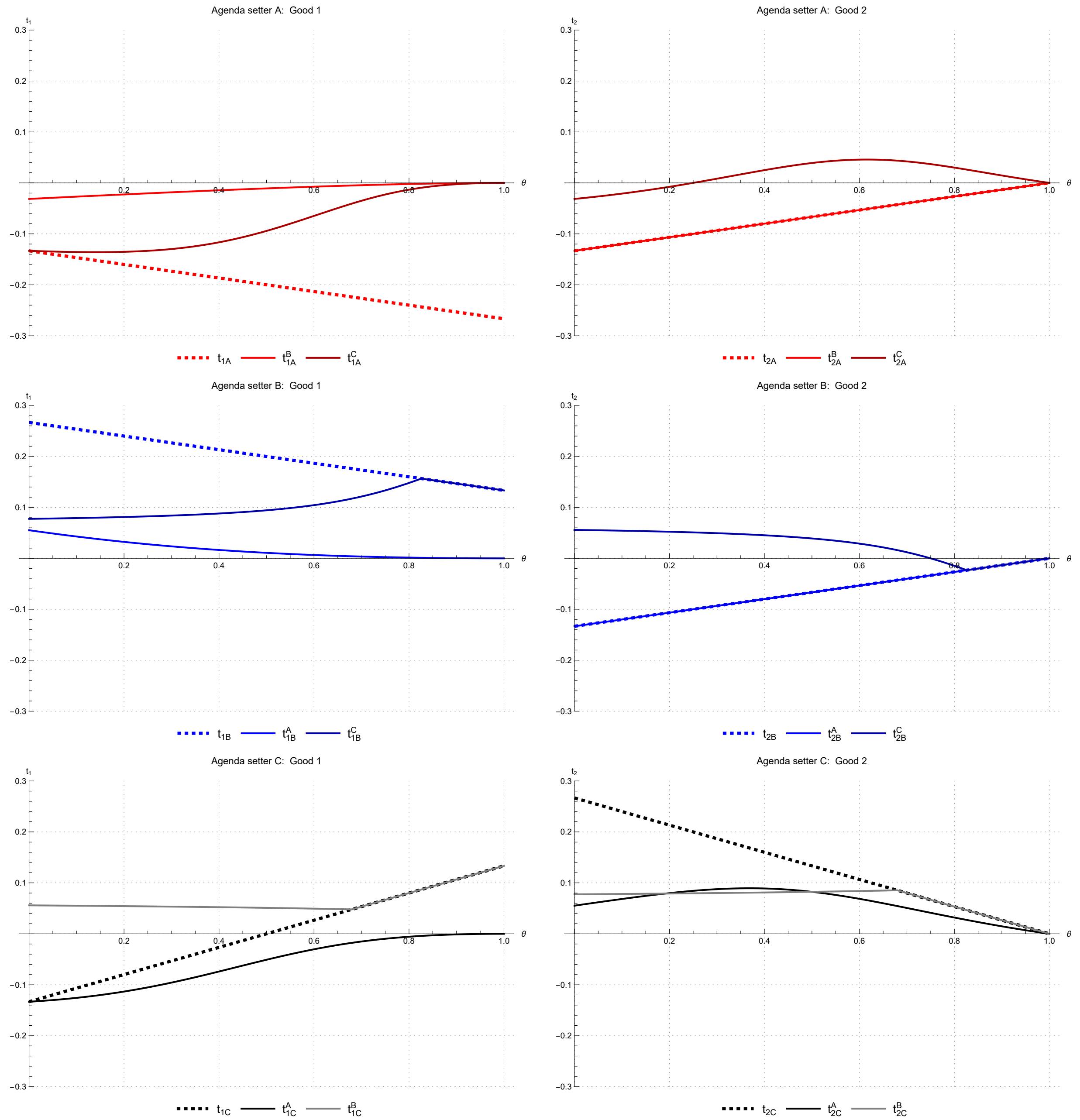


Figure 3: Unconstrained and constrained tariffs.

Note: The column on the left shows the unconstrained district preferred tariffs t_{ja} and the constrained preferred tariffs t^r_{ja} for $j = 1$ and for each of the two possible coalitions that can be formed. The column on the right shows the corresponding tariffs for $j = 2$.
Parameters: $a_j = 2$, $b_j = 1$, $\overline{p}_j = 1$, $n_\ell = 1$, $\sigma_{i\ell} = 1$, $n^K_{1B} = k$, $n^K_{1C} = \theta k$, $n^K_{2C} = (1-\theta)k$, $k = 2/5$, $s_\ell = 0$.

Figure 4 compares the unconstrained and constrained tariff vectors for each agenda setter $a \in \{A, B, C\}$ and their respective coalitions, as a function of $\theta \in [0, 1]$. In all graphs, solid lines represent the unconstrained tariff vectors $\mathbf{t}_r$ (red for A, blue for B, and black for C)

and the dashed lines the corresponding constrained tariff vectors $\mathbf{t}_a^r$ for each coalition.

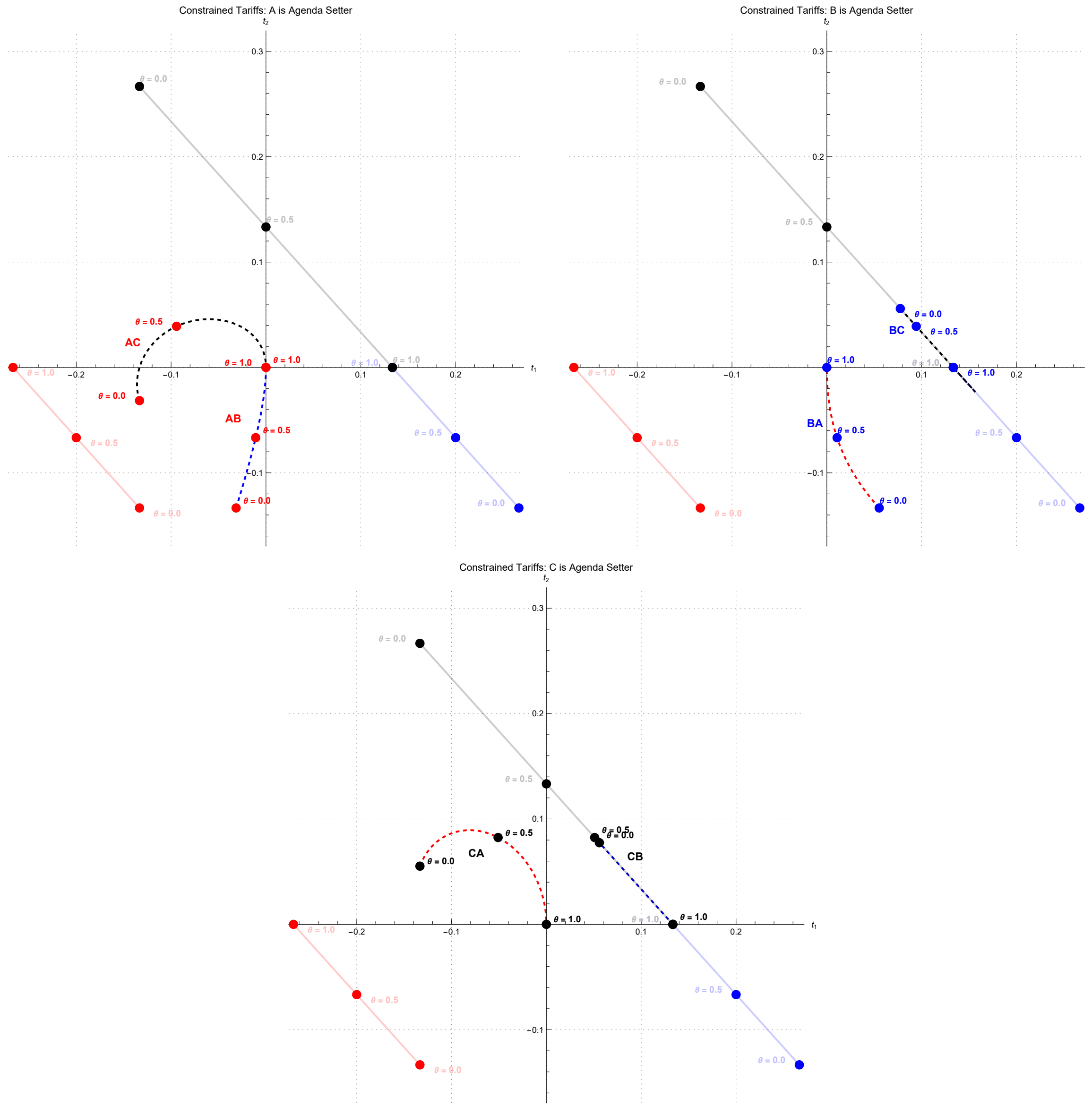


Figure 4: Unconstrained ($\mathbf{t}_r$) and constrained ($\mathbf{t}_a^r$) tariff vectors for each agenda setter and coalitions, as a function of $\theta \in [0, 1]$.

For coalitions that involve district A, the constrained tariff lies between the lines $t_{2A} = -\frac{1}{3}k\sigma - t_{1A}$ and $t_{2r} = \frac{1}{3}k\sigma + t_{1r}$, $r = B, C$, evaluated at given values of θ. For the coalition between B and C, the constrained tariff vectors lie along the line $t_{2r} = \frac{1}{3}k\sigma - t_{1r}$.

Figure 5 shows the welfare levels, $\Omega_a(\mathbf{t}_a^r)$ (on the left axis), and the corresponding weights, α_a^r (on the right axis), for each coalition that agenda setter a can form with a partner $r \neq a$, across different values of $\theta \in [0, 1]$.

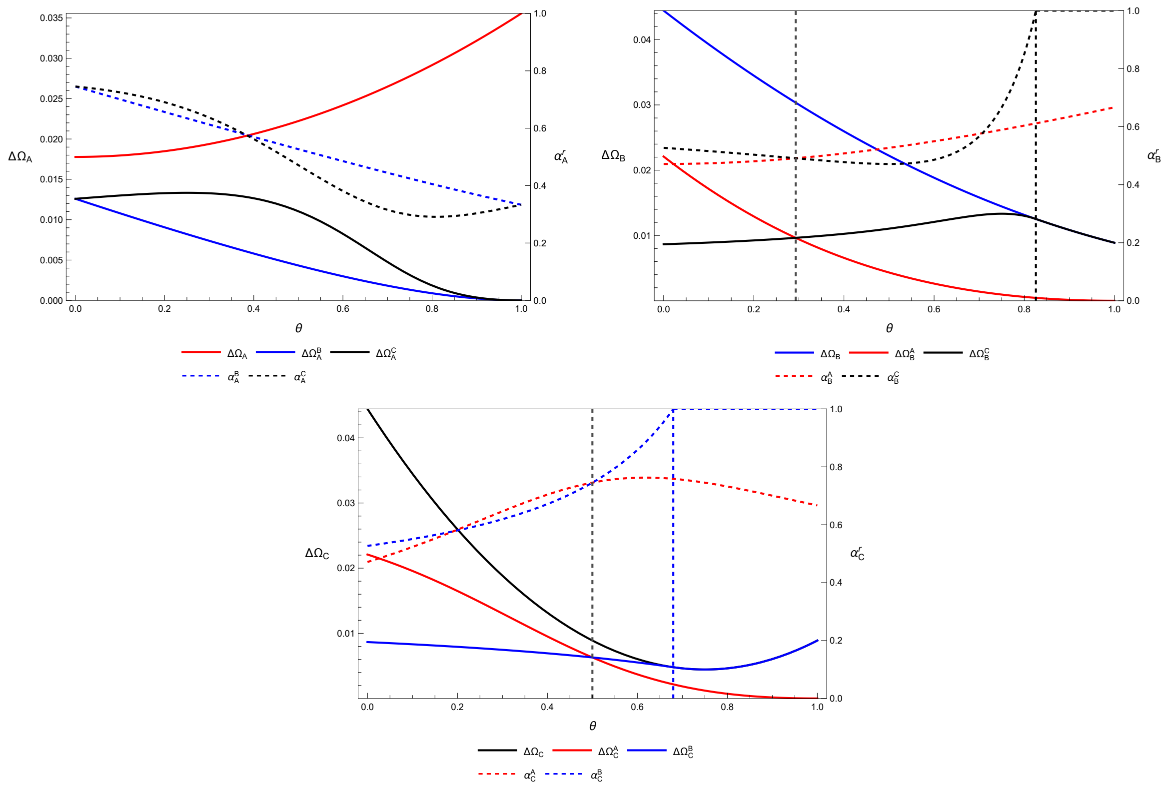


Figure 5: Welfare and α weights for different agenda setters.

The plots show $\Delta\Omega_a \equiv \Omega_a(\mathbf{t}_a) - \Omega(0)$ and $\Delta\Omega_a^r \equiv \Omega_a(\mathbf{t}_a^r) - \Omega(0)$ on the left axis, and α_a^r on the right axis, for agenda setters A, B, and C as θ changes. Top left: $a = A$, top right: $a = B$, bottom: $a = C$.
The example assumes $n_{1A}^K = n_{2A}^K = 0$, $n_{1B}^K = k$, $n_{2B}^K = 0$, $n_{1C}^K = \theta k$, $n_{2C}^K = (1-\theta)k$, $\sigma_{1B} = \sigma_{1C} = \sigma_{2C} = \sigma$, and $s_r = 0$ (or $\overline{\Omega}_r = \Omega_r(0)$).

The vertical dashed lines in the graphs delimit different intervals of θ. First, these lines mark cutoff points where the welfare curves from alternative coalitions intersect, delimiting regions where the welfare gain of the agenda setter a, $\Delta\Omega_a^r$, is maximized by forming a coalition with a specific partner. Second, they also mark the values of θ for which α_a^r is equal to 1. In this case, the agenda setter's unconstrained preferred tariff vector is accepted, as the partner's PC is no longer binding. For values of θ lower than these thresholds, the PC is always binding. We use these graphs alongside the decision rule established in Proposition 4.1 to determine each agenda setter's optimal coalition.

Optimal coalitions. We now consider the decision by each agenda setter a, for different allocations $\theta \in [0, 1]$: As mentioned earlier, when $R = 3$, there are potentially eight possible coalition profiles to consider. However, as we show next, only the following five coalition profiles will actually be observed in equilibrium, depending on θ: $\{AB, BA, CA\}$, $\{AC, BA, CA\}$, $\{AC, BC, CA\}$, $\{AC, BC, CB\}$, $\{AB, BC, CB\}$.

- $a = A$: compare coalitions AB and AC.
  - Both PCs bind for all $\theta \in [0, 1]$, which means that if $g_A^{C,B}(\theta) > 0$ (< 0), A forms a coalition with B (C), and is indifferent if $g_A^{C,B}(\theta) = 0$. Note that at $\theta = 0$, $S_B = S_C = \frac{5}{18}$ and $S_A^B = S_A^C = \frac{1}{2}$ and at $\theta = 1$, $S_B = S_C = \frac{1}{18}$ and $S_A^B = S_A^C = \frac{1}{2}$. This means that $g_A^{C,B}(\theta) = 0$, so that $\Omega_A(\mathbf{t}_A^B) = \Omega_A(\mathbf{t}_A^C)$, which means that A is indifferent among the two coalitions.
  - When $0 < \theta < 1$, however, $g_A^{C,B}(\theta) < 0$, so that A prefers a coalition with C.
  - In sum, district A prefers a coalition with district C when $0 < \theta < 1$. At the extreme values, district A is indifferent between B and C, i.e., $m(A) = \{B, C\}$, if $\theta = 0$ or $\theta = 1$, and $m(A) = C$, if $0 < \theta < 1$.
- $a = B$: compare coalitions BA and BC.
  - As shown earlier, when $\theta > 0.8258$, C's PC becomes slack ($\alpha_B^C = 1$), $\Omega_B(\mathbf{t}_B^C)$ equals the unconstrained value $\Omega_B(\mathbf{t}_B)$, and $H_B^C = 0$. Since A's PC always binds, then $H_B^A > H_B^C$, so B prefers a coalition with C.
  - Consider next, values of $0 \le \theta \le 0.8258$, when both PC bind. There is a unique root $\theta_B^* \in [0, 0.8258]$, which follows from the fact that $g_B^{A,C}(\theta)$ is a continuous and strictly increasing function on this interval, with $g_B^{A,C}(0) < 0$ and $g_B^{A,C}(0.8258) > 0$.[36] Therefore, there exists a unique $\theta_B^* = 0.2970$ such that $g_B^{A,C}(\theta_B^*) = 0$. When $0 \le \theta < \theta_B^*$, B prefers a coalition with A; when $\theta_B^* < \theta \le 1$, B prefers a coalition with C.
  - In sum, for low values of θ, district B prefers a coalition with A. When θ becomes sufficiently large, B would rather form a coalition with C, i.e., $m(B) = A$ if $0 \le \theta < \theta_B^*$, $m(B) = \{A, C\}$, if $\theta = \theta_B^*$, and $m(B) = C$, if $\theta_B^* < \theta \le 1$.
- $a = C$: compare coalitions CA and CB.
  - As shown earlier, $0 < \alpha_C^A < 1$ (A's PC binds) for all $\theta \in [0, 1]$. Also, when $\theta \ge 0.6798$, $\alpha_C^B = 1$ (B's PC becomes slack), so $H_C^B = 0$. This means that for $\theta \ge 0.6798$, C prefers a coalition with B.
  - Note that $g_C^{B,A}(0) > 0$, $g_C^{B,A}(0.6798) < 0$, and $g_C^{B,A}(\theta)$ is a continuous and strictly decreasing function in $\theta \in [0, 0.6798]$.[37] The unique root is at $\theta = \frac{1}{2}$ (i.e.,

[36] At $\theta = 0.8258$, $\sqrt{S_B^C} - \sqrt{S_C} = 0$ (since $\alpha_B^C = 1$), $g_B^{A,C}(0.8258) \approx 0.27$

[37] When $\theta = 0.6798$, $\sqrt{S_C^B} - \sqrt{S_B} = 0$, so $g_B^{B,A} = -(\sqrt{S_C^A} - \sqrt{S_A}) \approx -0.13$.

$g_C^{B,A}\left(\frac{1}{2}\right) = 0$), where $S_C^A = S_C^B = \frac{1}{4}$ and $S_A = S_B = \frac{5}{36}$. Therefore, C prefers a coalition with A when $\theta < \frac{1}{2}$, a coalition with B when $\theta > \frac{1}{2}$, and is indifferent at $\theta = \frac{1}{2}$.

– In sum, for low values of θ, C would choose a coalition with A. As θ becomes sufficiently large, C would prefer a coalition with B, i.e., $m(C) = A$, if $0 \leq \theta < \frac{1}{2}$, $m(C) = \{A, C\}$, if $\theta = \frac{1}{2}$, and $m(C) = B$, if $\frac{1}{2} < \theta \leq 1$.

Hence, in equilibrium, the set of equilibrium coalition profiles, for different $\theta \in [0,1]$, is given by:

$$\begin{array}{cc} \big\{\{\mathbf{AB}, \mathbf{BA}, CA\},\ \{\mathbf{AC}, BA, \mathbf{CA}\}\big\}, & \theta = 0, \\ \{\mathbf{AC}, BA, \mathbf{CA}\}, & 0 < \theta < \theta_B^*, \\ \big\{\{\mathbf{AC}, BA, \mathbf{CA}\},\ \{\mathbf{AC}, BC, \mathbf{CA}\}\big\}, & \theta = \theta_B^*, \\ \{\mathbf{AC}, BC, \mathbf{CA}\}, & \theta_B^* < \theta < \frac{1}{2}, \\ \big\{\{\mathbf{AC}, BC, \mathbf{CA}\},\ \{AC, \mathbf{BC}, \mathbf{CB}\}\big\}, & \theta = \frac{1}{2}, \\ \{AC, \mathbf{BC}, \mathbf{CB}\}, & \frac{1}{2} < \theta < 1, \\ \big\{\{AB, BC, CB\},\ \{AC, \mathbf{BC}, \mathbf{CB}\}\big\}, & \theta = 1 \end{array} \tag{25}$$

where $\theta_B^* = 0.2970$.[38]

Intuitively, when $\theta = 0$, districts B and C are fully specialized, so their policy preferences are diametrically opposed. This misalignment gives A a higher bargaining influence in the legislative bargaining process, and both B and C choose A as their preferred coalition partner. As the country becomes less specialized (i.e., as θ increases), the differences between C and B narrow. Consequently, it becomes "cheaper" for them to form a coalition with each other, rather than with A. In other words, A loses influence as θ rises.

The composition of the equilibrium coalition is relevant because different coalitions give rise to different equilibrium tariff vectors. Specifically, coalitions involving district A are associated with lower levels of protection, since A's interests do not depend on producer rents. Coalitions between B and C, in contrast, tend to be associated with higher equilibrium levels of protection.

"Stability" of the equilibrium coalitions. To refine the set of equilibrium coalitions predicted by this one-shot game, we focus on those that are "stable". Formally, a coalition between districts r and r' is "stable" if both districts prefer to partner with each other rather

[38] We show in Figures 24 and 25 the average tariffs for each equilibrium coalition, which capture the aggregate level of protection in each case, and the expected average tariff for each coalition profile assuming agenda setters are chosen with equal probability 1/3.

than with a third district, r''. Based on this criterion, and using (25), a coalition between A and B is stable only when $\theta = 0$. A coalition between A and C is stable for sufficiently low values of θ, specifically when $0 \leq \theta \leq \frac{1}{2}$. A coalition between B and C is stable when θ is sufficiently large (when $\frac{1}{2} \leq \theta \leq 1$). It is worth noting that coalitions between A and C result in lower tariffs, while coalitions between B and C are associated with higher tariffs. The stable coalitions are highlighted in bold in (25).

6 Multi-period Bargaining

We extend the previous one-period model to capture the richer dynamics of the bargaining process and the role of delay. This extension analyzes a version with a finite number of bargaining periods ($T > 1$) and an infinite-horizon case to examine the model's steady-state properties. These multi-period extensions are relevant because they allow us to characterize how the equilibrium trade policy outcomes depend on the threat of delaying an agreement, leading to a more realistic understanding of how legislative incentives and strategic concessions evolve toward a stationary or steady-state equilibrium.

6.1 More Than One Round of Bargaining

Before moving to the infinite horizon case, consider first a game with $T > 1$ rounds of bargaining. Suppose the utility of region r at stage t when region a is the agenda setter and forms a coalition with region r' is $\Omega^{ar'}_{r,t}$. If after T rounds of bargaining, an agreement is not reached, districts receive the status quo utility, denoted $\overline{\Omega}_{r,0}$ (i.e, the utility evaluated at the prevailing tariffs).

Period $t+1$. If the game enters the second round of bargaining at $t+1$, an agenda setter is chosen with an equal probability of $1/3$. Suppose the agenda setter a forms a coalition with region r. Then, the proposal will be accepted by r if $\Omega_{\ell,t+1}(\mathbf{t}_a) \equiv \Omega^{ar}_{r,t+1} \geq d_{r,t+1}$. In other words, if no agreement is reached after the second round of bargaining, then the district obtains the continuation utility $d_{r,t+1}$, where $d_{r,t+1} \equiv \Omega^{e}_{r,t+1} = \frac{1}{3}\sum_a \Omega^{am(a)}_{r,t+1}$, and $m(a)$ denote district a's partner in the optimal coalition for a, as defined in Section 3. The continuation utility depends on all future coalitions and respective solutions. The agenda setter will form a coalition with district r if the coalition $\{ar\}$ gives district a the highest utility among all possible coalitions. So in this case, $r = m(a)$. When $t = T$, the solution at this stage is the same as the one described in the one-shot game.

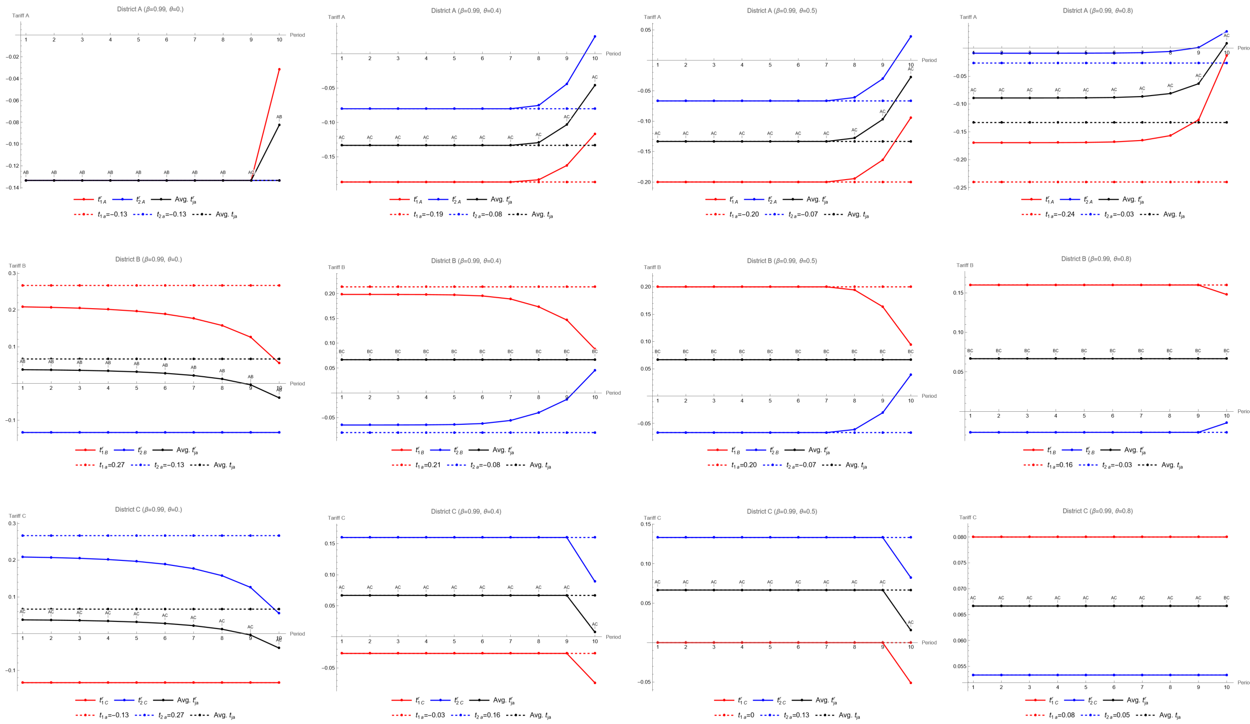
At the beginning of stage $t+1$, before knowing which district is the agenda setter, the expected utility of region r is $d_{r,t+1}$, i.e., the utility a region is expected to attain if no agreement is reached at period t and the bargaining moves to $t+1$.

Period t**.** At the beginning of stage t, the agenda setter a makes a tariff proposal $\mathbf{t}_a$. This proposal is either immediately accepted by at least one other region (passes a critical threshold), or it is rejected (by both regions), which leads to a second round of bargaining in period $t+1$.

A tariff proposal $\mathbf{t}_a$ that is accepted by a partner region r maximizes $\Omega_{a,t}(\mathbf{t}_a)$ subject to the PC of the partner, $\Omega_{r,t}(\mathbf{t}_a) \geq \beta_r \Omega^e_{r,t+1}$, where $0 \leq \beta_r \leq 1$. The term $\beta_r \Omega^e_{r,t+1}$ represents the partner's continuation utility, or the expected discounted payoff they would receive by rejecting the current offer and continuing the game in the next period. The agenda setter a then compares the maximized payoff it can obtain from an offer that is immediately accepted ($\Omega^{ar}_{a,t}$) to the expected payoff from an offer that is rejected, leading to the continuation of the game ($\beta_a \Omega^e_{a,t+1}$).

This comparison determines the optimal decision at period t: a will choose to make an immediately accepted offer to its preferred partner r, i.e., $m(a) = r$, if the resulting utility, $\Omega^{ar}_{a,t} \geq \beta_a \Omega^e_{a,t+1}$.

Example. To illustrate the results, we extend the previous one-period game example and assume that if no agreement is reached after the second round of bargaining, then the status quo utility level is free trade (i.e., $\overline{\Omega}_{r,0} = \Omega_r(\mathbf{t} = 0)$). The figure below shows the equilibrium tariff levels for districts A, B, and C, for different specialization levels of district C ($\theta = 0.0, 0.4, 0.5, 0.8$), calculated over $T = 10$ bargaining rounds.



$\theta = 0.0$ $\theta = 0.4$ $\theta = 0.5$ $\theta = 0.8$

Figure 6: $T = 10$ rounds of bargaining, for $\theta = \{0.0, 0.4, 0.5, 0.8\}$ and $\beta = 0.99$.

Remarks. The previous example highlights several key findings worth noting.

1. One-shot vs. dynamic tariffs:

    - In periods when $t < T$, each region's negotiated tariffs tend to differ from the static optimum (described by the dashed lines). The panels show that for periods 1 through $T - 1$, each region's tariffs t_1 and t_2 (and their average) tend to be approximately constant. In other words, throughout the beginning/middle of the game, the bargaining outcome appears to converge to an approximate stationary level. Districts concede part of their one-shot surplus to satisfy the partner's participation constraint.
    - In period T, when the threat of future punishment vanishes, all three districts adjust abruptly toward their one-shot optimal levels. This discrete "end-game" adjustment is the rollback to the static Nash outcome once the threat of delaying an agreement vanishes.

2. The coalition (partner) switches as θ changes:

    - When $\theta = 0$, B and C remain tied to A. For A, district B is a steady partner. Also, in this case, A has the strongest bargaining position.

- As θ increases, C becomes more diversified. While A prefers C and C prefers A in every period, B prefers a coalition with C.
- Note that in the one-shot game C's preferred coalition partner switches at $\theta = 0.5$: for $0 < \theta < 0.5$ it forms a coalition with A, while for $\theta > 0.5$ it forms one with B. The figures illustrate this. Accordingly, at $\theta = 0.4$, district B's steady-state tariffs deviate from its one-shot levels, whereas at $\theta = 0.8$ district A's steady-state tariffs diverge from its one-shot levels.[39]
- As θ increases, C gains a stronger bargaining position and can extract more surplus from its partners. When C splits its endowment equally ($\theta = 0.5$), the three figures exhibit a symmetric pattern, where all districts choose their preferred one-shot tariffs.

6.2 Infinite Rounds of Bargaining: Steady-State

We now consider a steady-state framework where three regions A, B, C repeatedly bargain over two tariffs (t_1, t_2).[40] In each period, one region $a \in \{A, B, C\}$ is chosen with probability 1/3 to set the agenda and form a two-district coalition by proposing a tariff pair (t_1, t_2). The continuation values for $r \in \{A, B, C\}$ are denoted d_r. Each district's period payoff is $\Omega_r(t_1, t_2), r \in \{A, B, C\}$. Let $\Omega_r^{ar'} \equiv \Omega_r\left(t_{1a}^{r'}, t_{2a}^{r'}\right)$ denote district r's welfare when district a is the agenda setter and forms a coalition with district $r' \neq a$.

Steady-state equilibrium. A steady-state equilibrium consists of:

- A set of coalitions $\{a, m(a)\}$ for each agenda setter $a \in \{A, B, C\}$, where the chosen partner is $m(a) \neq a$;
- Tariff choices: t_{ja}^r, for $j = 1, 2$ and $a, r \in \{A, B, C\}$, $a \neq r$;
- Lagrange multipliers ρ_a^r, for $a, r \in \{A, B, C\}$, $a \neq r$;
- Continuation values d_r, for $r \in \{A, B, C\}$;

that satisfy:

[39] The algorithm used to solve the problem assumes that in the event of a tie, the agenda setter breaks indifference by selecting the district whose name comes first alphabetically. Hence, for district C when $\theta = 0.8$, the plot displays coalition AC, although coalition BC would yield identical outcomes.

[40] For instance, assume there are two goods, good 1 and 2, where district A does not produce any tradable goods, district B produces good 1, and district C produces both goods.

(i) *Constrained maximization for each agenda setter.*

For a given agenda setter a and potential partner r, the problem is to choose tariffs to maximize Ω_a subject to the partner's PC. The Lagrangian is given by $\mathcal{L}_a^r(t_1, t_2, \rho_a) = \Omega_a(t_1, t_2) + \rho_a \Big[\Omega_r(t_1, t_2) - d_r\Big], \rho_a \geq 0$. The first-order conditions and the participation constraint (PC) are:

$$\frac{\partial \Omega_a}{\partial t_j}(t_1, t_2) + \rho_a \frac{\partial \Omega_r}{\partial t_j}(t_1, t_2) = 0, \quad j = 1, 2, \quad \text{and} \quad \Omega_r(t_1, t_2) \geq d_r, \quad r \neq a.$$

These equations are solved for $\left(t_{1a}^r, t_{2a}^r, \rho_a^r\right)$, which are functions of the continuation values d_r. This procedure is repeated for each potential partner.

(ii) *Optimal coalition choice for a.*

The agenda setter a chooses the partner $m(a)$ that yields the highest payoff, i.e., $m(a) = \arg\max_r \Omega_a^{ar}$.[41]

(iii) *Continuation values d_r.*

In a steady state, each region's continuation value d_ℓ is its discounted average payoff, determined by the payoffs from each of the three possible agenda setters:

$$d_r = \beta \, \frac{1}{3} \left[\Omega_r\big(t_{1A}^{m(A)}, t_{2A}^{m(A)}\big) + \Omega_r\big(t_{1B}^{m(B)}, t_{2B}^{m(B)}\big) + \Omega_r\big(t_{1C}^{m(C)}, t_{2C}^{m(C)}\big)\right], \quad r \in \{A, B, C\}.$$

Overall, this framework establishes a system of $3 \times (2 \text{ FOCs} + 1 \text{ PC}) + 3 = 12$ equations in 12 unknowns $\{t_{1a}^{m(a)}, t_{2a}^{m(a)}, \rho_a^{m(a)}, d_a\}$, for $a = A, B, C$.

6.2.1 Example

We continue with the example developed earlier, but now assume that regions may bargain over an infinite number of periods. We focus first on the case $\theta = 0$, and we next numerically solve for the steady state equilibrium for different values of $\theta \in (0, 1]$.

[41] If multiple partners yield the same maximum payoff, the tie is broken lexicographically according to the order A, B, C.

Steady state solution for $\theta = 0$. To illustrate the derivation of the steady-state, consider $\theta = 0$.[42] With equal weights, district payoffs are quadratic:

$$\begin{aligned}\Omega_A(t_1,t_2) &= \frac{1}{30}\left(60 - 4t_1 - 15t_1^2 - 4t_2 - 15t_2^2\right),\\ \Omega_B(t_1,t_2) &= \frac{1}{30}\left(60 + 8t_1 - 15t_1^2 - 4t_2 - 15t_2^2\right),\\ \Omega_C(t_1,t_2) &= \frac{1}{30}\left(60 - 4t_1 - 15t_1^2 + 8t_2 - 15t_2^2\right).\end{aligned}$$

Given a conjectured coalition profile $\{AB, BA, CA\}$, each agenda setter solves a constrained problem considering the partner's continuation value. For example, consider coalition AB. In this case, district A chooses (t_1, t_2) to maximize Ω_A subject to $\Omega_B \geq d_B$, which gives

$$\mathbf{t}_A^B = \left(\frac{-2 + 4\rho_A^B}{15\left(1+\rho_A^B\right)}, -\frac{2}{15}\right), \quad \text{with } \rho_A^B = \rho_A^B(d_B).$$

For BA, we obtain

$$\mathbf{t}_B^A = \left(\frac{4 - 2\rho_B^A}{15\left(1+\rho_B^A\right)}, -\frac{2}{15}\right), \quad \text{with } \rho_B^A = \rho_B^A(d_A).$$

For coalition CA, the problem is symmetric. Thus, tariff offers are, therefore, functions of the continuation values, so that $\Omega_r^{ar'}(d_r)$. The steady state d_r's are pinned down by the Bellman fixed-point system of equations

$$\begin{aligned}d_A &= \beta\frac{1}{3}\left[\Omega_A^{AB}(d_B) + \Omega_A^{BA}(d_A) + \Omega_A^{CA}(d_A)\right],\\ d_B &= \beta\frac{1}{3}\left[\Omega_B^{AB}(d_B) + \Omega_B^{BA}(d_A) + \Omega_B^{CA}(d_A)\right],\\ d_C &= \beta\frac{1}{3}\left[\Omega_C^{AB}(d_B) + \Omega_C^{BA}(d_A) + \Omega_C^{CA}(d_A)\right].\end{aligned}$$

Solving gives the unique solution $d_A = 1.9584, d_B = d_C = 1.9511$. This implies that $\rho_A = 0, \rho_B = \rho_C = 0.16$, and

$$\mathbf{t}_A^B = \left(-\frac{2}{15}, -\frac{2}{15}\right), \quad \mathbf{t}_B^A = \left(0.21, -\frac{2}{15}\right), \quad \mathbf{t}_C^A = \left(-\frac{2}{15}, 0.21\right).$$

Hence, at $\theta = 0$, in the coalition AB, B's PC is slack, while in the coalitions B and C, A's PC binds. Appendix G reports the full derivations, including the verification of the equilibrium.

[42] We still consider the baseline values $a_j = 2$, $b_j = 1$, $\bar{p}_j = 1$, $n_r = 1$, $k = 2/5$, and $\beta = 0.99$. Appendix Appendix G shows the calculations of the steady-state solutions.

One-shot vs. the dynamic steady state. At $\theta = 0$, both the one-shot and dynamic equilibrium select the same equilibrium coalition profiles $\{AB, BA, CA\}$ and $\{AC, BA, CA\}$. The key difference is the reservation utility: $\bar{\Omega}_r = \Omega_r(0) = 2$ in the one-shot game, and $d_A = 1.9584,\ d_B = d_C = 1.9511$, in the dynamic steady state. Therefore, partner constraints are weaker in the dynamic model, so setters can choose tariffs closer to their unconstrained ideals.

Table 2: Tariffs, Multipliers, and Utilities: One-shot vs. Dynamic Steady State

	Unconstrained	One-shot			Dynamic steady state		
ar	$\mathbf{t}_a$	$\mathbf{t}_a^r$	ρ_a^r	$(\Omega_A, \Omega_B, \Omega_C)$	$\mathbf{t}_a^r$	ρ_a^r	$(\Omega_A, \Omega_B, \Omega_C)$
AB	$(-0.13, -0.13)$	$(-0.03, -0.13)$	0.34	$(2.0126, 2.0000, 1.9593)$	$(-0.13, -0.13)$	0.00	$(2.0178, 1.9644, 1.9644)$
BA	$(0.27, -0.13)$	$(0.06, -0.13)$	1.12	$(2.0000, 2.0221, 1.9467)$	$(0.21, -0.13)$	0.16	$(1.9584, 2.0429, 1.9051)$
CA	$(-0.13, 0.27)$	$(-0.13, 0.06)$	1.12	$(2.0000, 1.9467, 2.0221)$	$(-0.13, 0.21)$	0.16	$(1.9584, 1.9051, 2.0429)$

We can also compare the one-shot expected per-period utilities under $\{AB, BA, CA\}$ (assuming ex-ante equal probabilities of being selected the agenda setter), given by $\mathbb{E}[\Omega_A] = 2.0042$, $E[\Omega_B] = 1.9896$, and $\mathbb{E}[\Omega_C] = 1.9760$, to the dynamic steady-state expected per-period utilities, $\frac{d_r}{\beta}$, given by $\frac{d_A}{\beta} = 1.9782$, $\frac{d_B}{\beta} = \frac{d_C}{\beta} = 1.9708$. Hence, at $\theta = 0$, dynamic bargaining relaxes partner PCs and yields more extreme setter-favorable tariffs in each coalition, while lowering average per-period payoffs relative to the one-shot benchmark.

Dynamic steady state for $\theta \in (0, 1]$. We next solve numerically for the steady state equilibrium for different values of $\theta \in (0, 1]$. The equilibrium coalitions that may arise in each case are summarized in Figure 7. Note that while there are potentially eight possible coalitions that may arise in steady state, in this case, only five are observed in equilibrium, depending on the values of θ.

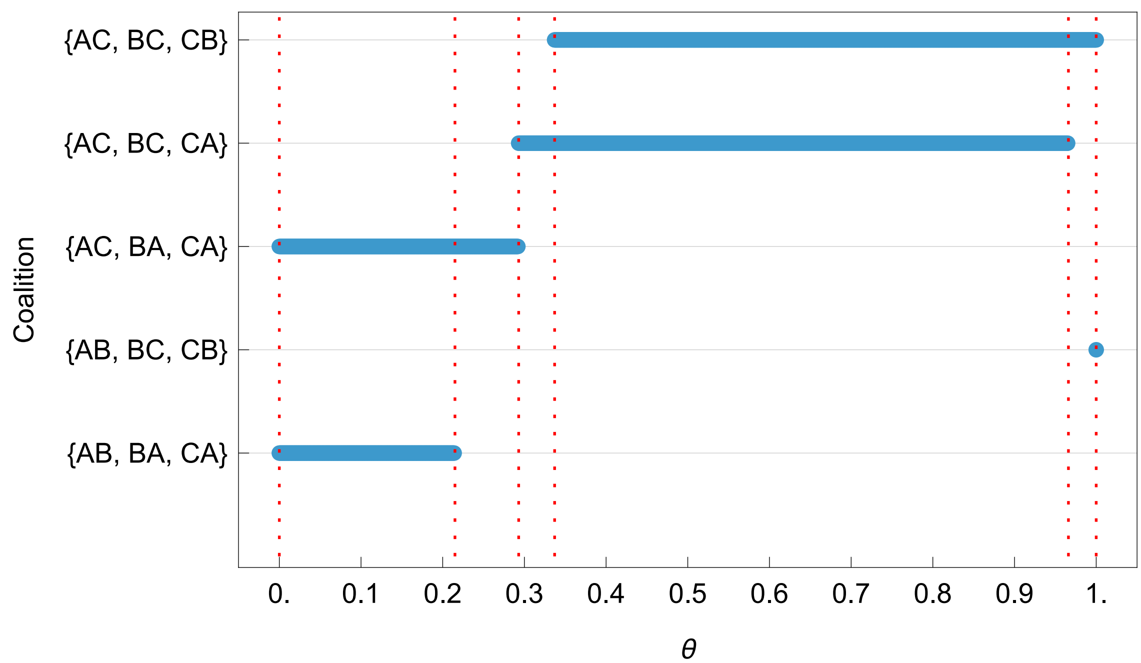


Figure 7: Equilibrium coalitions for different values of θ

From Figure 7, we can highlight the following results. When θ is small, the coalition profiles $\{AB, BA, CA\}$ and $\{AC, BA, CA\}$ are part of the steady state. Countries with low values of θ are more specialized, and this specialization tends to benefit region A more, which does not produce any tradable goods. Conversely, when θ becomes sufficiently large, coalitions $\{AC, BC, CA\}$ and $\{AC, BC, CB\}$ are part of the steady state. As regions B and C become more similar, their interests become more aligned, shifting the political advantage away from region A.

A key difference relative to the one-shot game is that, for low θ (specifically $0 < \theta < \theta_B^*$), the dynamic steady-state is consistent with both $\{AB, BA, CA\}$ and $\{AC, BA, CA\}$, while in the one-shot game $\{AC, BA, CA\}$ strictly dominates because A prefers C to B for those values of θ. The reason is that in the dynamic model, coalition partners compare offers to endogenous continuation values d_r (typically below $\Omega_r(0)$), which relaxes PCs, making A indifferent between partnering with B or C.

Applying the notion of pairwise stability introduced earlier in Section 5 to the present case reveals additional differences between the one-shot and dynamic equilibria. From Figure 7, it follows the coalitions $\{AC, CA\}$ are stable for all θ except $\theta = 1$ (in the one-shot game, this happens when $0 \leq \theta \leq \frac{1}{2}$), the coalitions $\{AB, BA\}$ are stable for low values of θ (in the one-shot game, only when $\theta = 0$), and the coalitions $\{BC, CB\}$ are stable for high values of θ (in the one-shot game, when $\frac{1}{2} \leq \theta \leq 1$.) in the dynamic equilibrium.

7 More Than Three Districts

The form of the solution, as characterized by equation (6), generalizes to an economy with more than three districts. However, finding the full equilibrium becomes significantly more complex. This complication arises not only because the number of minimum winning coalitions that must be considered grows exponentially with R, but also because the size of the optimization problem for each agenda setter is also directly proportional to the total number of goods J. Therefore, the characterization of the solution becomes less tractable, depending on both R and J, along with the specific regional distribution of economic activity.

Consider an economy with (an odd number of) R districts, from which district r is the agenda setter. District r seeks to form a minimum winning coalition of $(R+1)/2$ members by proposing a tariff vector to the other districts. Let $\mathscr{C}_r$ denote the minimum winning coalitions allowing district r to achieve a majority.[43] In the first stage, for each coalition $C_r \in \mathscr{C}_r$, the agenda setter r computes the vector of tariffs $\boldsymbol{t}_r^{C_r}$ that would satisfy districts in the coalition. In other words, the tariff vector $\boldsymbol{t}_r^{C_r}$ would offer those in the coalition a utility that is as large as what they can get in the status quo. The solution to this first step problem is an extension of (5).

Specifically, under the assumptions of fixed production and constant M_j', $\boldsymbol{t}_r^{C_r}$ (and $\boldsymbol{\tau}_r^{C_r}$) can be expressed as a convex combination of preferred tariffs of the districts in the coalition:

$$\tau_{jr}^{C_r} = \sum_{\ell \in C_r} \alpha_\ell \tau_{j\ell}, \quad \text{for each } C_r \in \mathscr{C}_r, \tag{26}$$

where $\tau_{j\ell}$ is the preferred ad valorem tariff of district ℓ for good j, and the weights satisfy $0 \leq \alpha_\ell \leq 1$ and $\sum_{\ell \in C_r} \alpha_\ell = 1$. In the second stage, the agenda-setter representing r can either preserve the status quo or choose a coalition C_r that gives r the highest utility and exceeds the status quo. To the extent that the agenda setter can form a coalition that yields all members a utility that is at least as high as the status quo, the solution tariff is characterized as (26).

In Appendix H, we characterize the solution for $R = 5$ under the assumptions considered in Section 4. We also develop several numerical examples that illustrate how different spatial

[43] The agenda setter needs $(R-1)/2$ additional districts in order to form a majority. The set $\mathscr{C}_r$ therefore contains $\frac{(R-1)!}{\{[(R-1)/2]!\}^2} = \frac{\Gamma[R]}{\Gamma[(1+R)/2]^2}$ different coalitions, where $\Gamma[x] = (x-1)!$.

allocations of production affect the outcomes.[44]

The three-district case, however, is not as restrictive as it may first appear. Take, for example, the 435 districts that make up the U.S. House of Representatives. A three-way clustering of districts is plausible as follows: Two party-based clusters, and a third cluster whose strong interests separate them from their parties. This may be because their constituents' demands go against the party line. Then, each of the three clusters may be aggregated as a single "district" and the three-district results hold. This balance between party and interests has an established history in political science (Peltzman, 1976, Cox and McCubbins, 1986, Dixit and Londregan, 1995, 1996, 1998, Besley, 2006, Ashworth and Bueno de Mesquita, 2006).

8 Conclusion

This paper develops a theory of tariff determination that replaces the unitary government of canonical trade models with an institutionally grounded mechanism of legislative bargaining. Districts derive distinct ideal tariff vectors from their local production structures, and national tariffs emerge from majority coalition formation under agenda-setting rules.

Our analysis applies the canonical Baron and Ferejohn (1989) bargaining protocol to an environment with geographically dispersed production, offering several results regarding the endogenous determination of tariffs. Each district's preferred tariff is determined by the district's output-to-import ratio and the welfare weight on specific-factor owners. The vector of tariffs chosen by a coalition is a convex combination of members' preferred tariffs, with endogenous bargaining weights determined by participation constraints and preference misalignment. The agenda setter ranks potential partners by minimizing a loss function that trades off preference misalignment against outside options.

The three-district case developed in the paper (with one non-producing and two producing districts) makes the political effect of the spatial distribution of production transparent. Specifically, the geographic concentration of production defines the type of coalitions that arise in equilibrium and the tariffs that would prevail nationally. When districts are specialized in the production of different goods, their tariff preferences diverge. In this scenario, a district with no producer interests tends to be a decisive player in the formation of coalitions, with large influence over the policy outcome. As production across districts becomes more similar, it is "cheaper" for the producing districts to form a coalition together, reducing the influence of the non-producing district.

[44] The problem becomes substantially more complex, as outcomes depend on the total number of goods J, the total number of regions R, and the distribution of economic activity across districts.

In the dynamic extension, endogenous continuation values, determined by the expected value of future bargaining, tend to be lower than the one-shot reservation benchmark. As a result, participation constraints are weaker in the dynamic setting, and agenda setters can obtain outcomes that are closer to their unconstrained preferred tariffs.

Overall, this framework bridges the demand-side political economy of protection with the institutional structure of legislative bargaining. The model shows that the influence of organized interests depends not only on lobbying but on how district-level preferences are aggregated through coalition formation. In majoritarian systems, geographically concentrated interests must pass through a legislative bargaining sieve; protection is therefore constrained by the outside options of coalition partners and the identity of the agenda setter. In systems with weaker legislative bargaining or proportional representation, this constraint may be attenuated.

More broadly, the present analysis provides a framework that can be used to predict trade policy outcomes across different economic and institutional environments. In our setup, the interaction of who gets to propose the policy (the power granted to the agenda setter) and how cohesive the coalitions are (stability of the coalition) ultimately determines trade policy outcomes. Because tariffs reshape economic geography over time, coalition structures evolve gradually, and reversals may occur with delay.

Extending the legislative bargaining model to a large-country setting, where nationally determined tariffs affect world prices and foreign governments respond strategically, is beyond the scope of this paper and is left for future work; Gawande et al. (2023) provides a foundation for such analysis by considering heterogeneous districts responding to interests from both importable and exportable sectors.[45]

By characterizing the underlying political and geographic drivers of trade policy, the model offers a conceptual framework to interpret the historical evolution of U.S. trade policy. Viewed through this lens, the Smoot–Hawley era reflects a political equilibrium dominated by a coalition of import-competing districts. Conversely, the transition initiated by the Reciprocal Trade Agreements Act of 1934 and subsequent fast-track delegation can be characterized as an institutional reallocation of agenda-setting power that enabled coalitions favoring trade liberalization. More recent episodes –including the tariff wars initiated in 2017, continued under the Biden administration, and the expansive use of tariffs in the second Trump administration– may reflect shifts in coalition composition toward districts more exposed to import competition and a relative decline in the political influence of export-

[45] Gawande et al. (2023) adopts a reduced-form institutional representation and does not explicitly model the underlying political bargaining mechanism that we develop here.

oriented regions. Trade policy is therefore not episodic or ad hoc; it is characterized by the equilibrium outcome of geographically structured bargaining under evolving domestic and international constraints.

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Appendix A Proof of Proposition 2

Proposition 2. *Assume quasi-linear and additive separable preferences. The ad valorem tariff on good j proposed by the agenda setter, district a, to district r that would be accepted by r (satisfies r' PC) is given by*

$$\tau_{ja}^r = \frac{n}{-\epsilon_j(\tau_{ja}^r)M_j(\tau_{ja}^r)}\left[\alpha_a^r \frac{\lambda_{ja}^K}{\lambda_a}\frac{q_{ja}(\tau_{ja}^r)}{n_{ja}^K} + (1-\alpha_a^r)\frac{\lambda_{jr}^K}{\lambda_r}\frac{q_{jr}(\tau_{ja}^r)}{n_{jr}^K} - \frac{Q_j(\tau_{ja}^r)}{n}\right], \tag{27}$$

where $\lambda_{jr}^K = \Lambda_{jr}^K n_{jr}^K$ is the aggregate welfare weight placed on special interests in district r, $\lambda_r = \Lambda_{0r}^L n_{0r}^L + \sum_m \sum_j \Lambda_{jr}^m n_{jr}^m$ is the aggregate welfare weight on district r's population (similarly for district a), and the bargaining weight $\alpha_a^r(t_{ja}^r) = \frac{\lambda_a}{\lambda_a + \rho_a^r(t_{ja}^r)\lambda_r}$ is a function of the Lagrange multiplier ρ_a^r (and the equilibrium t_{ja}^r), and $0 \leq \alpha_a^r(t_{ja}^r) \leq 1$.

Proof. District r's aggregate welfare is given by

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

The problem consists of maximizing $\Omega_a(\mathbf{t})$ with respect to $\mathbf{t} \geq 0$ subject to $\Omega_r(\mathbf{t}) \geq \overline{\Omega}_r$, where $\overline{\Omega}_r$ denotes the status quo utility for r. The Lagrangian is $\mathcal{L}_a = \Omega_a(\mathbf{t}) + \rho_a^r[\Omega_r(\mathbf{t}) - \overline{\Omega}_r]$, where $\rho_a^r \geq 0$ denotes the Lagrange multiplier for each $a \neq r$. The Kuhn-Tucker conditions are[46]

$$\frac{\partial \mathcal{L}_a}{\partial t_j} \equiv \frac{\partial \Omega_a}{\partial t_j} + \rho_a^r \frac{\partial \Omega_r}{\partial t_j} = 0, \quad \text{and} \quad \frac{\partial \mathcal{L}_a}{\partial \rho_a^r} \equiv \Omega_r(\mathbf{t}) - \overline{\Omega}_r \geq 0, \quad \frac{\partial \mathcal{L}_a}{\partial \rho_a^r}\rho_a^r = 0, \quad \rho_a^r \geq 0,$$

with

$$\begin{aligned}
\frac{\partial \Omega_r}{\partial t_j} &\equiv \Lambda_{jr}^K n_{jr}^K \left(\frac{q_{jr}}{n_{jr}^K}\right) + \frac{\lambda_r}{n}\left(M_j + t_{jr}M_j' - D_j\right), \\
&= \Lambda_{jr}^K n_{jr}^K \left(\frac{q_{jr}}{n_{jr}^K}\right) - \frac{\lambda_r}{n}Q_j + \frac{\lambda_r M_j'}{n}t_{jr}, \\
&= \frac{\lambda_r M_j'}{n}\left[t_{jr} + \frac{n}{\lambda_r M_j'}\Lambda_{jr}^K n_{jr}^K \left(\frac{q_{jr}}{n_{jr}^K}\right) - \frac{Q_j}{M_j'}\right], \\
&= \frac{\lambda_r \epsilon_j M_j}{n}\left[\frac{t_{jr}}{p_j} + \frac{1}{\epsilon_j}\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\left(\frac{q_{jr}/n_{jr}^K}{M_j/n}\right) - \frac{1}{\epsilon_j}\frac{Q_j}{M_j}\right], \\
&= \frac{\lambda_r \epsilon_j M_j}{n}\left[\tau_j + \frac{1}{\epsilon_j}\frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\left(\frac{q_{jr}/n_{jr}^K}{M_j/n}\right) - \frac{1}{\epsilon_j}\frac{Q_j}{M_j}\right],
\end{aligned}$$

where $\lambda_r = \lambda_r^L + \lambda_r^K$, and $\lambda_r^K = \sum_{j=1}^J \Lambda_{jr}^K n_{jr}^K$, $\lambda_r^L = \sum_{j=0}^J \Lambda_{jr}^L n_{jr}^L$, and $D_j = Q_j + M_j$, and $\epsilon_j = \frac{\partial M_j}{\partial p_j}\frac{p_j}{M_j}$. A similar expression holds for district a. Suppose the constraint holds with

[46] This version of the model allows tariffs to be negative. We also consider an extension in which $\mathbf{t} \geq 0$, so that the Kuhn-Tucker conditions become $\frac{\partial \mathcal{L}_a}{\partial t_j} \equiv \frac{\partial \Omega_a}{\partial t_j} + \rho_a^r \frac{\partial \Omega_r}{\partial t_j} \geq 0$, $\frac{\partial \mathcal{L}_a}{\partial t_j}t_j = 0$, $t_j \geq 0$, for $j = 1, \ldots, J$.

equality. Substituting $\frac{\partial \Omega_a}{\partial t_j}$ and $\frac{\partial \Omega_r}{\partial t_j}$ into the FOCs and isolating t_j (respectively, τ_j), gives the solution. Note that the endogenous variables $(M_j, \epsilon_j, q_{jr}, Q_j)$ are all evaluated at t^r_{ja} (τ^r_{ja}). $\square$

Appendix B Proof of Proposition 3

Proposition 3. *Assume quasi-linear and additive separable preferences. Consider good j and let τ denote its ad valorem tariff (ignoring the subscript j). Let each district $\ell = a, r$ have welfare $\Omega_\ell(\tau)$ that is twice continuously differentiable, strictly concave, and single-peaked with unique maximizer τ_{js} (the district's unconstrained preferred tariff). Let $\overline{\Omega}_r = \Omega_r(\tau_0)$ denote district r's outside option for some reference tariff τ_0 (not necessarily zero). Define the* acceptance set *for district r as $\mathcal{A}_r(\tau_0) = \{\tau : \Omega_r(\tau) \geq \Omega_r(\tau_0)\}$. Strict concavity implies that $\mathcal{A}_r(\tau_0)$ is an interval (possibly singleton). Assume $\overline{\Omega}_r \leq \max_\tau \Omega_r(\tau) = \Omega_r(\tau_{jr})$, so that $\mathcal{A}_r(\tau_0) \neq \emptyset$. The agenda setter a chooses τ to maximize $\Omega_a(\tau)$ subject to $\tau \in \mathcal{A}_r(\tau_0)$. Let τ_{ja}^r denote the solution to this problem. Then, under these assumptions,*

$$\min\{\tau_{jr}, \tau_{ja}\} \leq \tau_{ja}^r \leq \max\{\tau_{jr}, \tau_{ja}\}.$$

That is, the constrained tariff for good j lies between the unconstrained preferred tariffs of districts a and r.

Proof. Since preferences are quasi-linear and additive separable, welfare can be evaluated good by good (one-dimensional maximization problem). Consider good j. Because Ω_a is strictly concave and $\mathcal{A}_r(\tau_0)$ is an interval (convex set). Because Ω_r is strictly concave with unique maximizer τ_{jr} and $\Omega_r(\tau_0) \leq \Omega_r(\tau_{jr})$, the set $\mathcal{A}_r(\tau_0) = \{\tau : \Omega_r(\tau) \geq \Omega_r(\tau_0)\}$ is an interval containing τ_{jr}, with endpoints be $\underline{\tau}_r(\tau_0) \leq \overline{\tau}_r(\tau_0)$, so that $\underline{\tau}_r(\tau_0) \leq \tau_{jr} \leq \overline{\tau}_r(\tau_0)$. Therefore,

$$\tau_{ja}^r = \begin{cases} \tau_{ja}, & \text{if } \tau_{ja} \in \mathcal{A}_r(\tau_0) \quad \text{(constraint slack)}, \\ \text{boundary of } \mathcal{A}_r(\tau_0) \text{ closest to } \tau_{ja}, & \text{otherwise (constraint binds)}. \end{cases}$$

Consider these two possibilities:

- Constraint slack: If $\tau_{ja} \in \mathcal{A}_r(\tau_0)$, then $\tau_{ja}^r = \tau_{ja}$. Since $\tau_{jr} \in \mathcal{A}_r(\tau_0)$ and the set is an interval, $\min\{\tau_{jr}, \tau_{ja}\} \leq \tau_{ja}^r \leq \max\{\tau_{jr}, \tau_{ja}\}$.
- Constraint binds: If $\tau_{ja} \notin \mathcal{A}_r(\tau_0)$, then τ_{ja}^r equals the boundary of $\mathcal{A}_r(\tau_0)$ on the side of τ_{ja} that maximizes Ω_a. Because $\tau_{jr} \in \mathcal{A}_r(\tau_0)$ and $\mathcal{A}_r(\tau_0)$ is an interval, this boundary lies between τ_{jr} and τ_{ja}. Formally,

$$\tau_{ja} \geq \tau_{jr} \Rightarrow \tau_{jr} \leq \tau_{ja}^r = \overline{\tau}_r(\tau_0) \leq \tau_{ja}, \qquad \tau_{ja} \leq \tau_{jr} \Rightarrow \tau_{ja} \leq \tau_{ja}^r = \underline{\tau}_r(\tau_0) \leq \tau_{jr}.$$

Hence, in all cases,

$$\min\{\tau_{jr}, \tau_{ja}\} \leq \tau_{ja}^r \leq \max\{\tau_{jr}, \tau_{ja}\}.$$

□

What is the intuition behind this proposition? First, note that the welfare of each district is single-peaked in the tariff τ_j. Second, the r's PC defines an interval of tariffs that district r would accept (those that keep r at least as well off as under the outside option τ_0). Third, the agenda setter's unconstrained tariff τ_{ja} may or may not fall inside this interval. If it does, the constraint does not bind ($\rho_a^r = 0$), the bargaining weight is zero ($\alpha_a^r = 1$), and the outcome coincides with the agenda setter's preferred tariff: $\tau_{ja}^r = \tau_{ja}$. If the constraint binds ($\rho_a^r > 0$), the tariff that maximizes Ω_a is the point on r's acceptance frontier closest to τ_{ja} (on a's preferred side). As the constraint becomes infinitely tight ($\rho_a^r \to \infty$), the bargaining weight of a tends to zero ($\alpha_a^r \to 0$) and the outcome converges to r's own preferred tariff, $\tau_{ja}^r \to \tau_{jr}$. Therefore, the constrained tariff moves smoothly between the two unconstrained ideals, from the agenda setter's position when the constraint is slack to the receiver's position when the constraint binds strongly.

The figures below present different cases depending on the relationship between τ_0, τ_{jr}, and τ_{ja}. The shaded region indicates the region $\mathcal{A}_r(\tau_0)$. When $\tau_{ja} \in \text{int}\mathcal{A}_r(\tau_0)$, then $\tau_{ja}^r = \tau_{ja}$. Otherwise, τ_{ja}^r is equal to the boundary of $\mathcal{A}_r(\tau_0)$ closest to τ_{ja}.

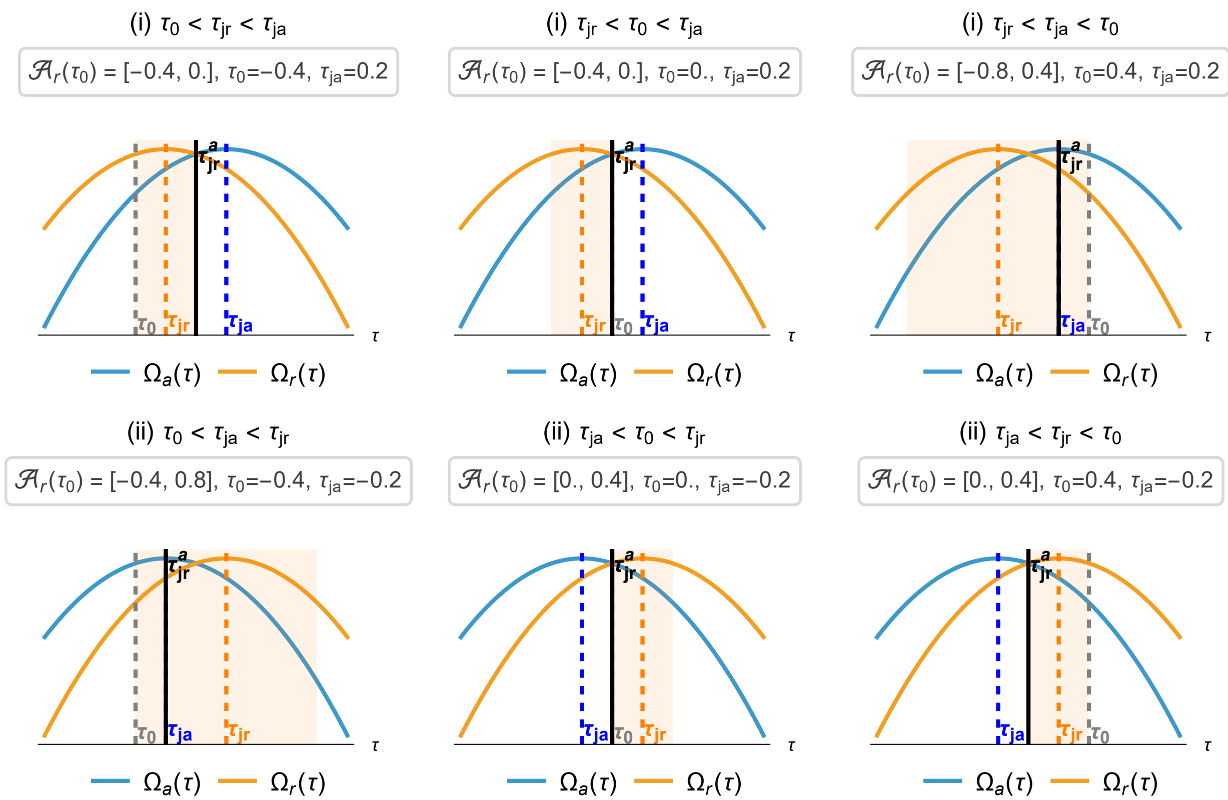


Figure 8: Different cases: (i) $\tau_{ja} < \tau_{jr}$, (ii) $\tau_{jr} < \tau_{ja}$

Notes: The shaded area shows the interval $\mathcal{A}_r(\tau_0)$.

Appendix C Comparative statics with respect to $\overline{\Omega}_r$

Recall the constrained tariff vector offered by agenda setter a to district r is $\mathbf{t}_a^r = \alpha \mathbf{t}_a + (1-\alpha)\,\mathbf{t}_r$, where

$$\alpha_a^r = \begin{cases} 1, & \text{if } \Omega_r(\mathbf{t}_a) \geq \overline{\Omega}_r \quad \text{(PC slack)}, \\ \sqrt{\dfrac{n_r D_r}{\lambda_r S_a^r}} = \sqrt{\dfrac{\Omega_r(\mathbf{t}_r) - \overline{\Omega}_r}{\lambda_r S_a^r}}, & \text{if } \Omega_r(\mathbf{t}_a) < \overline{\Omega}_r \leq \Omega_r(\mathbf{t}_r) \quad \text{(PC binds)}, \end{cases} \tag{28}$$

Suppose the PC is slack, then $\alpha_a^r = 1$ and $\frac{\partial t_{ja}^r}{\partial \overline{\Omega}_r} = 0$ for all j. Next, assume the participation constraint binds. Write $\alpha_a^r = \sqrt{\dfrac{\Omega_r(\mathbf{t}_r) - \overline{\Omega}_r}{\lambda_r S_a^r}}$. Differentiating gives

$$\frac{\partial \alpha_a^r}{\partial \overline{\Omega}_r} = -\frac{1}{2\lambda_r S_a^r \alpha_a^r} < 0. \tag{29}$$

Therefore, for each good j,

$$\frac{\partial t_{ja}^r}{\partial \overline{\Omega}_r} = \frac{\partial \alpha}{\partial \overline{\Omega}_r}\big(t_{ja} - t_{jr}\big) = -\frac{(t_{ja} - t_{jr})}{2\lambda_r S_a^r \alpha}.$$

Hence, when $\overline{\Omega}_r$ increases (a tougher participation constraint), α falls and the offer $\mathbf{t}_a^r$ moves toward $\mathbf{t}_r$ along the line segment joining $\mathbf{t}_a$ and $\mathbf{t}_r$. The impact on the tariff of good j depends on the difference between the unconstrained tariffs t_{ja} and t_{jr}.

The comparative static for the multiplier ρ_a^r w.r.t. $\overline{\Omega}_r$ follows immediately from the previous results. When the PC binds, the Lagrange multiplier satisfies

$$\rho_a^r = \frac{\lambda_a}{\lambda_r}\frac{(1-\alpha_a^r)}{\alpha_a^r} = \frac{\lambda_a}{\lambda_r}\left(\frac{1}{\alpha_a^r} - 1\right).$$

Therefore, the derivative of ρ_a^r w.r.t. $\overline{\Omega}_r$ is

$$\frac{\partial \rho_a^r}{\partial \overline{\Omega}_r} = \frac{\lambda_a}{\lambda_r}\frac{\partial}{\partial \overline{\Omega}_r}\left(\frac{1}{\alpha_a^r}\right) = \frac{\lambda_a}{\lambda_r}\left(-\frac{1}{(\alpha_a^r)^2}\right)\frac{\partial \alpha_a^r}{\partial \overline{\Omega}_r} = \frac{\lambda_a}{2\,\lambda_r^2\, S_a^r(\alpha_a^r)^3} > 0.$$

Thus, a tougher reservation level $\overline{\Omega}_r$ increases the multiplier ρ_a^r. Differentiating again (assuming the equilibrium is still in the binding region),

$$\frac{\partial^2 \rho_a^r}{\partial \overline{\Omega}_r^2} = \frac{3\,\lambda_a}{4\,\lambda_r^3\,(S_a^r)^2(\alpha_a^r)^5} \;>\; 0,$$

so ρ_a^r is increasing and convex in $\overline{\Omega}_r$.

Appendix D Comparative statics with respect to welfare weight on capital

Suppose that $\Lambda_{j\ell}^K = 1 + \kappa_\ell$, $\Lambda_{j\ell}^L = 1 - \kappa_\ell$, $\ell \in \{a, r\}$, and $n_\ell^K = \sum_j n_{j\ell}^K$, $n_\ell^L = \sum_j n_{j\ell}^L$, $n_\ell = n_\ell^K + n_\ell^L$, $\Delta n_\ell = n_\ell^K - n_\ell^L$. The welfare weights are in this case $\lambda_\ell(\kappa_\ell) = n_\ell + \kappa_\ell \Delta n_\ell$, $\lambda_{j\ell}^K(\kappa_\ell) = (1 + \kappa_\ell) n_{j\ell}^K$. Hence,

$$\frac{\partial t_{ja}}{\partial \kappa_a} = \frac{2 n_{ja}^K \sigma_{ja} n_a^L}{\left(\lambda_a\right)^2} > 0.$$

The constrained tariff offer from a to r is $t_{ja}^r(\kappa_a, \kappa_r) = \alpha(\kappa_a, \kappa_r)\, t_{ja}(\kappa_a) + \left[1 - \alpha(\kappa_a, \kappa_r)\right] t_{jr}(\kappa_r)$, with

$$\alpha_a^r(\kappa_a, \kappa_r) = \begin{cases} 1, & \Omega_r(\mathbf{t}_a(\kappa_a)) \geq \overline{\Omega}_r \quad \text{(PC slack)}, \\ \sqrt{\dfrac{n_r\, D_r(\kappa_r)}{\lambda_r(\kappa_r)\, S_a^r(\kappa_a, \kappa_r)}}, & \Omega_r(\mathbf{t}_a(\kappa_a)) < \overline{\Omega}_r \leq \Omega_r(\mathbf{t}_r(\kappa_r)) \text{(PC binds)}, \end{cases}$$

where $S_a^r(\kappa_a, \kappa_r) = \frac{1}{2} \sum_{j=1}^J \left(t_{jr}(\kappa_r) - t_{ja}(\kappa_a)\right)^2$, and $D_r(\kappa_r) = \frac{\Omega_r(\mathbf{t}_r(\kappa_r)) - \overline{\Omega}_r}{n_r}$. Only S_a^r in the denominator depends on κ_a. Therefore,

$$\frac{\partial \alpha_a^r}{\partial \kappa_a} = -\frac{\alpha_a^r}{2} \frac{1}{S_a^r} \frac{\partial S_a^r}{\partial \kappa_a}, \; \frac{\partial S_a^r}{\partial \kappa_a} = \sum_j \left(t_{ja} - t_{jr}\right) \frac{\partial t_{ja}}{\partial \kappa_a} \;\Rightarrow\; \frac{\partial \alpha_a^r}{\partial \kappa_a} = -\frac{\alpha_a^r}{2 S_a^r} \sum_j \left(t_{ja} - t_{jr}\right) \frac{\partial t_{ja}}{\partial \kappa_a}. \quad (30)$$

This means that for each good j, within the binding region,

$$\frac{\partial t_{ja}^r}{\partial \kappa_a} = \frac{\partial \alpha_a^r}{\partial \kappa_a} \left(t_{ja} - t_{jr}\right) + \alpha_a^r \frac{\partial t_{ja}}{\partial \kappa_a} = \alpha_a^r \left[\frac{\partial t_{ja}}{\partial \kappa_a} - \frac{\left(t_{ja} - t_{jr}\right)}{2 S_a^r} \sum_j \left(t_{ja} - t_{jr}\right) \frac{\partial t_{ja}}{\partial \kappa_a} \right].$$

If the PC is slack, then $\partial t_{ja}^r / \partial \kappa_a = \partial t_{ja} / \partial \kappa_a$.

With $\rho(\kappa_a, \kappa_r) = \frac{\lambda_a(\kappa_a)}{\lambda_r(\kappa_r)} \left[\frac{1}{\alpha_a^r(\kappa_a, \kappa_r)} - 1\right]$, we obtain

$$\begin{aligned} \frac{\partial \rho}{\partial \kappa_a} &= \frac{1}{\lambda_r} \frac{\partial \lambda_a}{\partial \kappa_a} \left(\frac{1}{\alpha_a^r} - 1\right) + \frac{\lambda_a}{\lambda_r} \frac{1}{(\alpha_a^r)^2} \left(-\frac{\partial \alpha_a^r}{\partial \kappa_a}\right) \\ &= \frac{\Delta n_a}{\lambda_r} \left(\frac{1}{\alpha_a^r} - 1\right) - \frac{\lambda_a}{\lambda_r (\alpha_a^r)^2} \frac{\partial \alpha_a^r}{\partial \kappa_a}. \end{aligned} \quad (31)$$

The sign of the first term depends on the sign of Δn_a. The sign of the second term depends on the sign of $\sum_j (t_{ja} - t_{jr}) \left(\partial t_{ja} / \partial \kappa_a\right)$.

Differentiating $\Omega_a\left(\mathbf{t}_a^r\right) = \Omega_a(0) + \lambda_a \left[S_a - (1 - \alpha_a^r)^2 S_a^r\right]$, with respect to κ_a, where $S_a(\kappa_a) = \frac{1}{2} \sum_j (t_{ja})^2$, gives

$$\frac{\partial \Omega_a}{\partial \kappa_a} = \frac{\partial \lambda_a}{\partial \kappa_a} \left[S_a - \left(1 - \alpha_a^r\right)^2 S_a^r\right] + \lambda_a \left[\frac{\partial S_a}{\partial \kappa_a} + 2(1 - \alpha_a^r) S_a^r \frac{\partial \alpha_a^r}{\partial \kappa_a} - (1 - \alpha_a^r)^2 \frac{\partial S_a^r}{\partial \kappa_a}\right],$$

with

$$\frac{\partial \lambda_a}{\partial \kappa_a} = \Delta n_a, \quad \frac{\partial S_a}{\partial \kappa_a} = \sum_j t_{ja} \frac{\partial t_{ja}}{\partial \kappa_a}, \quad \frac{\partial S_a^r}{\partial \kappa_a} = \sum_j \left(t_{ja} - t_{jr}\right) \frac{\partial t_{ja}}{\partial \kappa_a}.$$

If the PC is slack.

$$\frac{\partial \Omega_a}{\partial \kappa_a} = \frac{1}{2} \Delta n_a S_a + \frac{\lambda_a}{2} \frac{\partial S_a}{\partial \kappa_a}.$$

Appendix E Uniform and Equal Welfare Weights

Uniform welfare weights

We examine two cases of uniform weights: : $\Lambda_{jr}^m = \Lambda^m$ and $\Lambda_{jr}^m = \Lambda_r$.

First, consider the case where the welfare weight on factor m is uniform across all districts and sectors, $\Lambda_{jr}^m = \Lambda^m$. It follows that $\lambda_{ja}^K = \Lambda_{ja}^K n_{ja}^K = \Lambda^K n_{ja}^K$, and $\lambda_{jr}^K = \Lambda_{jr}^K n_{jr}^K = \Lambda^K n_{jr}^K$. The district aggregate welfare weights (λ_a and λ_r) also simplify: $\lambda_r = \Lambda^L n_r^L + \Lambda^K n_r^K$ and $\lambda_a = \Lambda^L n_a^L + \Lambda^K n_a^K$. Substituting into the constrained tariff formula:

$$t_{ja}^r = \alpha_a^r \frac{\Lambda^K n_{ja}^K}{\lambda_a}\sigma_{ja} + (1-\alpha_a^r)\frac{\Lambda^K n_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n}$$

The constrained tariff t_{ja}^r becomes:

$$t_{ja}^r = \left[\alpha_a^r \frac{\Lambda^K n_{ja}^K}{\Lambda^L n_a^L + \Lambda^K n_a^K}\sigma_{ja} + (1-\alpha_a^r)\frac{\Lambda^K n_{jr}^K}{\Lambda^L n_r^L + \Lambda^K n_r^K}\sigma_{jr}\right] - \frac{Q_j}{n}$$

Next, suppose that $\Lambda_{jr}^m = \Lambda_r$ for all districts r.

Proposition 3. *Suppose $\Lambda_{jr}^m = \Lambda_r$ for all districts r. Then, $\sum_\ell \frac{n_\ell}{n} t_{j\ell} = 0$.*

Proof. Consider the unconstrained preferred district tariff $t_{jr} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \sum_{\ell=1}^R \frac{n_{j\ell}^K}{n}\sigma_{j\ell}$. Adding over all districts,

$$\begin{aligned}\sum_{\ell=1}^R \frac{n_\ell}{n} t_{j\ell} &= \sum_{\ell=1}^R \frac{n_\ell}{n}\frac{\lambda_{j\ell}^K}{\lambda_\ell}\sigma_{j\ell} - \sum_{\ell=1}^R \frac{n_{j\ell}^K}{n}\sigma_{j\ell} \\ &= \sum_{\ell=1}^R \sigma_{j\ell}\left(\frac{n_\ell}{n}\frac{\lambda_{j\ell}^K}{\lambda_\ell} - \frac{n_{j\ell}^K}{n}\right). \end{aligned} \quad (32)$$

Since $\Lambda_{j\ell}^m = \Lambda_\ell$, then $\frac{\lambda_{j\ell}^K}{\lambda_\ell} = \frac{n_{j\ell}^K}{n_\ell}$. As a result, expression (32) becomes equal to zero. □

This means that if one of the terms in $\sum_{\ell=1}^R \frac{n_\ell}{n} t_{j\ell}$, for instance, the term for t_{jr}, is strictly positive (negative), then at least another term, $t_{jr'}$ must be negative (positive).

Corollary 1. *If $t_{jr} > (<) 0$ for one r, then, $t_{jr'} < (>) 0$ for at least another $r' \neq r$.*

When $R = 3$, if the preferred tariffs for good j in districts r and r' are strictly positive, then the preferred tariff for good j in the third district (denoted by r'' here) must be negative.

Equal welfare weights: $\Lambda_{jr}^m = 1$

We now impose a stronger condition that all actor owners receive equal weights irrespective of the sector of employment and region, that is, $\Lambda_{jr}^m = 1$ for all j, r, and $m \in \{L, K\}$. In this case, r's unconstrained preferred tariff on good j is

$$t_{jr} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \frac{Q_j}{n} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \sum_{\ell=1}^R \frac{n_{j\ell}^K}{n}\sigma_{j\ell} = \frac{n_{jr}^K}{n_r}\sigma_{jr} - \sum_{\ell=1}^R \frac{n_\ell}{n}\frac{n_{j\ell}^K}{n_\ell}\sigma_{j\ell}.$$

The tariff the agenda setter a offers to r, t^r_{ja}, satisfies $n_a t_{ar} + n_r \rho^r_a t_{jr} - (n_a + n_r \rho^r_a) t^r_{ja} \leq 0$, $t^r_{ja} \geq 0$, where, recall, ρ^r_a is the Lagrange multiplier associated with the district r''s participation constraint. As stated earlier, $t^r_{ja} = \alpha^r_a t_{ja} + (1 - \alpha^r_a) t_{jr}$, where $\alpha^r_a = \frac{n_a}{(n_a + n_r \rho^r_a)}$.

Properties. In addition to the properties described earlier with general weights, this case delivers a few further, specific results.

1. Consider districts r and r' with preferred tariffs $t_{jr}, t_{jr'}$. Then, $t_{jr} - t_{jr'} = \frac{n^K_{jr}}{n_r}\sigma_{jr} - \frac{n^K_{jr'}}{n'_r}\sigma_{jr'}$.

2. Note that t_{jr} is simply the deviation of $\frac{n^K_{jr}}{n_r}\sigma_{jr}$ from the nation's weighted average $\sum_{\ell=1}^{R} \frac{n_\ell}{n} \frac{n^K_{j\ell}}{n_\ell}\sigma_{j\ell}$. The unconstrained district-preferred tariffs on each good j are not independent. As stated in Proposition 3 in Appendix Appendix E, $\sum_{\ell=1}^{R} \frac{n_\ell}{n} t_{j\ell} = 0$. So if $t_{jr} > 0$ for one r, then, $t_{jr'} < 0$ for at least another $r' \neq r$. In other words, the district-preferred tariffs for a specific good j can be zero for all r, but they cannot all be strictly positive simultaneously. If the preferred tariffs for good j of two districts r and r' are strictly positive (negative), then the preferred tariff for the other district r'' is strictly negative (positive).

3. The aggregate welfare $\sum_\ell \Omega_\ell$ is maximized at $\mathbf{t} = 0$.

   Proposition 4. *Suppose $\Lambda^m_{jr} = \Lambda$ for all districts r. Then, the solution to the problem $\max_{\{\mathbf{t}\}} \sum_\ell \Omega_\ell(\mathbf{t})$ is $\mathbf{t} = 0$.*

   Proof. From the FOC for t_j, it follows that

$$\begin{aligned} \frac{\partial \Omega}{\partial t_j} &= \sum_\ell \frac{\partial \Omega_\ell}{\partial t_j} = \sum_\ell \frac{\lambda_\ell M'_j}{n}\left[t_j + \frac{n}{\lambda_\ell M'_j}\Lambda^K_{j\ell} n^K_{j\ell}\left(\frac{q_{j\ell}}{n^K_{j\ell}}\right) - \frac{Q_j}{M'_j}\right] = 0, \\ &= \Lambda M'_j t_j + \Lambda \underbrace{\left(\sum_\ell q_{j\ell} - Q_j\right)}_{=0} = 0, \quad \Rightarrow \quad t_j = 0. \end{aligned}$$

   □

4. The utility that district r attains at its preferred tariff vector $\mathbf{t} = \mathbf{t}_r$, $\Omega_r(\mathbf{t}_r)$, can be expressed as

$$\Omega_r(\mathbf{t}_r) = \Omega_r(\mathbf{0}) + n_r \frac{\sum_j t^2_{jr}}{2} \quad \Rightarrow \quad \frac{\Omega_r(\mathbf{t}_r) - \Omega_r(\mathbf{0})}{n_r} = \frac{\sum_j t^2_{jr}}{2}, \tag{33}$$

   where $\Omega_r(\mathbf{0})$ is r's welfare when tariffs are all equal to zero. $\Omega_r(\mathbf{0})$ can be expressed as

$$\frac{\Omega_r(\mathbf{0})}{n_r} = \frac{n^L_r}{n_r} + \phi(\overline{\mathbf{p}}) + \sum_{j \in \mathcal{Q}_r} \frac{n^K_{jr}}{n_r}\overline{p}_j \sigma_{jr}, \tag{34}$$

where $\mathcal{Q}_r$ is the set of goods produced in district r. The second term sums over goods i in which district r is active, i.e., $q_{ir} > 0$. Since tariffs are zero, no tariff revenue is generated.

Proposition 5. *Suppose $\Lambda^m_{jr} = \Lambda$ for all districts r. Then, district r's welfare at its vector of preferred tariffs $\mathbf{t}_r$, $\Omega_r(\mathbf{t}_r) \equiv \Omega_r$, can be expressed as*

$$\Omega_r = \Omega_r(\mathbf{0}) + n_r \frac{\sum_j t^2_{jr}}{2}, \quad \Rightarrow \quad \frac{\Omega_r - \Omega_r(\mathbf{0})}{n_r} = \frac{\sum_j t^2_{jr}}{2}. \tag{35}$$

5. Note that ρ^r_a may be expressed as $\rho^r_a = (n_a/n_r)(t_{ja} - t^r_{ja})/(t^r_{ja} - t_{jr})$. For $\rho^r_a \geq 0$, t^r_{ja} is between t_{ja} and t_{jr}.

6. Using the definition of district preferred tariffs $\mathbf{t}_a$, and $\mathbf{t}_r$, we can explicitly write the Lagrangian multiplier as

$$\begin{aligned} \rho^r_a &= \frac{n_a}{n_r}\left[\left(\frac{\sum_{j=1}^J (t_{jr} - t_{ja})^2/2}{\left[\Omega_r(\mathbf{t}_r) - \overline{\Omega}_r\right]/n_r}\right)^{1/2} - 1\right] \\ &= \frac{n_a}{n_r}\left[\left(\frac{S^r_a}{D_r}\right)^{\frac{1}{2}} - 1\right] = \frac{n_a}{n_r}\frac{(1-\alpha^r_a)}{\alpha^r_a} \geq 0, \end{aligned} \tag{36}$$

   where $\mathbf{t}_r$ is the vector of unconstrained tariffs for district r (derived earlier), $\Omega_r(\mathbf{t}_r)$ is district r's utility at its preferred tariffs, and $\alpha^r_a = \left(\frac{D_r}{S^r_a}\right)^{1/2}$.

7. A necessary condition for $\rho^r_a > 0$ is that $S^r_a > D_r > 0$ (i.e., $\Omega_r(\mathbf{t}_r) > \overline{\Omega}_r$). This means that an interior solution for ρ^r_a holds whenever the status quo utility $\overline{\Omega}_r$ satisfies $\Omega_r(\mathbf{t}_r) > \overline{\Omega}_r > \Omega_r(\mathbf{t}_r) - n_r S^r_a$. This is because a solution to the constrained problem does not exist when $\overline{\Omega}_r > \Omega_r(\mathbf{t}_r)$, and the constraint does not bind (i.e., $\rho^r_a = 0$) when $\overline{\Omega}_r < \Omega_r(\mathbf{t}_r) - n_r \sum_j (t_{jr} - t_{ja})^2/2$.

8. If $\rho^{r'}_r$ and $\rho^r_{r'}$, for $r \neq r'$, are positive, then

$$\frac{1 + \frac{n_{r'}}{n_r}\rho^{r'}_r}{1 + \frac{n_r}{n_{r'}}\rho^r_{r'}} = \left(\frac{D_r}{D_{r'}}\right)^{\frac{1}{2}}, \quad \text{or} \quad \frac{\alpha^{r'}_r}{\alpha^r_{r'}} = \left(\frac{D_r}{D_{r'}}\right)^{\frac{1}{2}}, \quad \text{or} \quad \alpha^{r'}_r = \delta_{rr'}\alpha^r_{r'}, \tag{37}$$

   where $\delta_{rr'} \equiv \left(\frac{D_r}{D_{r'}}\right)^{\frac{1}{2}}$ (so that $\frac{1}{\delta_{rr'}} = \delta_{r'r}$). If $n_r = n_{r'}$,

$$\frac{1 + \rho^{r'}_r}{1 + \rho^r_{r'}} = \left(\frac{D_r}{D_{r'}}\right)^{\frac{1}{2}}. \tag{38}$$

9. Also, $\rho_a^r > \rho_a^{r'}$ when

$$\frac{1}{n_r}\left[\left(\frac{S_a^r}{D_r}\right)^{\frac{1}{2}} - 1\right] > \frac{1}{n_{r'}}\left[\left(\frac{S_a^{r'}}{D_{r'}}\right)^{\frac{1}{2}} - 1\right]. \tag{39}$$

If $n_r = n_{r'}$, the latter condition becomes

$$\left(\frac{S_a^r}{D_r}\right)^{\frac{1}{2}} > \left(\frac{S_a^{r'}}{D_{r'}}\right)^{\frac{1}{2}} \Leftrightarrow \left(\frac{S_a^r}{S_a^{r'}}\right) > \left(\frac{D_r}{D_{r'}}\right). \tag{40}$$

10. If $\overline{\Omega}_r = \Omega_r(\mathbf{0})$, $\rho_a^r > 0$ whenever $\sum_j (t_{jr} - t_{ja})^2 > \sum_j t_{jr}^2$, and

$$\rho_a^r > \rho_a^{r'} \iff \frac{\left(\frac{\sum_j (t_{jr} - t_{ja})^2}{\sum_j t_{jr}^2}\right)^{\frac{1}{2}} - 1}{n_r} > \frac{\left(\frac{\sum_j (t_{jr'} - t_{ja})^2}{\sum_j t_{jr'}^2}\right)^{\frac{1}{2}} - 1}{n_{r'}}. \tag{41}$$

When the regions are of equal size:

$$\rho_a^r > \rho_a^{r'} \iff \frac{\sum_j (t_{jr} - t_{ja})^2}{\sum_j t_{jr}^2} > \frac{\sum_j (t_{jr'} - t_{ja})^2}{\sum_j t_{jr'}^2} \Rightarrow \frac{S_a^r}{S_r} > \frac{S_a^{r'}}{S_{r'}}. \tag{42}$$

If $\lambda_r = \lambda_{r'}$ and $s_r = s_{r'}$,

$$\alpha_a^r > \alpha_a^{r'} \iff \frac{S_r}{S_a^r} > \frac{S_{r'}}{S_a^{r'}}.$$

We can interpret ρ_a^r as a normalized misalignment index for district r in relation to the agenda setter a. Therefore, the shadow value on district r's PC is larger when the agenda setter's ideal vector $\mathbf{t}_a$ is farther from r's ideal $\mathbf{t}_r$ relative to the intensity of r's preferences, given by S_r. This provides a normalized-distance criterion to rank districts by the agenda setter's cost of attracting each district into the coalition. Everything else equal, the district whose ideal is more "orthogonal" to the agenda setter's and/or smaller in norm is costlier to integrate into the coalition, yielding a higher shadow cost ρ_a^r.

Appendix F Spatial Distribution of Production: Different Cases

The model underscores that the distribution of production across districts is a key determinant of tariffs. Districts with a high concentration of production of a specific good will naturally advocate for high tariffs on that good, protecting their local industry from cheaper imports. Conversely, districts with low output of import-competing goods and relatively more consumption of imports will push for lower tariffs. This sets the stage for a negotiation based on the relative power of the competing interests. Furthermore, the spatial allocation of economic activities supports the emergence of a wide range of potential coalitions. For instance, specialized districts, even those producing different goods, may find common ground in protecting their specialized economies. This highlights the interplay between local production patterns, the resulting distribution of economic power, and the formation of coalitions that ultimately shape tariff policy.

We explore further some of these alternatives below. We analyze and describe the solutions considering various alternative spatial arrangements of activities. For concreteness, we consider the case of three regions A, B, and C ($R = 3$). Among the examples, we consider the case of complete specialization (case 2 below), similar to the model developed by Celik et al. (2013).

Recall that the unconstrained preferred tariff for district r on good j is given by the general expression:

$$t_{jr} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \sum_{\ell=1}^{R}\frac{n_{j\ell}^K}{n}\sigma_{j\ell} = \frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} - \frac{Q_j}{n}.$$

Case 1: Uniform spatial distribution of activities

Suppose each district produces all types of goods: $A \to \{1,2,3\}$, $B \to \{1,2,3\}$, and $C \to \{1,2,3\}$. Specifically, $\frac{n_{jr}^K}{n_r} = k_j$, which implies $n_{jr}^K = k_j n_r$, and $\sigma_{jr} = \sigma_j$ for all j, r. Substituting the uniform values into the first term gives

$$\frac{\lambda_{jr}^K}{\lambda_r}\sigma_{jr} = \frac{\Lambda_{jr}^K n_{jr}^K}{\lambda_r}\sigma_j = \frac{\Lambda_{jr}^K (k_j n_r)}{\lambda_r}\sigma_j = \frac{\Lambda_{jr}^K n_r}{\lambda_r}k_j\sigma_j.$$

The second term simplifies to

$$\frac{Q_j}{n} = \sum_{\ell=1}^{R}\frac{n_{j\ell}^K}{n}\sigma_{j\ell} = \sum_{\ell=1}^{R}\frac{k_j n_r}{n}\sigma_j = k_j\sigma_j\underbrace{\sum_{\ell=1}^{R}\frac{n_\ell}{n}}_{=1} = k_j\sigma_j.$$

This means that

$$t_{jr} = k_j\sigma_j\left(\frac{\Lambda_{jr}^K n_r}{\lambda_r} - 1\right).$$

Suppose, in addition, that the weight is uniform: $\Lambda_{jr}^m = \Lambda^m$ for $m \in \{L, K\}$. Note that in this case, total district labor and capital shares are uniform across regions ($n_r^L = \mathfrak{s}^L n_r$,

$n_r^K = \mathfrak{s}^K n_r$). Then, the aggregate welfare weight on the district's population simplifies to:

$$\lambda_r = \Lambda^L n_r^L + \Lambda^K n_r^K = n_r(\Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K),$$

and the weight on sector j capital is:

$$\lambda_{jr}^K \sigma_{jr} = \Lambda_{jr}^K n_{jr}^K \sigma_{jr} = \Lambda^K (k_j n_r)\sigma_j.$$

Substituting into the original formula for t_{jr}:

$$t_{jr} = \left(\frac{\Lambda^K n_{jr}^K}{\lambda_r}\right)\sigma_j - k_j\sigma_j.$$

Substitute $n_{jr}^K = k_j n_r$ and λ_r:

$$\begin{aligned} t_{jr} &= \left[\frac{\Lambda^K (k_j n_r)}{n_r(\Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K)}\right]\sigma_j - k_j\sigma_j \\ &= k_j\sigma_j\left(\frac{\Lambda^K}{\Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K} - 1\right) \\ &= k_j\sigma_j\left(\frac{(1-\mathfrak{s}^K)(\Lambda^K - \Lambda^L)}{\Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K}\right). \end{aligned}$$

This means that the unconstrained tariff t_{jr} is non-zero unless $\Lambda^K = \Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K$ or $\Lambda^K = \Lambda^L$. This means the preferred tariff is determined by the deviation of the weight on capital (Λ^K) from the total weighted average weight ($\Lambda^L \mathfrak{s}^L + \Lambda^K \mathfrak{s}^K$).

The constrained tariff proposed by the agenda setter a to a potential coalition partner, in this case, is exactly equal to t_{ja}, confirming that when all districts are identical, the agenda setter chooses the unconstrained tariff of any region.

Therefore, $\Lambda^m = 1$, for example, district r's preferred tariff on good j is equal to zero, so the model predicts that (constrained) tariffs will be zero, i.e., $t_{ja}^r = 0$, for $r = A, B, C$ and $r \neq a$.

Example. We next construct several numerical examples that fully solve the two-stage problem under different assumptions. All examples consider three regions, A, B, C, and three tradable goods, goods 1, 2, 3, and the numeraire, good 0. Moreover, $n_r^L = \sum_j n_{jr}^L = 3/5$, $n_r^K = \sum_j n_{jr}^K = 2/5$ (same for all r), so that $n = 3$, and equal weights within each group but different across groups, i.e., $\Lambda_{jr}^m = \Lambda^m$ for all r, j and $m = L, K$. We also assume $\sigma_{jr} = 1$, and $\overline{p}_j = 1$, so that that tariff in sector j is $p_j - 1$.

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	n^K_j
1	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$
2	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$
3	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{6}{5}$

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	Q
1	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$
2	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$
3	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{15}$	$\frac{2}{5}$

(b) Production of goods q_{jr} by sector and region.

Figure 9: Allocation of the specific factors and production of goods by sector and region.

Suppose $\Lambda^K = 1 + \kappa$ and $\Lambda^L = 1 - \kappa$. The following tables summarize the unconstrained district-preferred tariffs.

a	t_1	t_2	t_3	Ω_a	$\overline{\Omega}_a$	M_1	M_2	M_3
A	0.0000	0.0000	0.0000	2.5000	2.5000	2.6000	2.6000	2.6000
B	0.0000	0.0000	0.0000	2.5000	2.5000	2.6000	2.6000	2.6000
C	0.0000	0.0000	0.0000	2.5000	2.5000	2.6000	2.6000	2.6000

(a) $\kappa = 0$

a	t_1	t_2	t_3	Ω_a	$\overline{\Omega}_a$	M_1	M_2	M_3
A	0.0421	0.0421	0.0421	2.3775	2.3750	2.4737	2.4737	2.4737
B	0.0421	0.0421	0.0421	2.3775	2.3750	2.4737	2.4737	2.4737
C	0.0421	0.0421	0.0421	2.3775	2.3750	2.4737	2.4737	2.4737

(b) $\kappa = 1/4$

Figure 10: Unconstrained preferred tariffs (which are also the constrained tariffs in this specific case) for each region r. Ω_r: Utility for region r at the preferred tariffs. $\overline{\Omega}_r$: Utility of region r evaluated at the status quo tariffs (in this case, zero tariffs). M_j: Imports of good j at the preferred tariffs.

Remarks

1. The constrained tariffs arising from the bilateral bargaining between the agenda a setter and another district r are, in this case, equal to the unconstrained tariffs, as shown earlier.
2. When $\kappa = 0$, all tariffs are all zero.
3. When $\kappa = 1/4$, the tariff profile reflects the fact that the fixed factors receive a larger welfare weight, leading to a higher level of trade protection.

Case 2: Complete specialization

Consider an economy with three importable goods $\{1, 2, 3\}$, where each district specializes in producing a single good:[47] A in 1, B in 2, and C in 3. The district-preferred tariffs are:

$$\begin{array}{c|ccc} t_{jr} & A & B & C \\ \hline 1 & \frac{(n_B+n_C)}{n}\frac{n^K_{1A}}{n_A}\sigma_{1A} > 0 & -\frac{n^K_{1A}}{n}\sigma_{1A} < 0 & -\frac{n^K_{1A}}{n}\sigma_{1A} < 0 \\ 2 & -\frac{n^K_{2B}}{n}\sigma_{2B} < 0 & \frac{(n_A+n_C)}{n}\frac{n^K_{2B}}{n_B}\sigma_{2B} > 0 & -\frac{n^K_{2B}}{n}\sigma_{2B} < 0 \\ 3 & -\frac{n^K_{3C}}{n}\sigma_{3C} < 0 & -\frac{n^K_{3C}}{n}\sigma_{3C} < 0 & \frac{(n_A+n_B)}{n}\frac{n^K_{3C}}{n_C}\sigma_{3C} > 0 \end{array} \tag{43}$$

[47] The paper by Celik et al. (2013) focuses on this specific case.

In this case

$$\sum_j t_{jr}^2 = \left(\frac{(n-n_r)}{n}\frac{n_{z_r r}^K \sigma_{z_r r}}{n_r}\right)^2 + \sum_{j \neq z_r}\left(\frac{n_{z_j \ell(j)}^K \sigma_{z_j \ell(j)}}{n}\right)^2, \tag{44}$$

where z_r denotes the good in which district r specializes and $\ell(j)$ denotes the district that specializes in good $j \neq z_r$. Consider a coalition between the agenda setter, district a, and another district $r \neq a$. It follows that $t_{ja}^r = \alpha_a^r t_{ja} + (1-\alpha_a^r)t_{jr}$, where

$$\sum_j (t_{jr} - t_{ja})^2 = \left(\frac{n_{z_a a}^K \sigma_{z_a a}}{n_a}\right)^2 + \left(\frac{n_{z_r r}^K \sigma_{z_r r}}{n_r}\right)^2. \tag{45}$$

Suppose district A is the agenda setter and forms a coalition with B. Then $\frac{\partial t_{1A}^B}{\partial \rho_A^B} < 0$, $\frac{\partial t_{2A}^B}{\partial \rho_A^B} > 0$, and $\frac{\partial t_{3A}^B}{\partial \rho_A^B} = 0$. When $\overline{\Omega}_B$ is low, the constraint will likely not bind and $\rho_A^B = 0$, so region A can charge its preferred unconstrained preferred tariffs t_{jA}, $j = 1,2,3$. As $\overline{\Omega}_B$ increases, the constraint begins to bind and $\rho_A^B > 0$. When $\rho_A^B = \frac{n_A}{n_A+n_C}$, $t_{1A}^B > 0$ and $t_{2A}^B = 0$. For higher levels of $\overline{\Omega}_B$, ρ_A^B becomes sufficiently large and t_{2A}^B becomes positive as well. When $\rho_A^B = \frac{n_B+n_C}{n_B}$, $t_{1A}^B = 0$ and $t_{2A}^B > 0$. In all cases, $t_{3A}^B = -\frac{n_{3C}^K \sigma_{3C}}{n} < 0$.

Suppose $n_r = 1$, $n_{z_r r}^K = k$, $\sigma_{z_r r} = \sigma$, and $\overline{\Omega}_r = \Omega_r(\mathbf{0})$ for all r. In this scenario, the agenda-setter a would be indifferent to forming a coalition with any of the other two districts. Consider the case in which A is the agenda setter and forms a coalition with B. The resulting tariff profile would (at least partially) consider district B's preferences, at the expense of district C's welfare. This means that while for good 1, $t_{1A} > t_{1A}^B > t_{1B}$, for good 2, $t_{2B} > t_{2A}^B > t_{2A}$. However for good 3, $t_{3A}^B = t_{3A} = t_{3B}$. As a result, the payoffs relative to the status quo, in this case, would be $\left(\Omega_A - \overline{\Omega}_A\right) > 0$, $\left(\Omega_B - \overline{\Omega}_B\right) = 0$, and $\left(\Omega_C - \overline{\Omega}_C\right) < 0$. Similar results follow when $a = B, C$.

Earlier, Proposition 4.1 showed that, for any two potential coalition partners $r = r', r'' \neq a$, the agenda setter a strictly prefers forming a coalition with the district with the lowest $H_a^r \equiv \left(\sqrt{S_a^r} - \sqrt{(1-s)S_r}\right)^2$. The proposition provides a characterization of this ordering when districts completely specialize in a single good and production technologies are symmetric. Under these assumptions, the agenda setter prefers to coalition with the smaller district. In particular, when $J = 3$, $H_{r'} > H_{r''}$ if and only if $n_{r'} > n_{r''}$. Thus, in the fully specialized and symmetric environment, coalition formation is determined entirely by relative district sizes.

Proposition Appendix F.1. *Consider $J = 3$ districts $\{A, B, C\}$, each specializing in a distinct good z_r (one-to-one mapping). Let $a \in \{A, B, C\}$ denote the agenda setter, and let $r \neq a$ be a potential coalition partner, and district populations satisfy $n_r > 0$ and $n := n_A + n_B + n_C$. Assume $s_r = s \in [0,1]$ for all $r \neq a$, $\sigma_{jr} = \sigma > 0$ for all (j, r), capital shares with common intensity $\kappa > 0$:*

$$\frac{n_{jr}^K}{n_r} = \begin{cases} \kappa, & j = z_r, \\ 0, & j \neq z_r, \end{cases} \qquad r = A, B, C.$$

Let
$$S_r \equiv \frac{1}{2}\sum_{j=1}^{3} t_{jr}^2, \quad S_a^r \equiv \frac{1}{2}\sum_{j=1}^{3}\left(t_{jr}-t_{ja}\right)^2, \quad H_a^r \equiv \left(\sqrt{S_a^r}-\sqrt{(1-s)\,S_r}\right)^2.$$
Then for any two non-agenda districts $r', r'' \neq a$, $H_{r'} > (<,=) H_{r''}$ if and only if $n_{r'} > (<,=) n_{r''}$.

Proof. For any district $r \in \{A, B, C\}$ and any good j, $\frac{n_{z_r r}^K}{n_r} = \Bbbk$, or $n_{z_r r}^K = \Bbbk n_r$, and $n_{jr}^K = 0$ if $j \neq z_r$. Therefore, in the present case, $t_{jr} = \frac{(n-n_r)}{n}\frac{n_{jr}^K}{n_r}\sigma = \frac{(n-n_r)}{n}\Bbbk\sigma$ if $j = z_r$, and $t_{jr} = -\frac{n_{jr}^K}{n}\sigma = -\frac{\Bbbk n_r}{n}\sigma$ if $j \neq z_r$. Thus,

$$\begin{aligned} S_a^r &= \frac{1}{2}\sum_j (t_{jr}-t_{ja})^2 = (\Bbbk\sigma)^2, & (46)\\ S_r &= \frac{1}{2}\sum_j t_{jr}^2 \\ &= \frac{(\Bbbk\sigma)^2}{2n^2}\left[(n-n_r)^2+n_a^2+n_\ell^2\right] \\ &= \frac{(\Bbbk\sigma)^2}{2n^2}\left[(n_a+n_\ell)^2+n_a^2+n_\ell^2\right] \\ &= \frac{(\Bbbk\sigma)^2}{n^2}\left(n_a^2+n_\ell^2+n_a n_\ell\right), & (47)\end{aligned}$$

$n - n_r = n_a + n_\ell$. Let $U_\ell = \sqrt{n_a^2+n_\ell^2+n_a n_\ell}$, then
$$\sqrt{S_r} = \frac{\Bbbk\sigma}{n}U_\ell. \tag{48}$$

Combining these expressions,
$$H_a^r = \left(\sqrt{S_a^r}-\sqrt{(1-s)S_r}\right)^2 = \left(\Bbbk\sigma - \sqrt{1-s}\,\frac{\Bbbk\sigma}{n}U_\ell\right)^2 = (\Bbbk\sigma)^2\left(1-\frac{\sqrt{1-s}}{n}U_\ell\right)^2. \tag{49}$$

Let $r', r'' \neq a$. By (49),
$$H_{r'} = (\Bbbk\sigma)^2\left(1-\frac{\sqrt{1-s}}{n}U_{r''}\right)^2, \quad H_{r''} = (\Bbbk\sigma)^2\left(1-\frac{\sqrt{1-s}}{n}U_{r'}\right)^2.$$

Consider now the difference:
$$\begin{aligned} H_{r'} - H_{r''} &= (\Bbbk\sigma)^2\left[\left(1-\frac{\sqrt{1-s}}{n}U_{r''}\right)^2 - \left(1-\frac{\sqrt{1-s}}{n}U_{r'}\right)^2\right] & (50)\\ &= (\Bbbk\sigma)^2\frac{\sqrt{1-s}}{n}\left(U_{r'}-U_{r''}\right)\left(2-\frac{\sqrt{1-s}}{n}(U_{r'}+U_{r''})\right). & (51)\end{aligned}$$

First, note that the last factor is strictly positive. For any $\ell \geq 0$, $U_\ell = \sqrt{n_a^2 + \ell^2 + n_a \ell} \leq n_a + \ell$, since $(n_a + \ell)^2 - (n_a^2 + \ell^2 + n_a \ell) = n_a \ell \geq 0$. Therefore,

$$U_{r'} + U_{r''} \leq (n_a + n_{r'}) + (n_a + n_{r''}) = 2n_a + n_{r'} + n_{r''} = n + n_a < 2n.$$

Because $s \in [0,1]$ implies $\sqrt{1-s} \in [0,1]$, we have

$$\frac{\sqrt{1-s}}{n}(U_{s'} + U_{s''}) < 2 \quad \Rightarrow \quad 2 - \frac{\sqrt{1-s}}{n}(U_{r'} + U_{r''}) > 0.$$

Second, it follows that the sign of $sign(H_{r'} - H_{r''}) = sign(U_{r'} - U_{r''})$. Consider the difference:

$$\begin{aligned} U_{r'}^2 - U_{r''}^2 &= \left(n_a^2 + n_{r'}^2 + n_a n_{r'}\right) - \left(n_a^2 + n_{r''}^2 + n_a n_{r''}\right) \\ &= (n_{r'}^2 - n_{r''}^2) + n_a(n_{r'} - n_{r''}) \\ &= (n_{r'} - n_{r''})(n_{r'} + n_{r''} + n_a) \\ &= (n_{r'} - n_{r''})n > 0. \end{aligned}$$

It follows that $U_{r'}^2 > U_{r''}^2 \iff n_{r'} > n_{r''}$. Because $U_\ell > 0$ for all ℓ, the same ordering holds for the square roots: $U_{r'} > U_{r''} \iff n_{r'} > n_{r''}$. Thus, $H_{r'} > H_{r''} \iff n_{r'} > n_{r''}$. □

For instance, if $a = A$, then $H_B > H_C \iff n_B > n_C$, $H_B = H_C \iff n_B = n_C$, and $H_B < H_C \iff n_B < n_C$. This means that the agenda setter $a = A$ will form a coalition with the less populated region. When B and C have the same population, $a = A$ is indifferent between them. A similar reasoning applies when the agenda setter is B or C.

Example. In this case, A produces good 1 only, B produces good 2 only, and C produces good 3 only. All cases assume $\Lambda^L = \Lambda^K = 1$.

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	n^K_j
1	$\frac{2}{5}$	0	0	$\frac{2}{5}$
2	0	$\frac{2}{5}$	0	$\frac{2}{5}$
3	0	0	$\frac{2}{5}$	$\frac{2}{5}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{6}{5}$

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	Q
1	$\frac{2}{5}$	0	0	$\frac{2}{5}$
2	0	$\frac{2}{5}$	0	$\frac{2}{5}$
3	0	0	$\frac{2}{5}$	$\frac{2}{5}$

(b) Production of goods q_{jr} by sector and region.

Figure 11: Allocation of the specific factors and production of goods by sector and region.

The tables below summarize the results.

a	t_1	t_2	t_3	Ω_a	$\overline{\Omega}_a$	M_1	M_2	M_3
A	0.2667	−0.1333	−0.1333	2.5533	2.5000	1.8000	3.0000	3.0000
B	−0.1333	0.2667	−0.1333	2.5533	2.5000	3.0000	1.8000	3.0000
C	−0.1333	−0.1333	0.2667	2.5533	2.5000	3.0000	3.0000	1.8000

Figure 12: Unconstrained preferred tariffs for each region r. Ω_r: Utility for region r at the preferred tariffs. $\overline{\Omega}_r$: Utility of region r evaluated at the status quo tariffs (in this case, zero tariffs). M_j: Imports of good j at the preferred tariffs.

a	r	t_1	t_2	t_3	Ω_A	Ω_B	Ω_C	M_1	M_2	M_3
A	B	0.0976	0.0357	-0.1333	2.5250	2.5000	2.4320	2.3070	2.4930	3.0000
A	C	0.0976	-0.1333	0.0357	2.5250	2.4320	2.5000	2.3070	3.0000	2.4930
B	A	0.0357	0.0976	-0.1333	2.5000	2.5250	2.4320	2.4930	2.3070	3.0000
B	C	-0.1333	0.0976	0.0357	2.4320	2.5250	2.5000	3.0000	2.3070	2.4930
C	B	-0.1333	0.0357	0.0976	2.4320	2.5000	2.5250	3.0000	2.4930	2.3070
C	A	0.0357	-0.1333	0.0976	2.5000	2.4320	2.5250	2.4930	3.0000	2.3070

(a) Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts. The coalition is formed with the district described under the column r. The columns titled Ω_r, $r = A, B, C$ show the region's utility at the chosen tariffs. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

a	r	S_r	S_a^r	s_r	α_a^r	H_r
A	B	0.0533	0.1600	0.0000	0.5774	0.0286
A	C	0.0533	0.1600	0.0000	0.5774	0.0286
B	A	0.0533	0.1600	0.0000	0.5774	0.0286
B	C	0.0533	0.1600	0.0000	0.5774	0.0286
C	A	0.0533	0.1600	0.0000	0.5774	0.0286
C	B	0.0533	0.1600	0.0000	0.5774	0.0286

(b) Trade policy intensity S_r, trade policy misalignment S_a^r, measure of the distance between the status quo utility and the "free trade" utility, the agenda setter's bargaining weight α_a^r, and the cost of forming a coalition with r H_a^r.

Figure 13

Remarks

1. To secure district r's participation in the bargaining coalition, agenda-setter a grants concessions: a lowers the tariff on the good it specializes in (relative to a's preferred rate) and raises the tariff on the good in which district r specializes (relative to a's preferred rate).

2. While the agenda setter is indifferent between the two possible partners, selecting one nonetheless harms the interests of the region that fails to form the majority.

Case 3: Combination of specialized and diversified districts.

Suppose that district A produces all three goods (factors are evenly distributed across sectors within district A), district B produces only good 1, and district C produces only good 3.

Example. In this case, production is spatially allocated as follows:

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	n^K_j
1	$\frac{2}{15}$	$\frac{2}{5}$	0	$\frac{8}{15}$
2	$\frac{2}{15}$	0	$\frac{2}{5}$	$\frac{8}{15}$
3	$\frac{2}{15}$	0	0	$\frac{2}{15}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{6}{5}$

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	Q
1	$\frac{2}{15}$	$\frac{2}{5}$	0	$\frac{8}{15}$
2	$\frac{2}{15}$	0	$\frac{2}{5}$	$\frac{8}{15}$
3	$\frac{2}{15}$	0	0	$\frac{2}{15}$

(b) Production of goods q_{jr} by sector and region.

Figure 14: Allocation of the specific factors and production of goods by sector and region.

The tables below summarize the results.

a	t_1	t_2	t_3	Ω_a	$\overline{\Omega}_a$	M_1	M_2	M_3
A	-0.0444	-0.0444	0.0889	2.5059	2.5000	2.6000	2.6000	2.6000
B	0.2222	-0.1778	-0.0444	2.5415	2.5000	1.8000	3.0000	3.0000
C	-0.1778	0.2222	-0.0444	2.5415	2.5000	3.0000	1.8000	3.0000

Figure 15: Unconstrained preferred tariffs for each region r. Ω_r: Utility for region r at the preferred tariffs. $\overline{\Omega}_r$: Utility of region r evaluated at the status quo tariffs (in this case, zero tariffs). M_j: Imports of good j at the preferred tariffs.

a	r	t_1	t_2	t_3	Ω_A	Ω_B	Ω_C	M_1	M_2	M_3
A	B	-0.0130	-0.0602	0.0731	2.5050	2.5000	2.4810	2.5060	2.6470	2.6470
A	C	-0.0602	-0.0130	0.0731	2.5050	2.4810	2.5000	2.6470	2.5060	2.6470
B	A	0.0444	-0.0889	0.0444	2.5000	2.5180	2.4640	2.3330	2.7330	2.7330
B	C	0.0259	0.0186	-0.0444	2.4930	2.5030	2.5000	2.3890	2.4110	3.0000
C	A	-0.0889	0.0444	0.0444	2.5000	2.4640	2.5180	2.7330	2.3330	2.7330
C	B	0.0186	0.0259	-0.0444	2.4930	2.5000	2.5030	2.4110	2.3890	3.0000

(a) Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts. The coalition is formed with the district described under the column r. The columns titled Ω_r, $r = A, B, C$ show the region's utility at the chosen tariffs. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

a	r	S_r	S_a^r	s_r	α_a^r	H_r
A	B	0.0415	0.0533	0.0000	0.8819	0.0007
A	C	0.0415	0.0533	0.0000	0.8819	0.0007
B	A	0.0059	0.0533	0.0000	0.3333	0.0237
B	C	0.0415	0.1600	0.0000	0.5092	0.0385
C	A	0.0059	0.0533	0.0000	0.3333	0.0237
C	B	0.0415	0.1600	0.0000	0.5092	0.0385

(b) Trade policy intensity S_r, trade policy misalignment S_a^r, measure of the distance between the status quo utility and the "free trade" utility, the agenda setter's bargaining weight α_a^r, and the cost of forming a coalition with r H_a^r.

Figure 16

Remarks

1. Even though district A produces all three goods, its preferred tariff is positive only for good 3, the good that is only produced in A.

2. Districts where production is more concentrated (B and C) are better off attracting the district with a more even distribution of fixed factors across the production of goods (district A).

Case 4: Three regions ($R = 3$) and two goods ($J = 2$)

Now suppose that $R = 3$ and $J = 2$. The following examples illustrate alternative spatial configurations of goods production.

Case 4 (i): One diversified and two specialized districts. Suppose that district A produces all three goods (factors are evenly distributed across sectors within district A), district B produces only good 1, and district C produces only good 3. In this case, production is spatially allocated as follows:

Sector	$n_{j,A}^K$	$n_{j,B}^K$	$n_{j,C}^K$	n_j^K
1	$\frac{1}{5}$	$\frac{2}{5}$	0	$\frac{3}{5}$
2	$\frac{1}{5}$	0	$\frac{2}{5}$	$\frac{3}{5}$
n_r^K	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{6}{5}$

(a) Allocation of n_{jr}^K across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	Q
1	$\frac{1}{5}$	$\frac{2}{5}$	0	$\frac{3}{5}$
2	$\frac{1}{5}$	0	$\frac{2}{5}$	$\frac{3}{5}$

(b) Production of goods q_{jr} by sector and region.

Figure 17: Allocation of the specific factors and production of goods by sector and region.

The tables below summarize the results.

a	t_1	t_2	Ω_a	$\overline{\Omega}_a$	M_1	M_2
A	0.0000	0.0000	2.0000	2.0000	2.4000	2.4000
B	0.2000	-0.2000	2.0400	2.0000	1.8000	3.0000
C	-0.2000	0.2000	2.0400	2.0000	3.0000	1.8000

Figure 18: Unconstrained preferred tariffs for each region r. Ω_r: Utility for region r at the preferred tariffs. $\overline{\Omega}_r$: Utility of region r evaluated at the status quo tariffs (in this case, zero tariffs). M_j: Imports of good j at the preferred tariffs.

a	r	t_1	t_2	Ω_A	Ω_B	Ω_C	M_1	M_2
A	B	0.0002	-0.0002	2.0000	2.0000	2.0000	2.3990	2.4010
A	C	-0.0002	0.0002	2.0000	2.0000	2.0000	2.4010	2.3990
B	A	0.0000	-0.0000	2.0000	2.0000	2.0000	2.4000	2.4000
B	C	-0.0000	0.0000	2.0000	2.0000	2.0000	2.4000	2.4000
C	A	-0.0000	0.0000	2.0000	2.0000	2.0000	2.4000	2.4000
C	B	0.0000	-0.0000	2.0000	2.0000	2.0000	2.4000	2.4000

(a) Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts. The coalition is formed with the district described under the column r. The columns titled Ω_r, $r = A, B, C$ show the region's utility at the chosen tariffs. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

a	r	S_r	S_a^r	s_r	α_a^r	H_r
A	B	0.0400	0.0400	0.0000	1.0000	0.0000
A	C	0.0400	0.0400	0.0000	1.0000	0.0000
B	A	0.0000	0.0400	0.0000	0.0000	0.0400
B	C	0.0400	0.1600	0.0000	0.5000	0.0400
C	A	0.0000	0.0400	0.0000	0.0000	0.0400
C	B	0.0400	0.1600	0.0000	0.5000	0.0400

(b) Trade policy intensity S_r, trade policy misalignment S_a^r, measure of the distance between the status quo utility and the "free trade" utility, the agenda setter's bargaining weight α_a^r, and the cost of forming a coalition with r H_a^r.

Figure 19

Remarks

1. Even though district A produces both goods, its preferred (unconstrained) tariffs for goods 1 and 2 are both zero. For districts B and C, the preferred tariffs are positive for the good in which they specialize and negative for the other good.

2. In this particular example, every district is indifferent between forming a coalition with any other district. The outcome in all cases is "free trade".

Case 4 (ii): Two specialized and one non-producing district. Suppose that district A does not produce any good, district B produces only good 1, and district C produces only good 2. In this case, production is spatially allocated as follows:

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	n^K_j
1	0	$\frac{2}{5}$	0	$\frac{2}{5}$
2	0	0	$\frac{2}{5}$	$\frac{2}{5}$
n^K_r	0	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{4}{5}$

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	Q
1	0	$\frac{2}{5}$	0	$\frac{2}{5}$
2	0	0	$\frac{2}{5}$	$\frac{2}{5}$

(b) Production of goods q_{jr} by sector and region.

Figure 20: Allocation of the specific factors and production of goods by sector and region.

The tables below summarize the results.

a	t_1	t_2	Ω_a	$\overline{\Omega}_a$	M_1	M_2
A	-0.1333	-0.1333	1.2107	1.2000	3.0000	3.0000
B	0.2667	-0.1333	2.0444	2.0000	1.8000	3.0000
C	-0.1333	0.2667	2.0444	2.0000	3.0000	1.8000

Figure 21: Unconstrained preferred tariffs for each region r. Ω_r: Utility for region r at the preferred tariffs. $\overline{\Omega}_r$: Utility of region r evaluated at the status quo tariffs (in this case, zero tariffs). M_j: Imports of good j at the preferred tariffs.

a	r	t_1	t_2	Ω_A	Ω_B	Ω_C	M_1	M_2
A	C	-0.1333	-0.0315	1.2080	1.9590	2.0000	3.0000	2.6940
A	B	-0.0315	-0.1333	1.2080	2.0000	1.9590	2.6940	3.0000
B	A	0.0552	-0.1333	1.2000	2.0220	1.9470	2.4340	3.0000
B	C	0.0775	0.0558	1.1870	2.0090	2.0000	2.3680	2.4320
C	A	-0.1333	0.0552	1.2000	1.9470	2.0220	3.0000	2.4340
C	B	0.0558	0.0775	1.1870	2.0000	2.0090	2.4320	2.3680

(a) Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts. The coalition is formed with the district described under the column r. The columns titled Ω_r, $r = A, B, C$ show the region's utility at the chosen tariffs. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

a	r	S_r	S_a^r	s_r	α_a^r	H_r
A	B	0.0444	0.0800	0.0000	0.7454	0.0052
A	C	0.0444	0.0800	0.0000	0.7454	0.0052
B	A	0.0178	0.0800	0.0000	0.4714	0.0224
B	C	0.0444	0.1600	0.0000	0.5270	0.0358
C	A	0.0178	0.0800	0.0000	0.4714	0.0224
C	B	0.0444	0.1600	0.0000	0.5270	0.0358

(b) Trade policy intensity S_r, trade policy misalignment S_a^r, measure of the distance between the status quo utility and the "free trade" utility, the agenda setter's bargaining weight α_a^r, and the cost of forming a coalition with r H_a^r.

Figure 22

Remarks

1. Now in this case, district A's preferred (unconstrained) tariffs for goods 1 and 2 are both negative. As before, for districts B and C, the preferred tariffs are positive for the good in which they specialize and negative for the other good.

2. In all cases, the PCs bind at the constrained tariffs. While A is indifferent between forming a coalition with either district B or C, they both preferred a coalition with A.

Case 4 (iii): General case with a non-producing region. We now consider a configuration in which region A produces neither good, region B specializes in the production of good 1, and region C produces different combinations of goods 1 and 2. In particular, let $n_{1C}^K = \theta n_C^K$ and $n_{2C}^K = (1-\theta)n_C^K$, with $0 \leq \theta \leq 1$ capturing different spatial configurations of production.[48] This means that $q_{1A} = q_{2A} = 0$, $q_{1B} = \sigma_{1B} n_{1B}^K$, $q_{2B} = 0$, $q_{1C} = \sigma_{1C}\theta n_C^K$, $q_{2C} = \sigma_{2C}(1-\theta)n_C^K$. Moreover, $Q_1 = q_{1B} + q_{1C} = \sigma_{1B} n_{1B}^K + \sigma_{1C}\theta n_C^K$, $Q_2 = q_{2C} = \sigma_{2C}(1-\theta)n_C^K$. In general, district r's utility can be written as

$$\Omega_r(\mathbf{t}) = \Omega_r(0) + n_r\left(\frac{q_{1r}}{n_r} - \frac{Q_1}{n}\right)t_1 + n_r\left(\frac{q_{2r}}{n_r} - \frac{Q_2}{n}\right)t_2 - \frac{n_r}{2}\left(t_1^2 + t_2^2\right).$$

For each district:

$$\begin{aligned}
\Omega_A(t_1,t_2) &= \Omega_A(0) - n_A\frac{Q_1}{n}t_1 - n_A\frac{Q_2}{n}t_2 - \frac{n_A}{2}\left(t_1^2+t_2^2\right), \\
\Omega_B(t_1,t_2) &= \Omega_B(0) + \left(\sigma_{1B}n_{1B}^K - n_B\frac{Q_1}{n}\right)t_1 - n_B\frac{Q_2}{n}t_2 - \frac{n_B}{2}\left(t_1^2+t_2^2\right), \\
\Omega_C(t_1,t_2) &= \Omega_C(0) + \left(\sigma_{1C}\theta n_C^K - n_C\frac{Q_1}{n}\right)t_1 + \left(\sigma_{2C}(1-\theta)n_C^K - n_C\frac{Q_2}{n}\right)t_2 - \frac{n_C}{2}\left(t_1^2+t_2^2\right).
\end{aligned}$$

Moreover, $\Omega_r(0) = n_r\phi(\bar{\mathbf{p}}) + n_r^L + \sum_{j=1}^{2} n_{jr}^K \bar{p}_j \sigma_{jr}$.

[48] When $\theta = 0$, there is complete specialization in the production of goods 1 and 2; when $\theta = 1$, both regions B and C produce good 1, and good 2 is not produced domestically.

Unconstrained tariffs. In this case, the unconstrained preferred tariffs are

$$t_{1A} = -\frac{\left(n_{1B}^K\sigma_{1B} + \theta n_C^K\sigma_{1C}\right)}{n} = -\frac{Q_1}{n}, \quad t_{2A} = -\frac{(1-\theta)n_C^K\sigma_{2C}}{n} = -\frac{Q_2}{n},$$
$$t_{1B} = \left(\frac{n_A+n_C}{n}\right)\frac{n_{1B}^K\sigma_{1B}}{n_B} - \left(\frac{n_C}{n}\right)\frac{\theta n_C^K\sigma_{1C}}{n_C}, \quad t_{2B} = -\frac{(1-\theta)n_C^K\sigma_{2C}}{n},$$
$$t_{1C} = \left(\frac{n_A+n_B}{n}\right)\frac{\theta n_C^K\sigma_{1C}}{n_C} - \left(\frac{n_B}{n}\right)\frac{n_{1B}^K\sigma_{1B}}{n_B}, \quad t_{2C} = \left(\frac{n_A+n_B}{n}\right)\frac{(1-\theta)n_C^K\sigma_{2C}}{n_C}.$$

Note that when the good 2 is not produced in the country (i.e., $\theta = 1$), then all regions prefer a zero tariff on 2. It follows that A's preferred tariffs and B's preferred tariff for good 2 are non-positive.

Constrained tariffs. We next characterize the constrained solutions in relation to the agenda setter. We use the following notation that was introduced earlier in equation (37): $\delta_{rr'} \equiv \left(\frac{D_r}{D_{r'}}\right)^{\frac{1}{2}}$, which implies $\frac{1}{\delta_{rr'}} = \delta_{r'r}$.

Region A is the agenda setter: When A is the agenda setter, it can form a coalition with region B, the region specializing in good 1, or with region C, the region producing both goods 1 and 2.

(i) $\{A,B\}$: $t_{1A}^B = \alpha_A^B t_{1A} + (1-\alpha_A^B)t_{1B}, t_{2A}^B = t_{2A}$, where $\alpha_A^B = \frac{n_A}{(n_A+n_B\rho_r^B)}$, and

$$\rho_A^B = \frac{n_A}{n_B}\left[\left(\frac{\left(\frac{n_{1B}^K\sigma_{1B}}{n_B}\right)^2/2}{[\Omega_B(\mathbf{t}_B)-\overline{\Omega}_B)]/n_B}\right)^{1/2} - 1\right]. \tag{52}$$

(ii) $\{A,C\}$: $t_{zA}^C = \alpha_A^C t_{zA} + (1-\alpha_A^C)t_{zC}, z = 1,2$, where $\alpha_A^C = \frac{n_A}{(n_A+n_C\rho_A^C)}$, and

$$\rho_A^C = \frac{n_A}{n_C}\left[\left(\frac{\left[\left(\frac{\theta n_C^K\sigma_{1C}}{n_C}\right)^2 + \left(\frac{(1-\theta)n_C^K\sigma_{2C}}{n_C}\right)^2\right]/2}{[\Omega_C(\mathbf{t}_C)-\overline{\Omega}_C)]/n_C}\right)^{1/2} - 1\right]. \tag{53}$$

Region B is the agenda setter:

(i) $\{B,A\}$: $t_{1B}^A = \alpha_B^A t_{1B} + (1-\alpha_B^A)t_{1A}$, $t_{2B}^A = t_{2B}$, where $\alpha_B^A = \frac{n_B}{(n_B+n_A\rho_B^A)}$, and $\alpha_B^A = \delta_{BA}\alpha_A^B$

(ii) $\{B,C\}$: $t_{zB}^C = \alpha_B^C t_{zB} + (1-\alpha_B^C)t_{z'C}$, $z = 1,2$, where $\alpha_B^C = \frac{n_B}{(n_B+n_C\rho_B^C)}$, and

$$\rho_B^C = \frac{n_B}{n_C}\left[\left(\frac{\left[\left(\frac{n_{1B}^K\sigma_{1B}}{n_B} - \frac{\theta n_C^K\sigma_{1C}}{n_C}\right)^2 + \left(\frac{(1-\theta)n_C^K\sigma_{2C}}{n_C}\right)^2\right]/2}{[\Omega_C(\mathbf{t}_C)-\overline{\Omega}_C)]/n_C}\right)^{1/2} - 1\right]. \tag{54}$$

Region C is the agenda setter:

(i) $\{C, A\}$: $t_{zC}^{A} = \alpha_{C}^{A} t_{zC} + (1-\alpha_{C}^{A}) t_{zA}$, $z = 1, 2$, where $\alpha_{C}^{A} = \frac{n_C}{(n_C + n_A \rho_C^A)}$, and $\alpha_{C}^{A} = \delta_{CA}\alpha_{A}^{C}$

(ii) $\{C, B\}$: $t_{zC}^{B} = \alpha_{C}^{B} t_{zC} + (1-\alpha_{C}^{B}) t_{zB}$, $z = 1, 2$, where $\alpha_{C}^{B} = \frac{n_C}{(n_C + n_B \rho_C^B)}$, and $\alpha_{C}^{B} = \delta_{CB}\alpha_{B}^{C}$.

Example. Consider a specific example in which the regions have the same size, $n_r = 1$ ($n = 3$). The example assumes $n_{1A}^{K} = n_{2A}^{K} = 0$, $n_{1B}^{K} = k$, $n_{2B}^{K} = 0$, $n_{1C}^{K} = \theta k$, $n_{2C}^{K} = (1-\theta)k$, and $\sigma_{1B} = \sigma_{1C} = \sigma_{2C} = \sigma$. Therefore, $q_{1A} = q_{2A} = 0, q_{1B} = k\sigma, q_{2B} = 0$, $q_{1C} = \theta k\sigma, q_{2C} = (1-\theta)k\sigma$, $Q_1 = (1+\theta)k\sigma, Q_2 = (1-\theta)k\sigma$. In this case, $\Omega_r(\mathbf{t}) = \Omega_r(0) + \sum_{j=1}^{2} \left(q_{jr} - \frac{Q_j}{3}\right) t_j - \frac{1}{2}\left(t_1^2 + t_2^2\right)$, so that

$$\begin{aligned}
\Omega_A(t_1, t_2) &= \Omega_A(0) - \frac{(1+\theta)k\sigma}{3} t_1 - \frac{(1-\theta)k\sigma}{3} t_2 - \frac{1}{2}\left(t_1^2 + t_2^2\right), \\
\Omega_B(t_1, t_2) &= \Omega_B(0) + \frac{(2-\theta)k\sigma}{3} t_1 - \frac{(1-\theta)k\sigma}{3} t_2 - \frac{1}{2}\left(t_1^2 + t_2^2\right), \\
\Omega_C(t_1, t_2) &= \Omega_C(0) + \frac{(2\theta-1)k\sigma}{3} t_1 + \frac{2(1-\theta)k\sigma}{3} t_2 - \frac{1}{2}\left(t_1^2 + t_2^2\right).
\end{aligned} \tag{55}$$

If we assume $a_j = 2, b_j = 1, \bar{p}_j = 1$, then $\Omega_A(0) = \Omega_B(0) = \Omega_C(0) = 2$. In the constrained problem, we assume $\overline{\Omega}_r = \Omega_r(0)$.

The unconditional preferred tariff vectors are:

$$\begin{aligned}
\mathbf{t}_A &= \left(-\frac{(1+\theta)k\sigma}{3}, -\frac{(1-\theta)k\sigma}{3}\right), \\
\mathbf{t}_B &= \left(\frac{(2-\theta)k\sigma}{3}, -\frac{(1-\theta)k\sigma}{3}\right), \\
\mathbf{t}_C &= \left(\frac{(2\theta-1)k\sigma}{3}, \frac{2(1-\theta)k\sigma}{3}\right).
\end{aligned}$$

For any coalition $\{a, r\}$, $\mathbf{t}_a^r = \alpha_a^r \, \mathbf{t}_a + (1-\alpha_a^r)\, \mathbf{t}_r$, $\alpha_a^r = \min\left\{1, \sqrt{\frac{S_r}{S_a^r}}\right\}$, with

$$S_A = \frac{(1+\theta^2)(k\sigma)^2}{9}, \quad S_B = \frac{(5-6\theta+2\theta^2)(k\sigma)^2}{18}, \quad S_C = \frac{(8\theta^2-12\theta+5)(k\sigma)^2}{18},$$

$$S_A^B = \frac{(k\sigma)^2}{2}, \quad S_A^C = \frac{(1-2\theta+2\theta^2)(k\sigma)^2}{2}, \quad S_B^C = (1-\theta)^2(k\sigma)^2.$$

The equilibrium α_a^r's are:

$$\begin{aligned}
\alpha_A^B &= \sqrt{\tfrac{5-6\theta+2\theta^2}{9}}, & \alpha_A^C &= \sqrt{\tfrac{8\theta^2-12\theta+5}{9(1-2\theta+2\theta^2)}}, \\
\alpha_B^A &= \sqrt{\tfrac{2(1+\theta^2)}{9}}, & \alpha_C^A &= \sqrt{\tfrac{2(1+\theta^2)}{9(1-2\theta+2\theta^2)}}, \\
\alpha_B^C &= \min\left\{1, \sqrt{\tfrac{8\theta^2-12\theta+5}{18(1-\theta)^2}}\right\}, & \alpha_C^B &= \min\left\{1, \sqrt{\tfrac{5-6\theta+2\theta^2}{18(1-\theta)^2}}\right\},
\end{aligned}$$

where $0 < \alpha_A^B, \alpha_A^C, \alpha_B^A, \alpha_C^A < 1$ for all $\theta \in [0,1]$, $\alpha_B^C < 1$ for all $\theta < 0.8258$, $\alpha_B^C = 1$ for $\theta \geq 0.8258$, $\alpha_C^B < 1$ for $\theta < 0.6798$, and $\alpha_C^B = 1$ for $\theta \geq 0.6798$. The constrained tariffs $\mathbf{t}_a^r(\theta)$

are:

$$
\begin{aligned}
\mathbf{t}_A^B &= \left(\frac{(2-\theta)-3\alpha_A^B}{3}\,k\sigma,\ -\frac{(1-\theta)}{3}\,k\sigma\right),\\
\mathbf{t}_A^C &= \left(\frac{(2\theta-1)-3\theta\,\alpha_A^C}{3}\,k\sigma,\ \frac{(1-\theta)(2-3\alpha_A^C)}{3}\,k\sigma\right),\\
\mathbf{t}_B^A &= \left(\frac{3\alpha_B^A-(1+\theta)}{3}\,k\sigma,\ -\frac{(1-\theta)}{3}\,k\sigma\right),\\
\mathbf{t}_B^C &= \left(\frac{(2\theta-1)+3(1-\theta)\alpha_B^C}{3}\,k\sigma,\ \frac{(1-\theta)(2-3\alpha_B^C)}{3}\,k\sigma\right),\\
\mathbf{t}_C^A &= \left(\frac{3\theta\,\alpha_C^A-(1+\theta)}{3}\,k\sigma,\ \frac{(1-\theta)(-1+3\alpha_C^A)}{3}\,k\sigma\right),\\
\mathbf{t}_C^B &= \left(\frac{(2-\theta)-3(1-\theta)\alpha_C^B}{3}\,k\sigma,\ \frac{(1-\theta)(-1+3\alpha_C^B)}{3}\,k\sigma\right).
\end{aligned}
\tag{56}
$$

Figure 23 shows the outcomes for different values of $\theta \in [0, 1]$.

Remarks

1. When $a = B$, and B forms a coalition with C, $\rho_B^C = Max\left[-1 + \frac{3\sqrt{2}(1-\theta)}{\sqrt{8\theta^2-12\theta+5}}, 0\right]$. This means that $\rho_B^C > 0$ when $\theta < 0.83$. In other words, when $\theta > 0.83$, $\Omega_C^{BC} > \overline{\Omega}_C$ and $t_{jB}^C = t_{jB}$.

2. Similarly, when $a = C$, and C forms a coalition with B, $\rho_C^B = Max\left[-1 + \frac{3\sqrt{2}(1-\theta)}{\sqrt{2\theta^2-6\theta+5}}, 0\right]$. This means that $\rho_C^B > 0$ when $\theta < 0.68$. In other words, when $\theta > 0.68$, $\Omega_B^{CB} > \overline{\Omega}_B$ and $t_{jC}^B = t_{jC}$.

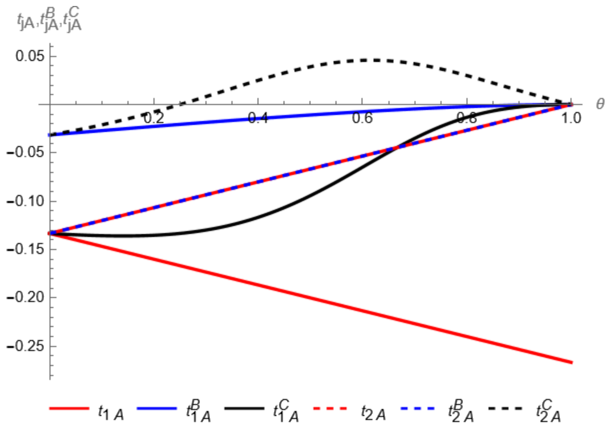
3. District A prefers a coalition with district C when $0 < \theta < 1$. At the extreme values $\theta = 0$ and $\theta = 1$, A is indifferent between B and C.

4. For low values of θ ($0 \leq \theta \leq 1 - \frac{2^{1/2}}{2}$), district B prefers a coalition with A. When θ becomes sufficiently large, B would rather form a coalition with C.

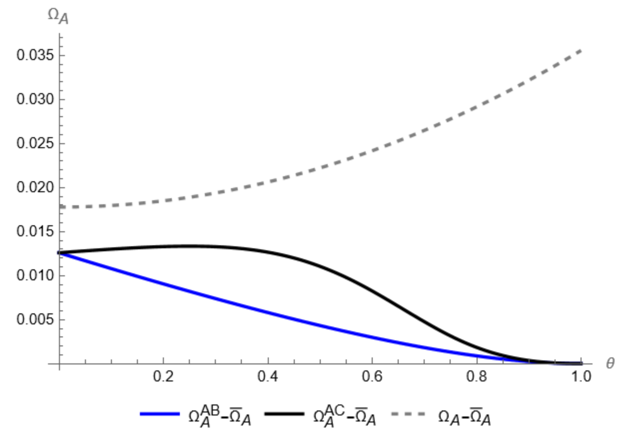
5. For low values of θ, specifically when $\theta \leq 0.5$, C would choose a coalition with A. As θ becomes sufficiently large, C would prefer a coalition with B.

6. Consider three regions ℓ, ℓ', ℓ''. The coalition $\{\ell, \ell'\}$ is a "stable" coalition if the agenda setter ℓ is better off forming a coalition with ℓ' rather than with ℓ'', and vice versa.

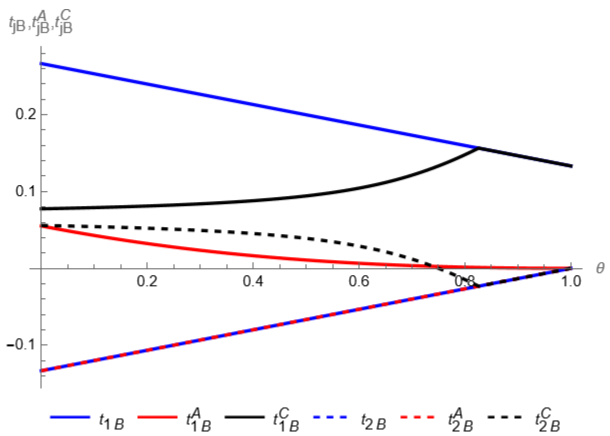
   - In this sense, the coalition $\{A, B\}$ is only stable when $\theta = 0$. The coalition $\{A, C\}$ is stable for sufficiently low values of θ ($\theta \leq \frac{1}{2}$). The coalition $\{B, C\}$ is stable when θ is sufficiently large ($\theta \geq \frac{1}{2}$). The coalition $\{A, C\}$ is associated with lower tariffs and the coalition $\{B, C\}$ with higher tariffs.



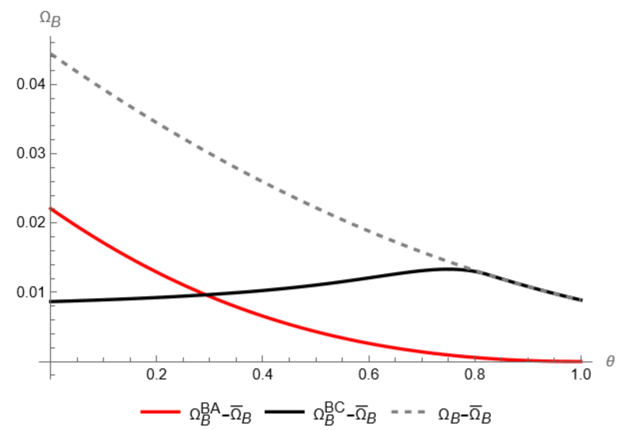
(a) District A: Tariffs



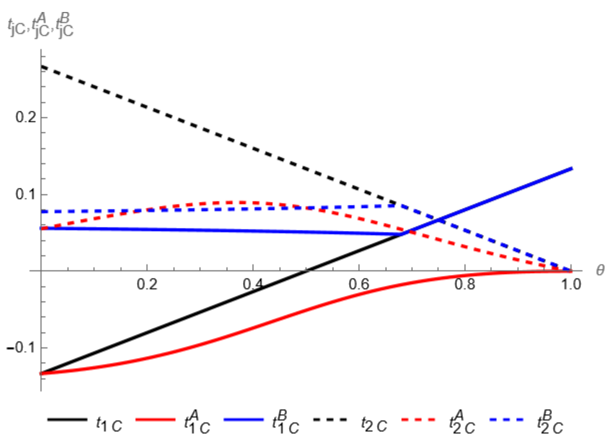
(b) District A: Utility



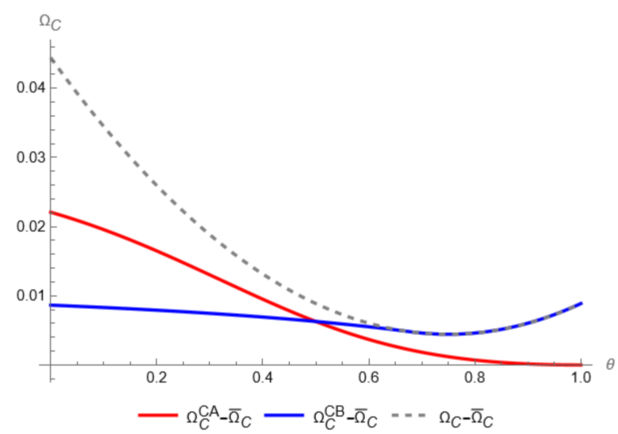
(c) District B: Tariffs



(d) District B: Utility



(e) District C: Tariffs



(f) District C: Utility

Figure 23: Tariffs and welfare.

Note: The column on the left shows the unconstrained district preferred tariffs t_{ja} and the constrained preferred tariffs t_{ja}^r for the two possible coalitions that can be formed in each case. The column on the right shows the agenda setter's welfare in each of the two possible coalitions Ω_a^r (net of $\overline{\Omega}_a = \Omega_a(\mathbf{0})$). In most cases, the constraint is binding. This means that in the coalition $\{a, r\}$, the welfare of the district in the coalition that is not the agenda setter, Ω_a^r, is equal to $\overline{\Omega}_r$, $r \neq a$. However, when B and C form a coalition, the constraint is not binding for sufficiently large θ. This means that when θ is sufficiently large, the preferences of regions B and C are aligned.
Parameters: $a_j = 2$, $\overline{p}_j = 1$, $n_\ell = 1$, $\sigma_{i\ell} = 1$, $n_{1B}^K = k$, $n_{1C}^K = \theta k$, $n_{2C}^K = (1-\theta)k$, $k = 2/5$.

The average tariffs for a given coalition $\{a, r\}$, defined as $\bar{t}_a^r \equiv \frac{t_{1a}^r + t_{2a}^r}{2}$, are given by

$$\begin{aligned}
\left(\bar{t}_A^B, \bar{t}_A^C\right) &= \left(\frac{1-3\alpha_A^B}{6}\, k\sigma, \frac{1-3\alpha_A^C}{6}\, k\sigma\right), \\
\left(\bar{t}_B^A, \bar{t}_B^C\right) &= \left(\frac{3\alpha_B^A - 2}{6}\, k\sigma, \frac{1}{6}\, k\sigma\right), \\
\left(\bar{t}_C^A, \bar{t}_C^B\right) &= \left(\frac{3\alpha_C^A - 2}{6}\, k\sigma, \frac{1}{6}\, k\sigma\right).
\end{aligned} \tag{57}$$

Figure 24 shows the average tariffs for the coalition formed by agenda setter a and its respective optimal partner $m(a)$, as θ changes.

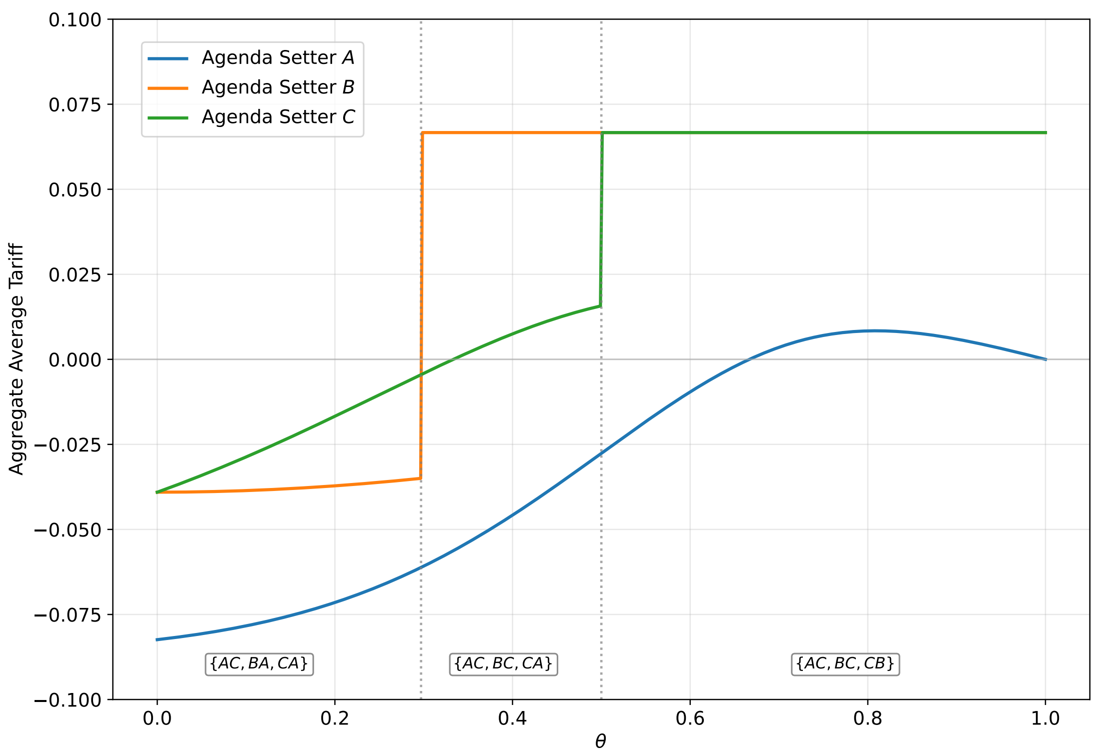


Figure 24: Average tariff by agenda setter as a function of θ. Parameters: $k = 0.4, \sigma = 1$.

We can also calculate the expected average tariffs for a given equilibrium coalition profile, defined as $\mathcal{C} = \{A\, m(A), B\, m(B), C\, m(C)\}$, where the agenda setter a is chosen with probability $1/3$ as:

$$\bar{t}^{\mathcal{C}}(\theta) \equiv \frac{1}{3}\left[\bar{t}_A^{m(A)} + \bar{t}_B^{m(B)} + \bar{t}_C^{m(C)}\right].$$

Figure 25 illustrates changes in $\bar{t}^{\mathcal{C}}(\theta)$ for each good and for the overall average as θ varies.

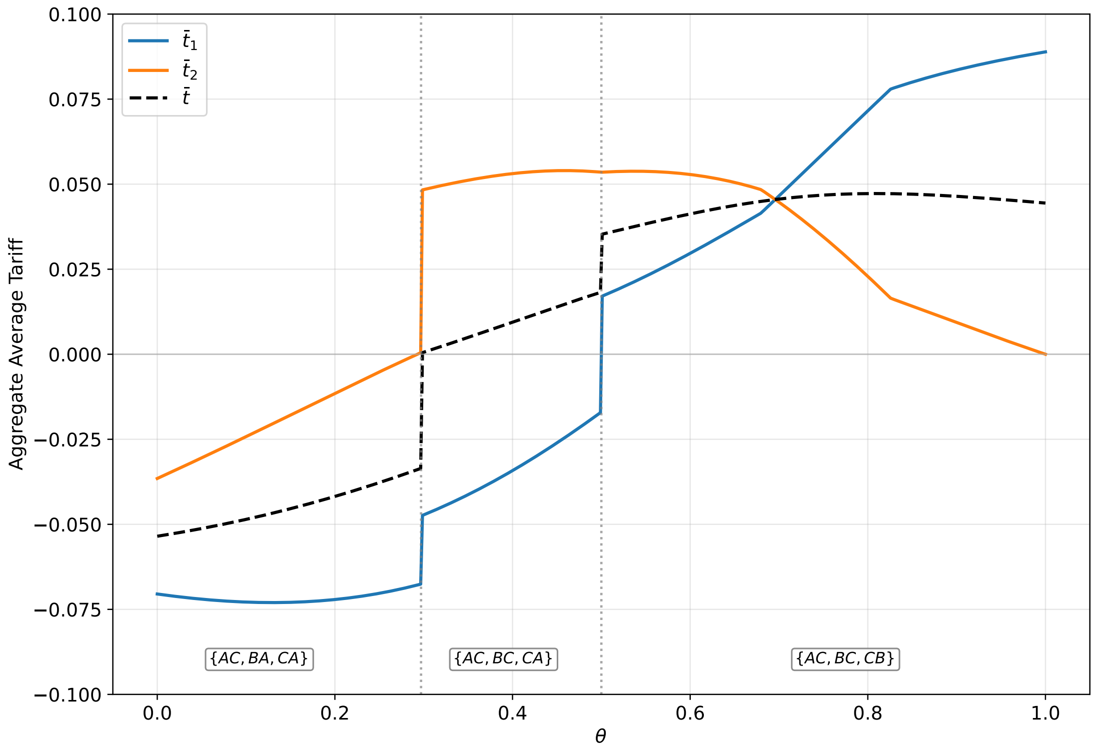


Figure 25: Aggregate average tariffs (overall and by good) as a function of θ. (Parameters: $k = 0.4, \sigma = 1$). The labels indicate the equilibrium coalition profile for each range.

Remarks

Figures 24 and 25 illustrate some interesting properties of the equilibrium tariffs.

1. Figure 24 highlights that the average tariff depends critically on whom the agenda setter is. While agenda setter A (the non-producing district) consistently delivers the lowest (most negative) average tariffs to minimize the cost of protection, agenda setters B and C impose higher tariffs when they are able to form their preferred coalitions.

2. The jumps in the figures at θ_B^* and $\theta = 0.5$ are driven by endogenous changes in coalition formation. For instance, at θ_B^*, district B switches from partnering with A (a "low tariff" coalition) to partnering with C (a "high tariff" coalition), generating a sharp increase in the aggregate level of protection.

3. Figure 25 shows that when production is highly concentrated ($\theta \approx 0$), the equilibrium entails low levels of protection (negative average tariffs). As production becomes more evenly distributed between B and C (θ tends to 1), expected average tariffs tend to increase (and stabilize for $\theta > 0.5$).

Appendix G Steady-state solution: Example

Appendix G.1 Consider an example with $\theta = 0$

Suppose that in each period one of $\{A, B, C\}$ is chosen with equal probability as agenda-setter, and the coalition pattern is $\{AB, BA, CA\}$. Also, assume $a_j = 2$, $b_j = 1$, $\overline{p}_j = 1$, $n_r = 1$, and $\beta = 0.99$. Substituting into (55), the objective functions become

$$\begin{aligned}
\Omega_A(t_1, t_2) &= \tfrac{1}{30}\left[60 - 4\,t_1 - 15\,t_1^2 - 4\,t_2 - 15\,t_2^2\right],\\
\Omega_B(t_1, t_2) &= \tfrac{1}{30}\left[60 + 8\,t_1 - 15\,t_1^2 - 4\,t_2 - 15\,t_2^2\right],\\
\Omega_C(t_1, t_2) &= \tfrac{1}{30}\left[60 - 4\,t_1 - 15\,t_1^2 + 8\,t_2 - 15\,t_2^2\right].
\end{aligned}$$

Consider the coalitions $\{a, m(a)\}$:

- $a = A$, $m(A) = B$: In this case, the solution is

  $$t_{1A} = \frac{-2 + 4\rho_A}{15(1+\rho_A)}, \quad t_{2A} = -\frac{2}{15},$$

  and

  $$\rho_A^B = \begin{cases} 0, & d_B \le 1.9644 \\ -1 + \frac{0.2828}{\sqrt{2.0444 - d_B}}, & 1.9644 < d_B < 2.0444, \end{cases}$$

  where $\Omega_B(t_A) = 1.9644$ and $\Omega_B(t_B) = 2.0444$. All the solutions are functions of d_B. Also, note that $B \sim_A C$.

- $a = B$, $m(B) = A$: district B chooses t_1, t_2, ρ_B that maximize $\Omega_B(t_1, t_2)$ subject to $\Omega_A(t_1, t_2) \ge d_A$, with $\rho_B \ge 0$. The FOCs are

  $$\begin{aligned}
  \frac{\partial \mathcal{L}_B}{\partial t_1} &= \frac{1}{30}(8 - 30\,t_1) + \rho_B \frac{1}{30}(-4 - 30\,t_1) = 0 \Rightarrow t_{1B} = \frac{4 - 2\rho_B}{15(1+\rho_B)},\\
  \frac{\partial \mathcal{L}_B}{\partial t_2} &= (1+\rho_B)\frac{1}{30}(-4 - 30\,t_2) = 0 \Rightarrow t_{2B} = -\frac{2}{15},
  \end{aligned}$$

  and

  $$\rho_B^A = \begin{cases} 0, & d_A \le 1.9378 \\ -1 + \frac{0.2828}{\sqrt{2.0178 - d_A}}, & 1.9378 < d_A < 2.0178, \end{cases}$$

  where $\Omega_A(\mathbf{t}_A) = 2.0178$ and $\Omega_A(\mathbf{t}_B) = 1.9378$. All the solutions are functions of d_A.

- $a = C$, $m(C) = A$: By symmetry with the coalition $\{BA\}$ with multiplier ρ_C, we obtain

  $$t_{1C} = -\frac{2}{15}, \quad t_{2C} = \frac{4 - 2\rho_C}{15(1+\rho_C)}, \tag{58}$$

and

$$\rho_C^A = \begin{cases} 0, & d_A \leq 1.9378 \\ -1 + \frac{0.2828}{\sqrt{2.0178 - d_A}}, & 1.9378 < d_A < 2.0178, \end{cases}$$

where $\Omega_A(\mathbf{t}_A) = 2.0178$ and $\Omega_A(\mathbf{t}_C) = 1.9378$. All the solutions are functions of d_A.

Note that even though B and C specialize in different goods, the problem for these two districts is symmetric, so that $\rho_B^A = \rho_C^A$, $t_{1B} = t_{2C}$, $t_{2B} = t_{1C} = -\frac{2}{15}$, $\Omega_B^{BA}(d_A) = \Omega_C^{CA}(d_A)$, and $\Omega_B^{CA}(d_A) = \Omega_C^{BA}(d_A)$.

Consider a steady state which

$$d_A = \beta \frac{1}{3}\Big[\Omega_A^{AB}(d_B) + \Omega_A^{BA}(d_A) + \Omega_A^{CA}(d_A)\Big], \tag{59}$$

$$d_B = \beta \frac{1}{3}\Big[\Omega_B^{AB}(d_B) + \Omega_B^{BA}(d_A) + \Omega_B^{CA}(d_A)\Big], \tag{60}$$

$$d_C = \beta \frac{1}{3}\Big[\Omega_C^{AB}(d_B) + \Omega_C^{BA}(d_A) + \Omega_C^{CA}(d_A)\Big]. \tag{61}$$

Equations (59) and (60) can be used to solve for d_A and d_B. Consider different cases:

- $d_A \leq 1.9378$ and $d_B \leq 1.9644$: In this case, $\Omega_A^{AB}(d_B) = 2.0178$, $\Omega_A^{BA}(d_A) = \Omega_A^{CA}(d_A) = 1.9378$, and $\Omega_B^{AB}(d_B) = 1.9644$, $\Omega_B^{BA}(d_A) = 2.0444$, and $\Omega_B^{CA}(d_A) = 1.8844$.[49] Equation (59) becomes $d_A = 1.9448$ and equation (60) becomes $d_B = 1.9448$. This cannot be a solution since $d_A \leq 1.9378$.

- $d_A \leq 1.9378$ and $1.9644 < d_B \leq 2.0444$: In this case, $\Omega_B^{BA}(d_A) = \Omega_B^{CA}(d_A) = 2.0444$, and $\Omega_B^{AB}(d_B) = d_B$. Solving gives $d_B = 2.0139$. Substituting into $\Omega_A^{AB}(d_B)$, and since $\Omega_A^{BA}(d_A) = \Omega_A^{CA}(d_A) = 1.9378$, gives $d_A = 1.94 > 1.9378$, a contradiction.

- $1.9378 < d_A < 2.0178$ and $d_B \leq 1.9644$: In this case, $d_A = \beta\frac{1}{3}(2.0178 + 2d_A)$, which gives $d_A = 1.9583$. Moreover, $\Omega_B^{AB}(d_A) = 1.9644$. Substituting $d_A = 1.9583$ into $\Omega_B^{BA}(d_A)$ and $\Omega_B^{CA}(d_A)$ gives $\Omega_B^{BA}(d_A) = 2.00429$, and $\Omega_B^{CA}(d_A) = 1.9051$. Hence, $d_B = 1.9511$.

- $1.9378 < d_A < 2.0178$ and $1.9644 < d_B < 2.0444$: In this case, $d_A = \beta\frac{1}{3}\left(\Omega_A^{AB}(d_B) + 2d_A\right)$ and $d_B = \beta\frac{1}{3}\left(d_B + \Omega_B^{BA}(d_A) + \Omega_B^{CA}(d_A)\right)$.

Solving the above system gives the steady-state solution:

$$t_{1A}^C = t_{2A}^C = -\frac{2}{15}, \quad t_{1B}^A = t_{2C}^A = 0.21, \quad t_{2B}^A = t_{1C}^A = -\frac{2}{15}, \tag{62}$$

$$\rho_A = 0, \quad \rho_B = \rho_C = 0.16, \tag{63}$$

$$d_A = 1.9584, \quad d_B = d_C = 1.9511. \tag{64}$$

Figure 26 shows graphically the steady-state levels of d_A and $d_B = d_C$.

[49] Note that $\Omega_B(\mathbf{t}_C) = 1.8844$.

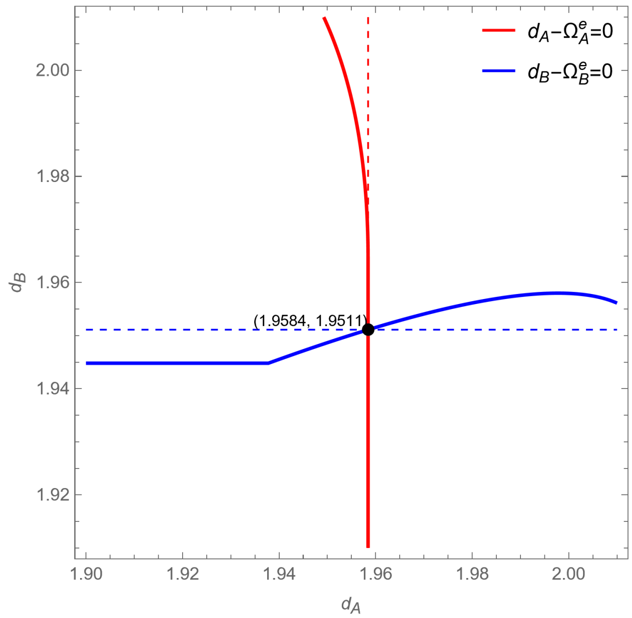


Figure 26: Steady-state values of d_A and d_B.

We finally check that $\{AB, BA, CA\}$ is an equilibrium set of coalitions, i.e., $m(A) = B$, $m(B) = A$, and $m(C) = A$:

- If A deviates and form a coalition with C, then : $d_A = 1.9584, d_B = d_C = 1.9511$, so A obtains the same utility.
- If B deviates and form a coalition with C, then : $d_A = 1.9657, d_B = 1.9482, d_C = 1.9731$, so B obtains a lower utility.
- If C deviates and form a coalition with B, then : $d_A = 1.9662, d_B = 1.9813, d_C = 1.9465$, so CB obtains a lower utility.

Appendix H More Than Three Districts

We show here how the analytical solutions derived for the case $R = 3$ can be extended to $R = 5$. The unconstrained ideal tariffs are described in (10). To simplify notation, we use $t_{jr} = \frac{c_{rj}}{\lambda_r}$, where $c_{jr} = \Lambda^K_{jr} n^K_{jr} \sigma_{jr} - \frac{\lambda_r}{n} Q_j$. We next focus on the constrained tariffs.

Constrained tariffs

For a given candidate pair (r, r'), the agenda setter a solves $\max_{\{\mathbf{t}\}} \Omega_a(\mathbf{t})$ subject to $\Omega_r(\mathbf{t}) \geq \Omega_r(\mathbf{0})$, $\Omega_{r'}(\mathbf{t}) \geq \Omega_{r'}(\mathbf{0})$. The Lagrangian with multipliers $\rho^r_a \geq 0$ and $\rho^{r'}_a \geq 0$, is given by $\mathcal{L}_a = \Omega_a(\mathbf{t}) + \rho^r_a \left[\Omega_r(\mathbf{t}) - \Omega_r(\mathbf{0})\right] + \rho^{r'}_a \left[\Omega_{r'}(\mathbf{t}) - \Omega_{r'}(\mathbf{0})\right]$. Differentiating with respect to t_j, and using $\frac{\partial \Omega_\ell}{\partial t_j} = c_{j\ell} - \lambda_\ell t_j$ gives:

$$\frac{\partial \mathcal{L}_a}{\partial t_j} = (c_{ja} - \lambda_a t_j) + \rho^r_a (c_{jr} - \lambda_r t_j) + \rho^{r'}_a (c_{jr'} - \lambda_{r'} t_j) = 0. \tag{65}$$

Substituting $c_{jr} = \lambda_r t_{jr}$ and rearranging:

$$t^{r,r'}_{ja} = \frac{\lambda_a t^*_{ja} + \rho^r_a \lambda_r t^*_{jr} + \rho^{r'}_a \lambda_{r'} t^*_{jr'}}{\lambda_a + \rho^r_a \lambda_r + \rho^{r'}_a \lambda_{r'}}. \tag{66}$$

Note that this is a weighted average of three ideal tariffs. Define

$$\alpha^{r,r'}_a = \frac{\lambda_a}{\lambda_a + \rho^r_a \lambda_r + \rho^{r'}_a \lambda_{r'}}, \quad \gamma^{r,r'}_r = \frac{\rho^r_a \lambda_r}{\rho^r_a \lambda_r + \rho^{r'}_a \lambda_{r'}}, \quad \gamma^{r,r'}_{r'} = \frac{\rho^{r'}_a \lambda_{r'}}{\rho^r_a \lambda_r + \rho^{r'}_a \lambda_{r'}} = 1 - \gamma^{r,r'}_r. \tag{67}$$

Therefore, we can write the equilibrium tariff as

$$\mathbf{t}^{r,r'}_a = \alpha^{r,r'}_a \, \mathbf{t}_a + (1 - \alpha^{r,r'}_a) \left[\gamma^{r,r'}_r \, \mathbf{t}_r + \gamma^{r,r'}_{r'} \, \mathbf{t}_{r'}\right], \tag{68}$$

where the bargaining weights satisfy $\alpha^{r,r'}_a + (1 - \alpha^{r,r'}_a)(\gamma^{r,r'}_r + \gamma^{r,r'}_{r'}) = 1$. The equilibrium tariff (68) is therefore a convex combination of the three coalition members' ideal tariff vectors.

Remarks

- When $\rho^r_a = \rho^{r'}_a = 0$ (neither constraint binds), $\alpha^{r,r'}_a = 1$ and the agenda setter implements its own unconstrained ideal.
- As $\alpha^{r,r'}_a$ falls, the bargaining weight shifts toward the coalition partners.
- Districts outside the coalition (the remaining two districts) receive zero weight in the policy decision-making process.
- $\gamma^{r,r'}_r$ and $\gamma^{r,r'}_{r'}$ split the partner share $(1 - \alpha^{r,r'}_a)$ between the two coalition partners, which depend on their respective PCs (captured by ρ^r_a and $\rho^{r'}_a$).

Coalition selection

In this case, each agenda setter evaluates $\binom{4}{2} = 6$ candidate pairs. For example, for $a = A$, the candidate pairs are $(B, C), (B, D), (B, E), (C, D), (C, E), (D, E)$.

Consider the agenda setter a and coalition partners (r, r'). In this case, we can write, $\Omega_a(\mathbf{t}_a^{r,r'}) = \Omega_a(\mathbf{0}) + \lambda_a(S_a - H_{r,r'})$, where $H_{r,r'} = (1 - \alpha_a^{r,r'})^2 S_a^{r,r'}$, and $S_a^{r,r'} = \frac{1}{2}\left\| \left(\gamma_r^{r,r'}\mathbf{t}_r + \gamma_{r'}^{r,r'}\mathbf{t}_{r'}\right) - \mathbf{t}_a \right\|^2$. As a result, the coalition that gives the agenda setter the highest welfare is the one with the lowest $H_{r,r'}$.

Suppose a preferred coalition is $\{a, r, r\}$ and the proposed tariff is $\mathbf{t}_a^{r,r'}$. Then, as before, a implements the proposed tariff if its PC holds, i.e., $\Omega_a(\mathbf{t}_a^{r,r'}) \geq \Omega_a(\mathbf{0})$. In this case, this condition is satisfied whenever $S_a \geq H_{r,r'}$.

Appendix H.1 Example with five regions and five tradable goods

Consider an economy with five regions, A, B, C, D, E ($R = 5$). A majority is reached with at least three regions. In this case, there are six possible majority coalitions.

Case 1. We construct an example that assumes the following:

- $J = 5$, $\Lambda^K = 1$, $\Lambda^L = 1$.
- Regions A, B, D, and E specialize in the production of goods $1, 2, 4, 5$, respectively.
- Region C produces all five goods, i.e., C produces all the goods that are produced elsewhere in addition to another good, good 3, that is specific to region C.

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	$n^K_{j,D}$	$n^K_{j,E}$	n^K_j
1	$\frac{2}{5}$	0	$\frac{2}{25}$	0	0	$\frac{12}{25}$
2	0	$\frac{2}{5}$	$\frac{2}{25}$	0	0	$\frac{12}{25}$
3	0	0	$\frac{2}{25}$	0	0	$\frac{2}{25}$
4	0	0	$\frac{2}{25}$	$\frac{2}{5}$	0	$\frac{12}{25}$
5	0	0	$\frac{2}{25}$	0	$\frac{2}{5}$	$\frac{12}{25}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	2

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	$q_{j,D}$	$q_{j,E}$	Q_j
j=1	$\frac{2}{5}$	0	$\frac{2}{25}$	0	0	$\frac{12}{25}$
j=2	0	$\frac{2}{5}$	$\frac{2}{25}$	0	0	$\frac{12}{25}$
j=3	0	0	$\frac{2}{25}$	0	0	$\frac{2}{25}$
j=4	0	0	$\frac{2}{25}$	$\frac{2}{5}$	0	$\frac{12}{25}$
j=5	0	0	$\frac{2}{25}$	0	$\frac{2}{5}$	$\frac{12}{25}$

(b) Production of goods q_{jr} by sector and region.

Figure 27: Allocation of the specific factors and production of goods by sector and region.

r	t_1	t_2	t_3	t_4	t_5	Ω_r	$\overline{\Omega}_r$	M_1	M_2	M_3	M_4	M_5
A	0.3040	-0.0960	-0.0160	-0.0960	-0.0960	3.5602	3.5000	3.0000	5.0000	5.0000	5.0000	5.0000
B	-0.0960	0.3040	-0.0160	-0.0960	-0.0960	3.5602	3.5000	5.0000	3.0000	5.0000	5.0000	5.0000
C	-0.0160	-0.0160	0.0640	-0.0160	-0.0160	3.5026	3.5000	4.6000	4.6000	4.6000	4.6000	4.6000
D	-0.0960	-0.0960	-0.0160	0.3040	-0.0960	3.5602	3.5000	5.0000	5.0000	5.0000	3.0000	5.0000
E	-0.0960	-0.0960	-0.0160	-0.0960	0.3040	3.5602	3.5000	5.0000	5.0000	5.0000	5.0000	3.0000

Figure 28: Unconstrained preferred tariffs for each region r. Ω_r: district r's utility at the preferred tariffs; $\overline{\Omega}_r$: district r's utility at the status quo tariffs (in this case, zero tariffs); M_j: Imports of good j at r's preferred tariffs.

a	r'	r''	t_1	t_2	t_3	t_4	t_5	Ω_A	Ω_B	Ω_C	Ω_D	Ω_E	M_1	M_2	M_3	M_4	M_5
A	B	E	0.0679	0.0220	−0.0160	−0.0960	0.0220	3.5184	3.5000	3.4912	3.4528	3.5000	4.1803	4.4099	5.0000	5.0000	4.4099
A	B	D	0.0679	0.0220	−0.0160	0.0220	−0.0960	3.5184	3.5000	3.4912	3.5000	3.4528	4.1803	4.4099	5.0000	4.4099	5.0000
A	D	E	0.0679	−0.0960	−0.0160	0.0220	0.0220	3.5184	3.4528	3.4912	3.5000	3.5000	4.1803	5.0000	5.0000	4.4099	4.4099
A	C	D	0.0400	−0.0400	0.0400	0.0000	−0.0400	3.5160	3.4840	3.5000	3.5000	3.4840	4.3200	4.7200	4.7200	4.5200	4.7200
A	B	C	0.0400	0.0000	0.0400	−0.0400	−0.0400	3.5160	3.5000	3.5000	3.4840	3.4840	4.3200	4.5200	4.7200	4.7200	4.7200
A	C	E	0.0400	−0.0400	0.0400	−0.0400	0.0000	3.5160	3.4840	3.5000	3.4840	3.5000	4.3200	4.7200	4.7200	4.7200	4.5200
B	A	E	0.0220	0.0679	−0.0160	−0.0960	0.0220	3.5000	3.5184	3.4912	3.4528	3.5000	4.4099	4.1803	5.0000	5.0000	4.4099
B	A	D	0.0220	0.0679	−0.0160	0.0220	−0.0960	3.5000	3.5184	3.4912	3.5000	3.4528	4.4099	4.1803	5.0000	4.4099	5.0000
B	D	E	−0.0960	0.0679	−0.0160	0.0220	0.0220	3.4528	3.5184	3.4912	3.5000	3.5000	5.0000	4.1803	5.0000	4.4099	4.4099
B	C	D	−0.0400	0.0400	0.0400	0.0000	−0.0400	3.4840	3.5160	3.5000	3.5000	3.4840	4.7200	4.3200	4.7200	4.5200	4.7200
B	A	C	0.0000	0.0400	0.0400	−0.0400	−0.0400	3.5000	3.5160	3.5000	3.4840	3.4840	4.5200	4.3200	4.7200	4.7200	4.7200
B	C	E	−0.0400	0.0400	0.0400	−0.0400	0.0000	3.4840	3.5160	3.5000	3.4840	3.5000	4.7200	4.3200	4.7200	4.7200	4.5200
C	A	B	−0.0060	−0.0060	0.0573	−0.0227	−0.0227	3.5000	3.5000	3.5024	3.4933	3.4933	4.5499	4.5499	4.6334	4.6334	4.6334
C	A	D	−0.0060	−0.0227	0.0573	−0.0060	−0.0227	3.5000	3.4933	3.5024	3.5000	3.4933	4.5499	4.6334	4.6334	4.5499	4.6334
C	A	E	−0.0060	−0.0227	0.0573	−0.0227	−0.0060	3.5000	3.4933	3.5024	3.4933	3.5000	4.5499	4.6334	4.6334	4.6334	4.5499
C	B	D	−0.0227	−0.0060	0.0573	−0.0060	−0.0227	3.4933	3.5000	3.5024	3.5000	3.4933	4.6334	4.5499	4.6334	4.5499	4.6334
C	D	E	−0.0227	−0.0227	0.0573	−0.0060	−0.0060	3.4933	3.4933	3.5024	3.5000	3.5000	4.6334	4.6334	4.6334	4.5499	4.5499
C	B	E	−0.0227	−0.0060	0.0573	−0.0227	−0.0060	3.4933	3.5000	3.5024	3.4933	3.5000	4.6334	4.5499	4.6334	4.6334	4.5499
D	A	B	0.0220	0.0220	−0.0160	0.0679	−0.0960	3.5000	3.5000	3.4912	3.5184	3.4528	4.4099	4.4099	5.0000	4.1803	5.0000
D	B	E	−0.0960	0.0220	−0.0160	0.0679	0.0220	3.4528	3.5000	3.4912	3.5184	3.5000	5.0000	4.4099	5.0000	4.1803	4.4099
D	A	E	0.0220	−0.0960	−0.0160	0.0679	0.0220	3.5000	3.4528	3.4912	3.5184	3.5000	4.4099	5.0000	5.0000	4.1803	4.4099
D	B	C	−0.0400	0.0000	0.0400	0.0400	−0.0400	3.4840	3.5000	3.5000	3.5160	3.4840	4.7200	4.5200	4.7200	4.3200	4.7200
D	A	C	0.0000	−0.0400	0.0400	0.0400	−0.0400	3.5000	3.4840	3.5000	3.5160	3.4840	4.5200	4.7200	4.7200	4.3200	4.7200
D	C	E	−0.0400	−0.0400	0.0400	0.0400	0.0000	3.4840	3.4840	3.5000	3.5160	3.5000	4.7200	4.7200	4.7200	4.3200	4.5200
E	A	D	0.0220	−0.0960	−0.0160	0.0220	0.0679	3.5000	3.4528	3.4912	3.5000	3.5184	4.4099	5.0000	5.0000	4.4099	4.1803
E	B	D	−0.0960	0.0220	−0.0160	0.0220	0.0679	3.4528	3.5000	3.4912	3.5000	3.5184	5.0000	4.4099	5.0000	4.4099	4.1803
E	A	B	0.0220	0.0220	−0.0160	−0.0960	0.0679	3.5000	3.5000	3.4912	3.4528	3.5184	4.4099	4.4099	5.0000	5.0000	4.1803
E	A	C	0.0000	−0.0400	0.0400	−0.0400	0.0400	3.5000	3.4840	3.5000	3.4840	3.5160	4.5200	4.7200	4.7200	4.7200	4.3200
E	C	D	−0.0400	−0.0400	0.0400	0.0000	0.0400	3.4840	3.4840	3.5000	3.5000	3.5160	4.7200	4.7200	4.7200	4.5200	4.3200
E	B	C	−0.0400	0.0000	0.0400	−0.0400	0.0400	3.4840	3.5000	3.5000	3.4840	3.5160	4.7200	4.5200	4.7200	4.7200	4.3200

Figure 29: Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts r', r''. The column titled Ω_r, $r = A, B, C, D, E$ shows each region's utility at the tariffs chosen by a. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

Remarks

1. Note that C not only produces all goods, but it also produces another good ($j = 3$) that is not produced by the other regions.

2. When $a = \{A, B, D, E\}$, the coalitions that give a the highest utility do not include region C.

3. Region C gets the same utility by forming a coalition with any two other districts. The sectors that district C will ultimately protect depend on the specific coalition.

Case 2 (i). In this case, we assume

- $J = 4$, $\Lambda^K = \Lambda^L = 1$.
- Regions A,B, D, and E: each one specializes in the production of a good.
- Region C produces all four goods (C produces all the goods that are also produced in other regions).

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	$n^K_{j,D}$	$n^K_{j,E}$	n^K_j
1	$\frac{2}{5}$	0	$\frac{1}{10}$	0	0	$\frac{1}{2}$
2	0	$\frac{2}{5}$	$\frac{1}{10}$	0	0	$\frac{1}{2}$
3	0	0	$\frac{1}{10}$	$\frac{2}{5}$	0	$\frac{1}{2}$
4	0	0	$\frac{1}{10}$	0	$\frac{2}{5}$	$\frac{1}{2}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	2

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	$q_{j,D}$	$q_{j,E}$	Q_j
j=1	$\frac{2}{5}$	0	$\frac{1}{10}$	0	0	$\frac{1}{2}$
j=2	0	$\frac{2}{5}$	$\frac{1}{10}$	0	0	$\frac{1}{2}$
j=3	0	0	$\frac{1}{10}$	$\frac{2}{5}$	0	$\frac{1}{2}$
j=4	0	0	$\frac{1}{10}$	0	$\frac{2}{5}$	$\frac{1}{2}$

(b) Production of goods q_{jr} by sector and region.

Figure 30: Allocation of the specific factors and production of goods by sector and region.

r	t_1	t_2	t_3	t_4	Ω_r	$\overline{\Omega}_r$	M_1	M_2	M_3	M_4
A	0.3000	−0.1000	−0.1000	−0.1000	3.0600	3.0000	3.0000	5.0000	5.0000	5.0000
B	−0.1000	0.3000	−0.1000	−0.1000	3.0600	3.0000	5.0000	3.0000	5.0000	5.0000
C	−0.0000	−0.0000	−0.0000	−0.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
D	−0.1000	−0.1000	0.3000	−0.1000	3.0600	3.0000	5.0000	5.0000	3.0000	5.0000
E	−0.1000	−0.1000	−0.1000	0.3000	3.0600	3.0000	5.0000	5.0000	5.0000	3.0000

Figure 31: Unconstrained preferred tariffs for each region r. Ω_r: district r's utility at the preferred tariffs; $\overline{\Omega}_r$: district r's utility at the status quo tariffs (in this case, zero tariffs); M_j: Imports of good j at r's preferred tariffs.

a	r'	r''	t_1	t_2	t_3	t_4	Ω_A	Ω_B	Ω_C	Ω_D	Ω_E	M_1	M_2	M_3	M_4
A	D	E	0.0633	−0.1000	0.0184	0.0184	3.0180	2.9527	2.9927	3.0000	3.0000	4.1835	5.0000	4.4082	4.4082
A	B	E	0.0633	0.0184	−0.1000	0.0184	3.0180	3.0000	2.9927	2.9527	3.0000	4.1835	4.4082	5.0000	4.4082
A	B	D	0.0633	0.0184	0.0184	−0.1000	3.0180	3.0000	2.9927	3.0000	2.9527	4.1835	4.4082	4.4082	5.0000
A	C	E	0.0001	−0.0001	−0.0001	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.4994	4.5003	4.5003	4.5000
A	B	C	0.0001	0.0000	−0.0001	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.4994	4.5000	4.5003	4.5003
A	C	D	0.0001	−0.0001	0.0000	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.4994	4.5003	4.5000	4.5003
B	D	E	−0.1000	0.0633	0.0184	0.0184	2.9527	3.0180	2.9927	3.0000	3.0000	5.0000	4.1835	4.4082	4.4082
B	A	D	0.0184	0.0633	0.0184	−0.1000	3.0000	3.0180	2.9927	3.0000	2.9527	4.4082	4.1835	4.4082	5.0000
B	A	E	0.0184	0.0633	−0.1000	0.0184	3.0000	3.0180	2.9927	2.9527	3.0000	4.4082	4.1835	5.0000	4.4082
B	A	C	0.0000	0.0001	−0.0001	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.4994	4.5003	4.5003
B	C	D	−0.0001	0.0001	0.0000	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.4994	4.5000	4.5003
B	C	E	−0.0001	0.0001	−0.0001	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.4994	4.5003	4.5000
C	B	D	−0.0000	0.0000	0.0000	−0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
C	A	B	0.0000	0.0000	−0.0000	−0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
C	B	E	−0.0000	0.0000	−0.0000	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
C	D	E	−0.0000	−0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
C	A	D	0.0000	−0.0000	0.0000	−0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
C	A	E	0.0000	−0.0000	−0.0000	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5000	4.5000	4.5000
D	A	E	0.0184	−0.1000	0.0633	0.0184	3.0000	2.9527	2.9927	3.0180	3.0000	4.4082	5.0000	4.1835	4.4082
D	A	B	0.0184	0.0184	0.0633	−0.1000	3.0000	3.0000	2.9927	3.0180	2.9527	4.4082	4.4082	4.1835	5.0000
D	B	E	−0.1000	0.0184	0.0633	0.0184	2.9527	3.0000	2.9927	3.0180	3.0000	5.0000	4.4082	4.1835	4.4082
D	A	C	0.0000	−0.0001	0.0001	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5003	4.4994	4.5003
D	B	C	−0.0001	0.0000	0.0001	−0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.5000	4.4994	4.5003
D	C	E	−0.0001	−0.0001	0.0001	0.0000	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.5003	4.4994	4.5000
E	B	D	−0.1000	0.0184	0.0184	0.0633	2.9527	3.0000	2.9927	3.0000	3.0180	5.0000	4.4082	4.4082	4.1835
E	A	B	0.0184	0.0184	−0.1000	0.0633	3.0000	3.0000	2.9927	2.9527	3.0180	4.4082	4.4082	5.0000	4.1835
E	A	D	0.0184	−0.1000	0.0184	0.0633	3.0000	2.9527	2.9927	3.0000	3.0180	4.4082	5.0000	4.4082	4.1835
E	A	C	0.0000	−0.0001	−0.0001	0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5000	4.5003	4.5003	4.4994
E	B	C	−0.0001	0.0000	−0.0001	0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.5000	4.5003	4.4994
E	C	D	−0.0001	−0.0001	0.0000	0.0001	3.0000	3.0000	3.0000	3.0000	3.0000	4.5003	4.5003	4.5000	4.4994

Figure 32: Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts r', r''. The column titled Ω_r, $r = A, B, C, D, E$ shows each region's utility at the tariffs chosen by a. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

Remarks

1. When $a = \{A, B, D, E\}$, the coalitions that give a the highest utility do not include region C.

2. Region C is indifferent between all possible coalitions.

3. The conclusions are similar to those described earlier in Case 1.

Case 2 (ii). In this case, we assume

- $J = 4$, $\Lambda^K = \Lambda^L = 1$.
- Regions A,B, D, and E: each one specializes in the production of a good.
- Region C does not produce any good.

Sector	$n^K_{j,A}$	$n^K_{j,B}$	$n^K_{j,C}$	$n^K_{j,D}$	$n^K_{j,E}$	n^K_j
1	$\frac{2}{5}$	0	0	0	0	$\frac{2}{5}$
2	0	$\frac{2}{5}$	0	0	0	$\frac{2}{5}$
3	0	0	0	$\frac{2}{5}$	0	$\frac{2}{5}$
4	0	0	0	0	$\frac{2}{5}$	$\frac{2}{5}$
n^K_r	$\frac{2}{5}$	$\frac{2}{5}$	0	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{8}{5}$

(a) Allocation of n^K_{jr} across sectors and regions.

Sector	$q_{j,A}$	$q_{j,B}$	$q_{j,C}$	$q_{j,D}$	$q_{j,E}$	Q_j
j=1	$\frac{2}{5}$	0	0	0	0	$\frac{2}{5}$
j=2	0	$\frac{2}{5}$	0	0	0	$\frac{2}{5}$
j=3	0	0	0	$\frac{2}{5}$	0	$\frac{2}{5}$
j=4	0	0	0	0	$\frac{2}{5}$	$\frac{2}{5}$

(b) Production of goods q_{jr} by sector and region.

Figure 33: Allocation of the specific factors and production of goods by sector and region.

r	t_1	t_2	t_3	t_4	Ω_r	$\overline{\Omega}_r$	M_1	M_2	M_3	M_4
A	0.3200	-0.0800	-0.0800	-0.0800	3.0608	3.0000	3.0000	5.0000	5.0000	5.0000
B	-0.0800	0.3200	-0.0800	-0.0800	3.0608	3.0000	5.0000	3.0000	5.0000	5.0000
C	-0.0800	-0.0800	-0.0800	-0.0800	1.8077	1.8000	5.0000	5.0000	5.0000	5.0000
D	-0.0800	-0.0800	0.3200	-0.0800	3.0608	3.0000	5.0000	5.0000	3.0000	5.0000
E	-0.0800	-0.0800	-0.0800	0.3200	3.0608	3.0000	5.0000	5.0000	5.0000	3.0000

Figure 34: Unconstrained preferred tariffs for each region r. Ω_r: district r's utility at the preferred tariffs; $\overline{\Omega}_r$: district r's utility at the status quo tariffs (in this case, zero tariffs); M_j: Imports of good j at r's preferred tariffs.

a	r'	r''	t_1	t_2	t_3	t_4	Ω_A	Ω_B	Ω_C	Ω_D	Ω_E	M_1	M_2	M_3	M_4
A	B	C	0.0586	−0.0000	−0.0800	−0.0800	3.0234	3.0000	1.8000	2.9680	2.9680	4.3072	4.6000	5.0000	5.0000
A	C	E	0.0586	−0.0800	−0.0800	−0.0000	3.0234	2.9680	1.8000	2.9680	3.0000	4.3072	5.0000	5.0000	4.6000
A	C	D	0.0586	−0.0800	−0.0000	−0.0800	3.0234	2.9680	1.8000	3.0000	2.9680	4.3072	5.0000	4.6000	5.0000
A	B	E	0.0865	0.0367	−0.0800	0.0367	3.0199	3.0000	1.7912	2.9533	3.0000	4.1673	4.4163	5.0000	4.4163
A	D	E	0.0865	−0.0800	0.0367	0.0367	3.0199	2.9533	1.7912	3.0000	3.0000	4.1673	5.0000	4.4163	4.4163
A	B	D	0.0865	0.0367	0.0367	−0.0800	3.0199	3.0000	1.7912	3.0000	2.9533	4.1673	4.4163	4.4163	5.0000
B	C	E	−0.0800	0.0586	−0.0800	−0.0000	2.9680	3.0234	1.8000	2.9680	3.0000	5.0000	4.3072	5.0000	4.6000
B	A	C	−0.0000	0.0586	−0.0800	−0.0800	3.0000	3.0234	1.8000	2.9680	2.9680	4.6000	4.3072	5.0000	5.0000
B	C	D	−0.0800	0.0586	−0.0000	−0.0800	2.9680	3.0234	1.8000	3.0000	2.9680	5.0000	4.3072	4.6000	5.0000
B	A	D	0.0367	0.0865	0.0367	−0.0800	3.0000	3.0199	1.7912	3.0000	2.9533	4.4163	4.1673	4.4163	5.0000
B	D	E	−0.0800	0.0865	0.0367	0.0367	2.9533	3.0199	1.7912	3.0000	3.0000	5.0000	4.1673	4.4163	4.4163
B	A	E	0.0367	0.0865	−0.0800	0.0367	3.0000	3.0199	1.7912	2.9533	3.0000	4.4163	4.1673	5.0000	4.4163
C	A	B	−0.0242	−0.0242	−0.0800	−0.0800	3.0000	3.0000	1.8058	2.9777	2.9777	4.7211	4.7211	5.0000	5.0000
C	A	E	−0.0242	−0.0800	−0.0800	−0.0242	3.0000	2.9777	1.8058	2.9777	3.0000	4.7211	5.0000	5.0000	4.7211
C	A	D	−0.0242	−0.0800	−0.0242	−0.0800	3.0000	2.9777	1.8058	3.0000	2.9777	4.7211	5.0000	4.7211	5.0000
C	B	D	−0.0800	−0.0242	−0.0242	−0.0800	2.9777	3.0000	1.8058	3.0000	2.9777	5.0000	4.7211	4.7211	5.0000
C	B	E	−0.0800	−0.0242	−0.0800	−0.0242	2.9777	3.0000	1.8058	2.9777	3.0000	5.0000	4.7211	5.0000	4.7211
C	D	E	−0.0800	−0.0800	−0.0242	−0.0242	2.9777	2.9777	1.8058	3.0000	3.0000	5.0000	5.0000	4.7211	4.7211
D	B	C	−0.0800	−0.0000	0.0586	−0.0800	2.9680	3.0000	1.8000	3.0234	2.9680	5.0000	4.6000	4.3072	5.0000
D	C	E	−0.0800	−0.0800	0.0586	−0.0000	2.9680	2.9680	1.8000	3.0234	3.0000	5.0000	5.0000	4.3072	4.6000
D	A	C	−0.0000	−0.0800	0.0586	−0.0800	3.0000	2.9680	1.8000	3.0234	2.9680	4.6000	5.0000	4.3072	5.0000
D	A	E	0.0367	−0.0800	0.0865	0.0367	3.0000	2.9533	1.7912	3.0199	3.0000	4.4163	5.0000	4.1673	4.4163
D	A	B	0.0367	0.0367	0.0865	−0.0800	3.0000	3.0000	1.7912	3.0199	2.9533	4.4163	4.4163	4.1673	5.0000
D	B	E	−0.0800	0.0367	0.0865	0.0367	2.9533	3.0000	1.7912	3.0199	3.0000	5.0000	4.4163	4.1673	4.4163
E	B	C	−0.0800	−0.0000	−0.0800	0.0586	2.9680	3.0000	1.8000	2.9680	3.0234	5.0000	4.6000	5.0000	4.3072
E	C	D	−0.0800	−0.0800	−0.0000	0.0586	2.9680	2.9680	1.8000	3.0000	3.0234	5.0000	5.0000	4.6000	4.3072
E	A	C	−0.0000	−0.0800	−0.0800	0.0586	3.0000	2.9680	1.8000	2.9680	3.0234	4.6000	5.0000	5.0000	4.3072
E	B	D	−0.0800	0.0367	0.0367	0.0865	2.9533	3.0000	1.7912	3.0000	3.0199	5.0000	4.4163	4.4163	4.1673
E	A	D	0.0367	−0.0800	0.0367	0.0865	3.0000	2.9533	1.7912	3.0000	3.0199	4.4163	5.0000	4.4163	4.1673
E	A	B	0.0367	0.0367	−0.0800	0.0865	3.0000	3.0000	1.7912	2.9533	3.0199	4.4163	4.4163	5.0000	4.1673

Figure 35: Tariffs chosen by the agenda setter a, when it forms a coalition with one of the other two districts r', r''. The column titled Ω_r, $r = A, B, C, D, E$ shows each region's utility at the tariffs chosen by a. The rows in each case are sorted in descending order according to the utility the agenda setter obtains in each coalition.

Remarks

1. When $a = \{A, B, D, E\}$, the coalitions that give a the highest utility include region C (the "free trade" district).
2. Region C is indifferent between all possible coalitions.
3. The conclusions are therefore very different to those obtained in Case 2 (i).