Legislated Protection and the WTO*

PRELIMINARY AND INCOMPLETE

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Abstract

Tariff bindings and administered protection are two characteristics of WTO agreements that are little understood. Tariff bindings place a ceiling on tariffs that is not always reached, while administered protection ensures that all sectors have access to at least some import protection, effectively creating a floor for protection. How do these policies affect applied MFN tariff rates that are enacted through the legislature? More specifically, can these policies embolden legislatures to enact lower applied tariffs? We address this question using a model of tariffs determined by a dynamic legislative process. We show existence of a set of symmetric Markov perfect equilibria in which a low level of protection is a possible outcome, and show that it is more difficult to achieve this outcome with tariff bindings and easier to achieve with administered protection, than it is under purely legislated protection.

JEL Classification: C7, D7, F1, H2

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1 Introduction

Applied MFN tariff rates in many countries are determined through the legislative process. However, under WTO agreements, countries place upper bounds on MFN tariffs that may be applied and have procedures established outside of the legislative process through which protection may be granted to some industries under special circumstances. Protection that is determined outside of the legislative process is usually referred to as *administered* protection, and is typically temporary in nature, while tariff bindings are permanent. What impact does the allowance of administered protection and the presence of tariff bindings have on trade policies that are determined through the legislative process? More importantly, do these policies help or hinder the prospects for free trade as decided through the legislative process?

In the case of the United States, MFN tariffs are legislated through Congress, however, the International Trade Commission (ITC) can recommend (or directly authorize) the application of various temporary measures of protection, such as antidumping duties, or countervailing duties (CVDs), in the event that a domestic industry has been injured by imports. In recent years these instruments of administered protection, especially antidumping duties have been used more frequently as the requirements to prove "injury" have been reduced. Some authors (Finger, Hall and Nelson (1982), Destler (2005) among others) have argued that this surge in the use of administered protection has biased trade policy in the direction of producer interests, allowing for higher levels of protection at the expense of consumer interests. But is it possible that these policies may act in favor of consumer interests by allowing legislatures to enact low MFN tariffs?

In this paper we ask, first, under what circumstances will the legislative process result in low applied MFN tariffs, and, second, whether administered protection or tariff bindings can enhance the legislature's willingness to enact low applied tariffs. If we consider that the outcome of the legislative process is somewhat uncertain and individuals are risk averse, then, clearly, sustained free trade is preferred by each legislator in the long run to an outcome in which a single legislative district receives high protection with uncertain frequency. But legislators are inherently selfish, and the opportunity to garner protection for their legislative district in the short run, may outweigh the long run incentives for free trade. It seems, however, that the converse has been observed in reality - permanent tariffs in the United States have continued their downward trend. Could this in fact be aided by the use of tariff bindings or administered protection?

This paper is a first step towards presenting a formal model to answer this question. We model a dynamic endowment economy characterized by legislative districts that specialize in different industries. Individuals in each district are identical, so preferences of elected representatives reflect the preferences of all members of the district. These members have preferences for high tariffs on the good produced in their district and negative tariffs (import subsidies) on all other goods. In this model, such preferences lead to dead-weight losses because of losses in consumer surplus, whereas free trade is efficient.

Each period trade policy is determined through the legislative process as a game among locally elected representatives. A trade policy vector is proposed by a randomly selected legislator and is passed by a majority vote. If the current period's proposal fails to achieve a majority vote, the previous period's tariff vector remains effective. This stylized legislative process is common in the literature on legislative bargaining. It was introduced by Baron and Ferejohn (1989) who argued that, with a large number of legislators, each seeking to put forward his own policy, a legislative process that does not favor a particular legislator will result in a randomly selected proposer each period. This is entirely appropriate in the context of trade policy, as legislators are constantly vying for protection for their industry. By modeling each district with a single industry we provide the starkest possible representation of trade policy conflict. In trade policy, a reversion to the status quo tariff reflects the fact that trade policies remain effective until amendments are passed by the legislature.

We show that a set of equilibria exists in which low levels of protection across all industries is a possible outcome of the legislative process. However this equilibrium is dependent on initial conditions. For a given set of initial conditions, the outcome will be low levels of protection for all industries, whereas for an alternative set of conditions the outcome will be high levels of protection for a single industry, and negative protection for all other industries (what we call *biased* protection). This paper shows that when tariffs are bound this decreases the set of initial conditions that results in low levels of protection. However, when a low level of administered protection is allowed, the set of initial conditions that results in low levels of legislated protection across industries, expands.

The intuition for the result is as follows. To sustain an equilibrium in which low applied rates are possible, there must be a threat of spiralling towards a biased outcome. Tariff bindings essentially impose a ceiling on protection allowed to all industries thereby reducing the negative externality imposed on all other industries, hence increasing the expected payoff to a biased proposal. This unambiguously increases the incentive to enact such a biased policy, hence shrinks the set of initial tariffs that lead to a low protection outcome.

Administered protection, on the other hand, essentially imposes a floor on protection allowed to all industries, raising the minimum protection applied to any industry in equilibrium. Higher tariffs on a sector other than that specific to a legislator's district, reduces the payoff to that legislator. This, in turn, reduces the payoff possible under any proposal in which a single legislator attempts to garner protection for his own district. This reduces the incentive to make such a proposal when compared to free trade. It should be noted that if administered protection is sufficiently large, or tariff bindings sufficiently low, the equilibrium breaks down. This is because there must be some conditions under which biased polices are an attractive outcome, so that the "threat" of implementation is credible.

Little formal work has been done to examine the equilibrium effects of administered protection and tariff bindings, and even less has been done to look at protection as an outcome of the legislative process. Anderson (1992) considers the impact of the *prospect* of administrative protection on a country's incentives to export, and the protectionist response of the exporting country. Thus Anderson (1992) argues that administrative protection in the domestic country, may have an adverse effect of encouraging protectionism in the exporting country. Bagwell and Staiger (1990) develop a model that explains administered protection. They consider two countries' governments setting trade taxes to maximize national welfare, and show that when future trade volumes are uncertain, equilibrium tariffs will be high when trade volumes are high. We do not provide here a model that explains the existence of administered protection and tariff bindings. We provide a model that determines MFN tariffs as decided through the legislative process, and assess the effect of temporary administered protection and tariff bindings on applied MFN tariffs. Grossman and Helpman (2004) discuss the protectionist bias of majoritarian politics, but focus on intra-party incentives to maintain protection. This paper argues, conversely, that a legislative process characterized by a majority voting rule can sustain low tariff levels, and need not be biased towards protectionism. When combined with administered protection, the legislation may in fact have a greater likelihood of maintaining low tariffs.

Anderson (1992) and Bagwell and Staiger (1990) consider the effect of administered protection on the non-cooperative interaction between two countries while Grossman and Helpman (2004) consider trade policy determination as the result of interaction within political parties. This paper is a first attempt to model trade policy determination as the outcome of a legislative process *combined* with administered protection, and tariff bindings.

The model of the legislative process we follow is similar to that in Baron and Ferejohn (1989), Dixit, Grossman and Gul (2000), Kalandrakis (2003), Kalandrakis (2004), and Bowen and Zahran (2006). Policies in these papers are purely distributive, allocating a share of a fixed surplus each period to legislators. Trade policy, in contrast, is a multi-dimensional public good. A positive tariff on any good imposes negative externalities on all industries through losses in consumer surplus, but creates a benefit to the industry on which the tariff is applied through gains in producer surplus. This paper is therefore the first to show that an equilibrium exists in a dynamic status quo game for a multi-dimensional public good. Baron (1996) showed the existence of an equilibrium with a single-dimensional public good.

The remainder of the paper is organized as follows: Section 2 presents the model of a dynamic endowment economy and derives preferences of individuals in different legislative districts over trade policies. Section 3 specifies the legislative process, and section 4 characterizes a Markov perfect equilibrium of the game. In sections 5 and 6 we modify the model to introduce the effects of tariff bindings and administered protection, and present the main propositions. Section 7 concludes.

2 The Economy

A small open economy produces $K+1$ goods, $k = 0, 1, \ldots, K$ each period over an infinite horizon. Let y_k be the total output in sector k in each period. The production technology is such that one unit of each good requires one unit of a sector specific factor, hence y_k is also the total endowment of the factor used specifically in sector k in each period. All goods are traded. Good zero is the freely traded numeraire with price, $p_0 = 1$. All other goods, $k = 1, \ldots, K$, have world price p_k^*. These prices are exogenously given and constant each period. The domestic price of each of the non-numeraire goods is the world price, p_k^*, plus a specific tariff, τ_k^t, so $p_k^t = p_k^* + \tau_k^t$. The vector of specific tariffs in period t, τ^t, is determined by the legislative process at the beginning of the period, and once a tariff policy is selected, individuals make consumption decisions.

There are N citizens in the economy who live in K symmetric legislative districts, each having an equal number of citizens. A citizen in legislative district k is endowed with $\frac{y_0}{N}$ units of the factor used in the numeraire sector and $\frac{y_k K}{N}$ units of the factor used in non-numeraire sector k each period. Hence legislative district k is the exclusive producer of non-numerarie good k. To simplify the calculations, we assume that the legislative districts are symmetric.

Assumption 1. *Legislative districts are symmetric such that,*

(a) output in each legislative district is $y_k = y$ for all k,

(b) the world price of each good is $p_k^* = p^*$ for all k.

Consumption of good j is given byc_j. Each period, a citizen's quasi-linear preferences are given by

$$U(c) = c_0 + \sum_{j=1}^{K} u(c_j),$$

with $u(c_j) = \beta c_j - \frac{1}{2}c_j^2$ and β is an exogenous constant. An individual from legislative district k derives income from his allocation of the numeraire factor plus his allocation of non-numeraire factor k, so total factor income is $\frac{1}{N}(yp_k K + y_0)$. Government revenue derived from tariffs is evenly rebated to individuals. Government revenue from tariffs for each individual is therefore $\frac{1}{N}\sum_{j=1}^{K} \tau_j (N c_j - y)$. So individuals maximize utility from consumption subject to the budget constraint

$$\textstyle\sum_{j=1}^{K} p_j c_j + c_0 = \frac{1}{N}\left[(yp_k K + y_0) + \sum_{j=1}^{K} \tau_j (N c_j - y)\right]$$

Each individual's demand for non-numeraire good j is given by $c_j = \beta - p_j$, hence, given a tariff vector τ, an individual from district k has indirect utility

$$v^k(\tau) = \frac{\tau_k y K}{N} - \sum_{j=1}^{K} \left[\frac{\tau_j^2}{2} + \frac{\tau_j y}{N} \right] + \lambda, \tag{1}$$

where λ is a constant.[1]

Any trade policy vector that is legislated will be such that the payoffs to that vector will lie on the Pareto-frontier. That is, tariffs that are legislated will maximize a weighted sum of the utilities of all districts. The rationale is that if there is a tariff policy that would be accepted by the legislature such that payoffs do not lie on the Pareto frontier, then the proposing legislator will do better by choosing a payoff that does lie on the frontier, while holding everyone else's payoff constant. Note that payoffs that lie on the Pareto frontier do not imply that there are no deadweight losses induced by the corresponding tariff vectors. The only tariff vector that does not involve deadweight losses is the free trade vector which weights everyone's utility equally. Denote the set $\mathbb{T} \subset \mathbb{R}^K$ as the set of trade polices that correspond to payoffs on the Pareto frontier, that is

$$\mathbb{T} = \{\tau \in \mathbb{R}^K : \tau = \arg\max \sum_{j=1}^{K} \phi_j v_j(\tau), \forall \phi_j \in [0,1] \text{ s.t. } \sum_{j=1}^{K} \phi_j = 1\}.$$

All tariffs in the set $\mathbb{T}$ satisfy

$$\sum_{j=1}^{K} \tau_j = 0. \tag{2}$$

Since these tariffs sum to a constant they can be conveniently represented in a $(K-1)$-dimensional simplex. In the case of 3 legislators the 2-dimensional simplex as in Figure 1. The vertices represent a tariff vector where a single district maximizes his utility at the expense of all other districts (i.e. $\phi_j = 1$ for some j), and the centroid represents the free trade tariff vector (i.e. $\phi_j = \frac{1}{K}$ for all j). The free trade tariff vector is the most efficient vector, so the further the trade policy is from the centroid, the higher are the deadweight losses. This representation will be useful as we illustrate the equilibrium and the effects of tariff bindings and administered protection.

[1] $\lambda = y_0 + K \left[p^* y + \frac{1}{2}(\beta - p^*)^2 \right]$.

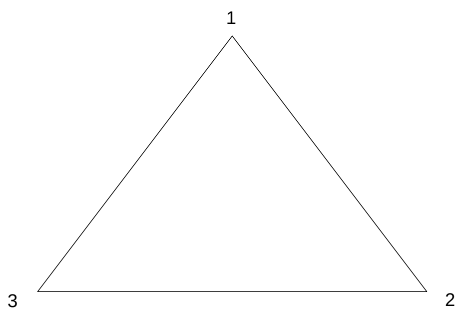

Figure 1: Tariffs Corresponding to the Pareto Frontier

3 Legislative Process

Tariff policy is determined by the legislative process in each period. Elections are held within each district to select a local representative. Local representatives form the legislature, and the legislature meets every period to determine tariff policy. Let $\mathbb{K}$ denote the set of legislators, one from each district. Since agents from district k are identical, we know that the representative from district k will have the same preferences as all other members of his district. Preferences for legislator k over tariffs in each period are given by equation 1. When choosing tariff policy in period t legislator k therefore maximizes the expected discounted utility given by

$$E\left[\sum_{t=1}^{\infty} \delta^{t-1}(1-\delta)v^k(\tau^t)\right]. \tag{3}$$

where $\tau^t = \{\tau_1^t, \ldots, \tau_K^t\} \in \mathbb{T}$ is the vector of trade tariffs for each of the non-numeraire sectors in period t.

At the beginning of each period a legislator, $l^t \in \mathbb{K}$, is randomly recognized to make a tariff vector proposal for that period. Legislators are recognized with equal probability in each period. The recognized legislator, l^t, makes a tariff proposal, $q^t \in \mathbb{T}$, which is voted on by all legislators, each legislator having a single vote. A simple majority of votes is required for a proposal to be implemented, hence the proposer requires $\frac{K}{2}$ legislators (including the proposer) to be in agreement. If the proposal fails to achieve $\frac{K}{2}$ legislators' vote, the status quo tariff policy, τ^{t-1}, prevails.[2]

[2]The implicit tie-breaking rule is that ties go in favor of the proposer. This is for simplicity and does not affect results qualitatively.

4 Markov Perfect Equilibrium

We seek an equilibrium of this game that does not rely on complicated coordination schemes, as would be required if trigger strategies were considered. We focus on the class of subgame perfect equilibria that requires only information that is payoff-relevant, i.e. Markov perfect equilibrium.

With Markov perfect equilibria players' strategies condition only on information that is relevant to current period payoffs. The payoff relevant variables in this model are the status quo tariff policy, τ^{t-1}, and the identity of the proposing legislator, l^t. We summarize these payoff relevant variables as the state variable $\omega^t = (\tau^{t-1}, l^t) \in \mathbb{T} \times \mathbb{K}$.

Each legislator's strategy is a pair (α_k, σ_k) such that α_k is legislator k's acceptance strategy and σ_k is legislator k's proposal strategy, so a strategy profile is given by (α, σ). A proposal strategy for legislator k, $\sigma_k(\omega^t)$, is a tariff proposal for each sector, q^t. Given a proposal, q^t, an acceptance strategy for legislator k is a binary function $\alpha_k(\omega^t; q^t)$ such that

$$\alpha_k(\omega^t; q^t) = \begin{cases} 1 & \text{if legislator } k \text{ accepts proposal } q^t, \\ 0 & \text{if legislator } k \text{ rejects proposal } q^t. \end{cases}$$

We seek a notion of symmetry for the legislators' strategies reflecting the fact that any legislator k will be expected to behave in the same manner as legislator j if he was in legislator j's position. More concretely, define the one-to-one operator, $\Phi : \mathbb{K} \to \mathbb{K}$ that represents any permutation of the identity of the legislators. Given a proposed vector of tariffs, $q^t = (q_1^t, \ldots, q_K^t)$, and permutation $\Phi(\cdot)$, we denote the resulting permuted vector of proposed tariffs as $q_\Phi^t = (q_{\Phi(1)}^t, \ldots, q_{\Phi(K)}^t)$. A permutation of the state variable $\omega^t = (\tau^{t-1}, l^t)$ is therefore denoted $\omega_\Phi^t = (\tau_\Phi^{t-1}, \Phi(l^t))$, and a symmetric strategy profile is given by the following definition.

Definition 1. A strategy profile (α, σ) is *symmetric* if for any permutation of the identities of legislators, $\Phi : \mathbb{K} \to \mathbb{K}$,

$$\alpha_k(\omega^t; q^t) = \alpha_{\Phi(k)}(\omega_\Phi^t; q_\Phi^t), \text{ and}$$
$$\sigma_j(\omega^t) = \sigma_{\Phi(j)}(\omega_\Phi^t).$$

The dynamic payoff for any legislator k, given a strategy profile, (α, σ), and a state ω^t is,

$$V_k(\alpha, \sigma; \omega^t) = (1-\delta)v^k(\tau^t) + \delta E_{p^{t+1}}[V_k(\alpha, \sigma; \omega^{t+1})].$$

Where $\tau^t = \sigma_{l^t}(\omega^t)$ if the proposal receives the required majority of votes, otherwise the policy reverts to the status quo, τ^{t-1}. A Markov perfect equilibrium strategy profile must maximize this dynamic payoff for all legislators, for all possible states and must be a best response to *any* history contingent strategy played by any other legislator. We focus on symmetric strategies, hence we define a symmetric Markov perfect equilibrium formally as follows.

Definition 2. A symmetric *Markov Perfect Equilibrium (MPE)* is a symmetric strategy profile, $(\alpha^*(\omega^t; q^t), \sigma^*(\omega^t))$, such that for all $\omega^t \in \mathbb{T} \times \mathbb{K}$, for all $(\alpha_k(h^t; q^t), \sigma_k(h^t))$, for all (h^t, q^t), and for all k,

$$\begin{aligned} V_k(\alpha^*, \sigma^*; \omega^t) &\geq V_k(\alpha_k(h^t; q^t), \alpha^*_{-k}, \sigma^*; \omega^t) \\ \text{and } V_k(\alpha^*, \sigma^*; \omega^t) &\geq V_k(\alpha^*, \sigma_k(h^t), \sigma^*_{-k}; \omega^t), \end{aligned}$$

where h^t represents any history of the state ω^t.

The first main proposition of the paper states that a symmetric Markov perfect equilibrium exists in which low levels of protection is a possible outcome.

Proposition 1. *Under assumption 1, there exists a non-degenerate interval* $[\underline{\delta}, \overline{\delta}]$*, such that for all* $\delta \in [\underline{\delta}, \overline{\delta}]$ *a symmetric MPE exists, in which low levels of protection may be legislated each period.*

The proof is constructive. In the next sections we characterize a Markov perfect equilibrium of this game in which low levels of protection is a possible outcome. We are interested to know under what conditions the legislative process will result in low levels of protection and how tariff bindings and administered protection affect these conditions.

4.1 Equilibrium Characterization

Naturally, for an individual from district k, the single period optimal tariff for good k differs from the single period optimal tariff for any of the other goods. Denote the optimal tariff for a district k person for good k as τ^x. From the first order condition this is

$$\tau^x = \tfrac{y}{N}\left[K-1\right].$$

This is the maximum value any tariff on the Pareto frontier will take. The tariff for goods $j \neq k$, the *loser* tariff, or τ^z is

$$\tau^z = -\tfrac{y}{N}.$$

This is the minimum value any tariff on the Pareto frontier will take. We denote τ^{xz} as the vector of tariffs where a single good k faces tariff τ^x and all other goods $j \neq k$ face tariff τ^z. Since this tariff vector awards a high level of protection to a single industry, we will denote it as the *biased* tariff vector. This biased tariff vector is represented in Figure 2 below

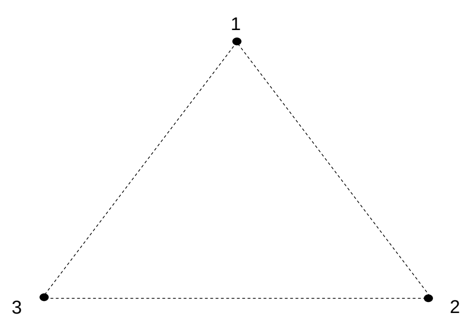

Figure 2: Biased Tariff Policies

Denote the payoffs from the biased policies as $v^x(\tau^{xz})$ for the proposer, and $v^z(\tau^{xz})$ for the losers. These represent the highest and lowest payoffs that will be legislated. For simplicity, we normalize $v^z(\tau^{xz}) = 0$, which implies $v^x(\tau^{xz}) = \left(\tfrac{yK}{N}\right)^2$.

Now define the set of tariff vectors $\mathbb{T}_\theta \subset \mathbb{T}$ to be such that a number, θ, of industries receive a tariff that is equal to the loser tariff. That is

$$\mathbb{T}_\theta \equiv \left\{\tau \in \mathbb{T} : \left|\left\{k : \tau^k = \tau^z\right\}\right| = \theta\right\}$$

The set $\mathbb{T}_{K-1}$ therefore represents all permutations of the biased tariff policy illustrated in Figure 2.

Now consider an (almost) completely equitable tariff vector for a single period. This will maximize the joint payoff of a coalition of legislators consisting of all legislators except one. Let the legislator that will be frozen out be legislator j. Then the maximization problem is

$$\max_{\tau} \ \sum_{k \neq j} v^k(\tau)$$

Denote the coalition tariff on good k as τ^c. This is given by

$$\tau^c = \frac{y}{N(K-1)} \ ,$$

and the tariff on good $j \neq k$ is

$$\tau_j = -\frac{y}{N} \ .$$

This is the same as τ^z. Denote this cooperative vector as τ^{cz}, and the payoffs from this vector as $v^c(\tau^{cz})$ for coalition members and $v^z(\tau^{cz})$ for the loser. These are

$$\begin{aligned} v^c(\tau^{cz}) &= \frac{y^2 K^3}{2N^2(K-1)}, \text{ and} \\ v^z(\tau^{cz}) &= \frac{y^2 K^2 (K-2)}{2N^2(K-1).} \end{aligned}$$

Since this vector implies low levels of tariffs across sectors, we denote it as *low levels of protection*. This tariff vector allows all legislators, except one, to maximize their payoff, while reducing the remaining legislator's industry to the lowest tariff level that is optimal. Hence this tariff vector involves significantly lower dead-weight losses than a biased tariff vector. These tariffs are illustrated in Figure 3. Denote the entire set of low level tariff vectors as $\overline{\mathbb{T}}_1$.

Corollary 1 describes how low tariff policies are arrived at in equilibrium.

Corollary 1. *Under assumption 1, if* $\delta \in [\underline{\delta}, \overline{\delta}]$ *there exists a set* $\Gamma \in \mathbb{T}$ *such that if* $\tau^0 \in \Gamma$*, a symmetric MPE exists in which low levels of protection are legislated each period.*

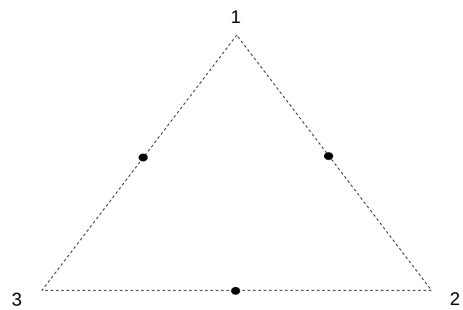

Figure 3: The Low Tariff Class

The equilibrium is such that, if initial trade policies are close to free trade, the sustained outcome is low levels of protection, whereas for all other initial tariffs, the outcome will be biased policies. The set of initial tariff policies that lead to low tariff levels, Γ, is indicated by the shaded region in figure 4. We are interested in the properties of this region as we allow for administered protection, but first we fully describe the equilibrium strategies and payoffs.

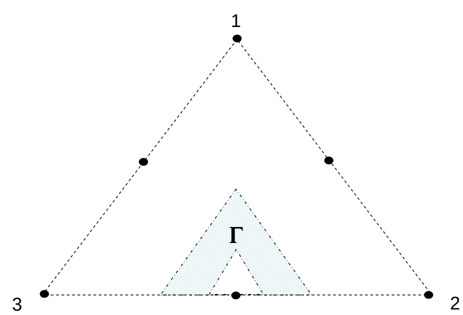

Figure 4: Initial Tariffs that Lead to Low Levels of Protection

4.2 Equilibrium Strategies

The equilibrium acceptance strategy for any legislator k is α_k^* such that he accepts proposals that give a dynamic payoff that is at least as great as the payoff to the status quo. That is, given proposal q^t,

$$
\alpha_k^*(\omega^t; q^t) = \begin{cases} 1 \text{ if} & \begin{array}{l} (1-\delta)v^k(q^t) + \delta E_{p^{t+1}}[V_k(\alpha^*, \sigma^*; q^t, p^{t+1})] \geq \\ (1-\delta)v^k(\tau^{t-1}) + \delta E_{p^{t+1}}[V_k(\alpha^*, \sigma^*; \tau^{t-1}, p^{t+1})] \end{array} \\ \\ 0 \text{ otherwise.} \end{cases}
$$

A proposal strategy, $\sigma_k^*(\omega^t)$, depends on the status quo allocation and the proposing legislator. Under the equilibrium proposal strategies, if $\frac{K}{2}$ or more legislators have a status quo tariff equal to the loser tariff, τ^z, the proposer exploits the opportunity to legislate high tariffs for their industry, and offers a *biased* tariff proposal. If less than $\frac{K}{2}$ legislators have a status quo tariff equal to the loser tariff, the proposer will choose between offering the *low level tariff* proposal or extracting as much protection for their industry as possible by using a *cherry-picking* strategy. Once a low level of tariffs has been implemented, these tariffs are sustained.

More specifically, suppose first that there are $\frac{K}{2}$ or more legislators whose industry faces the loser tariff, τ^z. That is, $\tau^{t-1} \in \mathbb{T}_{\theta \geq \frac{K}{2}}$. Each legislator with a loser tariff is willing to accept a proposal that gives them a loser tariff, since they can't do better under the status quo. This allows the proposer to legislate tariffs biased towards his industry. So the equilibrium proposal is the biased policy, $\sigma^*(\omega^t) = \tau^{xz}$, such that

$$
\begin{aligned}
\sigma_{l^t}^* &= \tau^x \\
\sigma_k^* &= \tau^z \text{ for } k \neq l^t \ .
\end{aligned}
$$

Notice that the proposal $\tau^{xz} \in \mathbb{T}_{K-1}$ is also an element of the set $\mathbb{T}_{\theta \geq \frac{K}{2}}$ so all subsequent equilibrium strategies will call for the proposal τ^{xz} to be implemented. This means that once a biased policy is legislated all subsequent policies that are legislated will be biased.

Now consider that $\tau^{t-1} \in \overline{\mathbb{T}}_1$. In this case one legislator has tariff τ^z and the remaining $K-1$ legislators maximize their joint payoff, so have tariff τ^c. The equilibrium strategy for this set of status quo allocations is the low tariff proposal, $\sigma^*(\omega^t) = \tau^{cz}$, such that if the proposer's status tariff is not τ^z, then the legislator that had τ^z is given τ^z again and all other legislators receive τ^c. That is

$$\sigma_k^* = \begin{cases} \tau^z & \text{if } \tau_k^{t-1} = \tau^z \ , \\ \tau^c & \text{otherwise.} \end{cases}$$

If the proposer's status quo tariff is τ^z, then the proposer takes a legislator at random to give τ^z and splits the surplus evenly among himself and the remaining legislators. That is

$$\sigma_{l^t}^* = \ \tau^c,$$

and for $k \neq l^t$,

$$\sigma_k^* = \begin{cases} \tau^z & \text{with probability } \frac{1}{K-1} \ , \\ \tau^c & \text{with probability } \frac{K-2}{K-1} \ . \end{cases}$$

Notice again that once a proposal in the low tariff class, $\overline{\mathbb{T}}_1$, has been implemented the equilibrium strategies dictate that all subsequent proposals lie in this set. So once low tariffs are legislated, all subsequent tariff proposals are low tariff proposals.

We must also consider status quo tariffs that are not an element of (or do not lead directly to) the biased polices class or the low tariffs class, i.e. *interior tariffs.* Suppose we have $\tau^{t-1} \in \mathbb{T}_{\theta<\frac{K}{2}} \backslash \overline{\mathbb{T}}_1$. In this case, there are fewer than $\frac{K}{2}$ legislators that have a status quo tariff, τ^z, so the proposer does not have an immediate opportunity to achieve the maximum payoff.[3] The proposer is faced with the choice of buying-off a minimum winning coalition, or offering a low-tariff proposal. Clearly for the proposer to want to propose the low tariffs the correct incentives must be in place. The set Γ_{l^t} is the set of interior tariffs such that, in equilibrium, the proposer has an incentive to propose the low tariffs rather than buy-off a minimum winning coalition. So if $\tau^{t-1} \in \Gamma_{l^t}$ then the proposer gives the legislator with the largest tariff (other than the proposer) τ^z and each of the $K-1$ remaining legislators τ^c. So the equilibrium calls for the low tariff strategy, $\sigma^*(\omega^t) = \tau^{cz}$, such that

$$\sigma_k^* = \begin{cases} \tau^z & \text{if } \tau_k^{t-1} = \max\{\tau_j^{t-1} | j \in \mathbb{K}\backslash\{l^t\}\}, \\ \tau^c & \text{otherwise.} \end{cases}$$

This proposal is an element of the low tariff class, so once implemented the equilibrium remains in the low tariff class.

[3]The only exception here is if $\tau^{t-1} \in \mathbb{T}_{\theta=\frac{K}{2}-1}$ and $\tau_{l^t}^{t-1} \neq \tau^z$. Here the proposer would be able to extract the entire surplus, and implement a biased policy.

Suppose there is an interior tariff that does not fall within Γ_{l^t}, so $\tau^{t-1} \in \mathbb{T}_{\theta<\frac{K}{2}} \setminus \left(\overline{\mathbb{T}}_1 \bigcup \Gamma_{l^t}\right)$. The proposer then has an incentive to cherry-pick legislators to form a minimum winning coalition. He will do so by offering a tariff vector that gives $\frac{K}{2}$ legislators the loser tariff, and offers $\frac{K}{2} - 1$ coalition members a tariff vector that makes them at least indifferent to the status quo. Let C_{l^t} be the set of legislators that are a part of the proposing legislator's coalition. Define the single period payoff that makes coalition member j indifferent as $c^j(\omega^t)$, and define the vector $\tilde{\tau}(\omega^t)$ such that $v^j(\tilde{\tau}(\omega^t)) \equiv \max\{c^j(\omega^t), 0\}$ for all $j \in C_{l^t}$. Then the proposing legislator will offer the cherry picking proposal $\sigma^*(\omega^t) = \tilde{\tau}(\omega^t)$ such that

$$\tilde{\tau}_k(\omega^t) = \begin{cases} \frac{K}{2}(-\tau^z) - \sum_{j \in C_{l^t}} \tilde{\tau}_j(\omega^t) & \text{if } k = l^t \\ \tilde{\tau}_j(\omega^t) & \text{if } j \in C_{l^t}, \\ \tau^z & \text{otherwise.} \end{cases}$$

These cherry-picking strategies are transitory, and lead to the biased class.

The equilibrium proposal strategies can be summarized as

$$\sigma_k^*(\omega^t) = \begin{cases} \tau^{xz} & \text{if } \tau^{t-1} \in \mathbb{T}_{\theta \geq \frac{K}{2}}, \\ \tilde{\tau} & \text{if } \tau^{t-1} \in \mathbb{T}_{\theta<\frac{K}{2}} \setminus \left(\overline{\mathbb{T}}_1 \bigcup \Gamma_k\right), \\ \tau^{c0} & \text{if } \tau^{t-1} \in \overline{\mathbb{T}}_1 \bigcup \Gamma_k. \end{cases}$$

Starting from some vector where strictly less than $\frac{K}{2}$ legislators have the loser tariff, the equilibrium may head either towards the low tariff class, $\overline{\mathbb{T}}_1$, where the surplus is evenly split among $K-1$ legislators, or the biased class, $\mathbb{T}_{K-1}$, where the proposer benefits from a high level of protection on his industry, and all other industries are subsidized. Where the equilibrium heads depends on whether the initial allocations fall in the set Γ_k.

4.3 Low Tariffs as an Equilibrium Outcome

Bowen and Zahran (2006) prove that the above strategies constitute a symmetric MPE of a game where legislators bargain over the share of a fixed surplus. Since the Pareto-efficient tariffs lie in a simplex the strategies are analogous, hence the proof of equilibrium is identical. We will focus here on incentive constraints that determine the region of initial tariff vectors that lead to the low tariff class. The region consists of a lower and an upper bound on initial tariffs of coalition members.

The lower bound on initial tariffs for coalition members is derived from the incentive of the proposer to propose low tariffs rather than choose a cherry-picking strategy that will lead to biased policies. We can define the recursive dynamic payoffs when proposals are in the low tariff class as γ for the proposer and coalition members and $\overline{V}_z$ for the loser. With probability $\frac{K-1}{K}$ each legislator receives the same payoff as it did in the previous period, and with probability $\frac{1}{K}$ the current loser becomes the proposer, and a new loser is randomly selected. These dynamic payoffs are given by

$$\begin{aligned} \gamma =& \ (1-\delta)v^c(\tau^{cz}) + \tfrac{\delta}{K}\left[(K-1)\gamma + [\tfrac{1}{K-1}\overline{V}_z + \tfrac{K-2}{K-1}\gamma]\right], \text{ and} \\ \overline{V}_z =& \ (1-\delta)v^z(\tau^{cz}) + \tfrac{\delta}{K}\left[\gamma + (K-1)\overline{V}_z\right]. \end{aligned}$$

Solving for $\overline{V}_z$ and γ gives

$$\gamma = \tfrac{(K-1)[K(1-\delta)+\delta]}{K[(K-1)(1-\delta)+\delta]}v^c(\tau^{cz}) + \tfrac{\delta}{K[(K-1)(1-\delta)+\delta]}v^z(\tau^{cz}) \tag{4}$$

and

$$\overline{V}_z = \tfrac{\delta(K-1)}{K[(K-1)(1-\delta)+\delta]}v^c(\tau^{cz}) + \tfrac{K(K+1)(1-\delta)+\delta}{K[(K-1)(1-\delta)+\delta]}v^z(\tau^{cz}) \ . \tag{5}$$

We need to compare these payoffs to cherry-picking proposal payoffs. Define the payoffs to the cherry-picking proposals, $\tilde{\tau}$, as V_x for the proposer, and V_y for a coalition member. The cherry-picking proposal, $\tilde{\tau}$, involves giving at least $\frac{K}{2}$ legislators the minimum tariff, hence is in the set $\mathbb{T}_{\theta \geq \frac{K}{2}}$, so the period $t+1$ proposal will lie in the biased class. Define the recursive payoffs when proposals are in the biased class as $\underline{V}_x$ for the proposer and $\underline{V}_z$ for the losers. With probability $\frac{1}{K}$ each legislator is the proposer in the next period, hence any legislator's continuation value is $\underline{V}_x$ with probability $\frac{1}{K}$ and $\underline{V}_z$ with probability $\frac{K-1}{K}$. Denote this continuation value as $\underline{V} = \frac{\delta}{K}\left[\underline{V}_x + (K-1)\underline{V}_z\right]$. So payoffs to the cherry-picking proposals are

$$V_x = (1-\delta)v^x\left(\tilde{\tau}(\omega^t)\right) + \underline{V}, \text{ and} \tag{6}$$

$$V_y = (1-\delta)v^y\left(\tilde{\tau}(\omega^t)\right) + \underline{V}. \tag{7}$$

And payoffs in the biased class are

$$\underline{V}_x = (1-\delta)v^x(\tau^{xz}) + \underline{V}, \text{ and} \tag{8}$$

$$\underline{V}_z = (1-\delta)v^z(\tau^{xz}) + \underline{V}. \tag{9}$$

Solving gives

$$\underline{V}_x = \tfrac{K(1-\delta)+\delta}{K}v^x(\tau^{xz}) + \tfrac{\delta(K-1)}{K}v^z(\tau^{xz}) \tag{10}$$

$$\underline{V}_z = \tfrac{\delta}{K}v^x(\tau^{xz}) + \tfrac{(K-\delta)}{K}v^z(\tau^{xz}). \tag{11}$$

Starting from an allocation that is interior, that is if $\tau^{t-1} \in \mathbb{T}_{\theta<\frac{K}{2}} \backslash \overline{\mathbb{T}}_1$, for a proposer to have an incentive to propose low tariffs it must be the case that $\gamma \geq V_x$. Rearranging gives an upper bound on the single period payoff for the cherry-picking proposal which is

$$v^x\left(\tilde{\tau}(\omega^t)\right) \leq \tfrac{\gamma-\underline{V}}{1-\delta}.$$

The cherry-picking proposal, $\tilde{\tau}(\omega^t)$, is a function of the status quo tariff, τ^{t-1}, so the cherry-picking payoff, $v^x\left(\tilde{\tau}(\omega^t)\right)$, is implicity a function of the status quo tariff vector of coalition members. In the appendix, section 8.1, we show that this implies a lower bound on the status quo tariff of a coalition member. For the three-legislator case, considering that legislator 1 is the proposer, then either legislators 2 or 3 will be in the coalition. The restriction that $\gamma \geq V_x$ reduces to the lower bounds on legislator 2 and 3's status quo tariffs illustrated in Figure 5. The darker shaded region gives the intersection of these two, and is the set of allocations from which Γ_1 is derived.

In order for the low tariff proposal to be implemented, it must also be the case

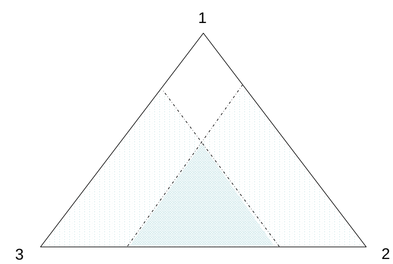

Figure 5: Acceptors' Lower Bound

that a minimum winning majority will accept it. The members of this minimum winning majority will compare the payoff from the low tariff proposal γ to the payoff to the status quo allocation, $V_k(\tau^{t-1})$. The payoff $V_k(\tau^{t-1})$ is given in equation 13 in the appendix, so the condition that $\gamma \geq V_k(\tau^{t-1})$ simplifies to

$$v^k(\tau^{t-1}) \leq \gamma - \tfrac{\delta}{(1-\delta)K}\left[\gamma - V_x\right]. \tag{12}$$

Since $v^k(\tau^{t-1})$ is increasing in τ_k^{t-1} (for the ranges of tariffs considered) this implies an upper bound on τ_k^{t-1}. In the case of 3 legislators and legislator 1 proposing this upper bound is illustrated in figure 6,

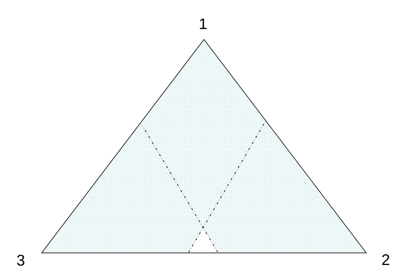

Figure 6: Acceptors' Upper Bound

Figures 5 and 6 together define the region Γ illustrated in figure 4. The region is defined by incentive constraints. It identifies those initial payoffs, such that, in equilibrium, a proposing legislator does not have an opportunity to extract a high level of protection for his legislative district, hence it is in his best interest to make a "good faith " proposal for free trade. Once this proposal is implemented it becomes politically impossible to legislate biased policies.

5 Tariff Bindings

With tariff bindings there is a ceiling on tariffs that can be implemented. This exogenously lowers the maximum tariff that can be a part of any equilibrium. The maximum tariff, τ^x, is no longer chosen optimally, and is now set below the optimal level. To determine the effect of tariff bindings it suffices to examine the impact of changes in τ^x on the boundaries of Γ_j. First lemma 1 says how the expected payoff in the biased tariff class, $\underline{V}$ behaves as τ^x changes.

Lemma 1. *The expected payoff in the biased outcome, $\underline{V}$, is a decreasing function of the maximum tariff, τ^x.*

Proof. Combining equations 10 and 11, we can derive $\underline{V} = \frac{\delta}{K} v^x(\tau^{xz}) + \frac{\delta(K-1)}{K} v^z(\tau^{xz})$. Differentiating $\underline{V}$ with respect to τ^x we have $\frac{d\underline{V}}{d\tau^x} = -\delta\tau^x$. This is clearly negative. ■

The intuition for lemma 1 is simple. The expected payoff in the biased outcome is a weighted sum of the high payoff when the legislator is the proposer, and the low payoff when the legislator is not a proposer. Clearly with tariff bindings, the negative externalities imposed on non-proposing legislators by a high tariff is reduced. Since legislators are more likely to be non-proposers, in the biased outcome, they benefit more from the reduced externality, than they lose when they are the proposer.

Lemma 2. *The coalition member's cherry-picking tariff, $\tilde{\tau}_k$, is an increasing function of the maximum tariff, τ^x.*

Proof. The cherry-picking tariff is defined by equating a coalition member's status quo payoff to the coalition member's payoff under the cherry-picking proposal. Hence we can define the function $H(\tau^x, \tilde{\tau}_k) = V_k(\tau^{t-1}) - V_y = 0$, and by the implicit function theorem we know

$$\frac{d\tilde{\tau}_k}{d\tau^x} = -\frac{\partial H}{\partial \tau^x} \Big/ \frac{\partial H}{\partial \tilde{\tau}_k}.$$

This simplifies to

$$\frac{d\tilde{\tau}_k}{d\tau^x} = \frac{4\delta N \tau^x}{K[2y(2-\delta) - (1-\delta)(K-2)N(\tau^z + \tilde{\tau}_k)]}.$$

The denominator is positive because a coalition member's cherry-picking tariff, $\tilde{\tau}^k$, will not exceed $\frac{y}{N}$, hence the result is proved.

■

The intuition for this result is also quite straight forward. The coalition member's dynamic cherry-picking payoff is a sum of the current period cherry-picking payoff and the expected payoff to the biased proposal, $\underline{V}$. Since $\underline{V}$ is decreasing in the maximum tariff (lemma 1), an increase in the maximum tariff will increase the $v^y(\tilde{\tau})$ that is required to equate $V_k(\tau^{t-1})$ and V_y. Since $v^y(\tilde{\tau})$ is increasing in the coalition member's tariff, $\tilde{\tau}^k$, (for the range of tariffs considered), this results in an increase in the $\tilde{\tau}^k$ required to make the coalition member indifferent between the status quo and the cherry-picking proposal.

Proposition 2 tells us what happens to the region of initial payoffs that allows for the low levels of protection as τ^x decreases.

Proposition 2. *If tariffs are bound, the set of tariffs leading to the low-tariff outcome is reduced.*

Proof. The lower bound on the acceptor's status quo tariff is derived from the condition $\gamma \geq V_x$. Denote the lower bound as $(\tau^{t-1})^*$ so this is defined by, $\gamma = V_x$. By the implicit function theorem, we can define the function $M((\tau_k^{t-1})^*, \tau^x) = V_x - \gamma$, and we know that

$$\frac{d(\tau_k^{t-1})^*}{d\tau^x} = -\frac{\partial M}{\partial \tau^x} / \frac{\partial M}{\partial (\tau_k^{t-1})^*}.$$

The function $M((\tau_k^{t-1})^*, \tau^x)$ can be rewritten as $M((\tau_k^{t-1})^*, \tau^x) = (1-\delta)v^x(\tilde{\tau}(\omega^t)) + \underline{V} - \gamma$, so

$$\frac{\partial M}{\partial \tau^x} = (1-\delta)\frac{\partial v^x(\tilde{\tau})}{\partial \tilde{\tau}_k}\frac{\partial \tilde{\tau}_k}{\partial \tau^x} + \frac{\partial \underline{V}}{\partial \tau^x}.$$

From lemma 3 we know that $\frac{\partial v^x(\tilde{\tau})}{\partial \tilde{\tau}_k}$ is negative, from lemma 2 $\frac{\partial \tilde{\tau}_k}{\partial \tau^x}$ is positive and from lemma 1 $\frac{\partial \underline{V}}{\partial \tau^x}$ is negative. Hence $\frac{\partial M}{\partial \tau^x}$ is negative. Now

$$\frac{\partial M}{\partial (\tau_k^{t-1})^*} = (1-\delta)\frac{\partial v^x(\tau^{xz})}{\partial (\tau_k^{t-1})^*}.$$

From lemma 5 we know that $\frac{\partial v^x(\tau^{xz})}{\partial (\tau_k^{t-1})^*}$ is negative, hence $\frac{\partial M}{\partial (\tau_k^{t-1})^*}$ is also negative. Hence the lower bound on the coalition member's status quo tariff increases with τ^x, the maximum tariff.

Last, we must examine the effect on the upper bound of the coalition member's statu-quo tariff. This upper bound is given by equation 12, which can be written as $v^k(\tau^{t-1}) \leq \gamma + \frac{\delta}{(1-\delta)K}M$. Since we just showed that M is decreasing in τ^x, an increase in τ^x will also increase the upper bound on the coalition member's status quo tariff. The overall effect is a reduction in the set of tariffs that lead to the biased outcome. We therefore have the result.

■

Proposition 2 is illustrated below. Essentially, the region of initial payoffs that allows the low tariff outcome, shrinks with tariff bindings. The intuition as follows: With tariff bindings, the expected payoff to the biased outcome is increased because of the reduced externality to non-proposing legislators. Hence the incentive to implement biased policies is increased. This results in the reduction of the area that allows low levels of tariffs to be implemented.

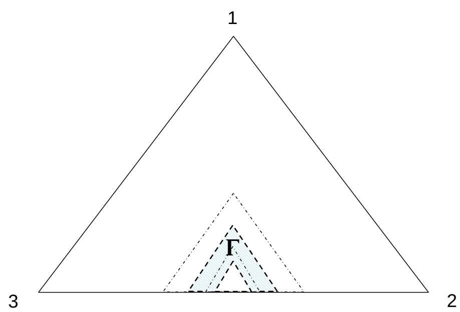

Figure 7: Effect of Tariff Bindings

6 Administered Protection

Under administered protection, all industries are allowed some minimum level of protection. This exogenously raises the minimum tariff that can be a part of any equilibrium. The minimum tariff, τ^z is no longer chosen optimally, and is now set above the optimal level. To determine the effect of administered protection it suffices to examine the impact of increases in τ^z on the boundaries of Γ_j.

The details of the proof are left to the appendix, but the intuition is as as follows. Under administered protection, the payoff to the biased outcome is reduced by the minimum tariff allowed for the "loser" industries. Hence the incentive to apply high levels of protection to the legislator's own industry is reduced. This results in the expansion of the area that allows low levels of tariffs to be implemented.

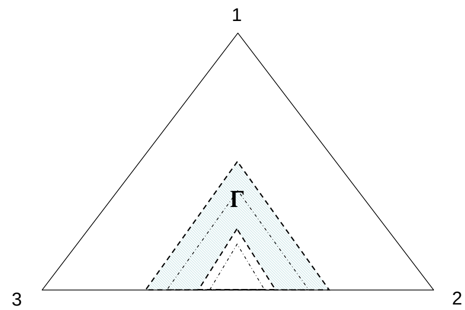

Figure 8: Effect of Administered Protection

7 Conclusion

One of the main objectives of the WTO is to facilitate the reduction of trade barriers. In the WTO's words it is "an organization for liberalizing trade".[4] However, each country sets its own trade policy through some domestic process, usually, through some legislative process, so in this paper I examine the impact of two of the central components of WTO agreements: tariff bindings and administered protection, on tariffs that are enacted legislatively.

Tariff bindings was one of the first elements spelled out by the GATT in 1947, and it provides a ceiling on tariffs that can be enacted through the legislature. Administered protection, on the other hand, came later, and allowed countries a safety valve in the event that a domestic industry was injured or threatened by a surge of imports. This administered protection comes in the form of anti-dumping duties or safeguards, which need not be approved by a legislative process. This safety valve almost gives an industry some minimum level of protection, essentially placing a floor on tariffs that can be legislated.

To examine the impact of these policies I first develop a dynamic model of trade policy determination through a legislative process, and ask first, under what circumstances will the legislative process result in low applied MFN tariffs. What I find is that, depending on initial conditions, the legislative process can result in low applied MFN tariffs or biased MFN tariffs.

To look at the effect of tariff bindings on the legislative outcome, I consider how a ceiling on legislated tariffs affects the set of initial conditions that lead to a low

[4] http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact1_e.htm

protection outcome. The, somewhat surprising, answer is that tariff bindings shrink the set of initial conditions that leads to the low protection outcome, whereas administered protection expands the set of initial tariffs that leads to the low protection outcome. So, loosely speaking, we see tariff bindings leadings to a lower likelihood of a low applied MFN tariff outcome, while administered protection leads to a higher likelihood of a low applied MFN tariff outcome.

The implications for welfare are as yet ambiguous. In the case of tariff bindings, while we can determine that the set of initial tariffs leading to a low protection outcome shrinks (seemingly a welfare reducing result), but at the same time, the negative consequences of being outside of this set is diminished. Another way of saying this is that the biased tariff outcome resembles a form of punishment. Tariff bindings make the punishment less severe, increasing the payoff to those initial tariffs that would have resulted in the biased tariff outcome. A complete treatment of welfare effects is left for future work.

8 Appendix

8.1 Proof of Lower Bound

The next few lemmas show that the above restriction implies a lower bound on the status quo tariff of a coalition member.

The cherry-picking proposal is such that it gives coalition members the same dynamic payoff as the status quo tariff vector, τ^{t-1}. For simplicity, assume that the status quo tariff vector gave the same tariff to all members of the coalition, hence the cherry-picking tariff will also give the same tariff to all coalition members, $\tilde{\tau}_k$.

Lemma 3. *The proposer's single period cherry-picking payoff is a decreasing function of a coalition member's cherry-picking tariff.*

Proof. The proposer's cherry-picking payoff is given by

$$v^x\left(\tilde{\tau}(\omega^t)\right) = \tilde{\tau}_{l^t}\left[\frac{y}{N}(K-1) - \frac{\tilde{\tau}_{l^t}}{2}\right] - \left(\frac{K}{2}-1\right)\tilde{\tau}_k\left[\frac{\tilde{\tau}_k}{2} + \frac{y}{N}\right] - \frac{K}{2}\tau^z\left[\frac{\tau^z}{2} + \frac{y}{N}\right] + \lambda$$

where the proposer's tariff is $\tilde{\tau}_{l^t} = \frac{K}{2}(-\tau^z) - \left(\frac{K}{2}-1\right)\tilde{\tau}_k$. Differentiating with respect to the coalition member's cherry-picking tariff, $\tilde{\tau}_k$, we have

$$\frac{\partial v^x\left(\tilde{\tau}(\omega^t)\right)}{\partial \tilde{\tau}_k} = -\frac{(K-2)K[2y+N(\tau^z+\tilde{\tau}_k)]}{4N}.$$

This is negative since a coalition member's cherry-picking tariff is at least as great as the loser tariff.

■

Lemma 4. *The coalition member's cherry-picking tariff is an increasing function of a coalition member's status quo tariff.*

Proof. Denote the payoff to each member of the coalition under status quo tariff τ^{t-1} as $V_k(\tau^{t-1})$. This is given by

$$V_k(\tau^{t-1}) = (1-\delta)v^k(\tau^{t-1}) + \frac{\delta}{K}[V_x + (K-1)V_y].\ ^5 \tag{13}$$

Since $\tilde{\tau}(\omega^t)$ is obtained from equality of $V_k(\tau^{t-1})$ and V_y, this simplifies to

$$V_k(\tau^{t-1}) = \frac{(1-\delta)K}{K-\delta(K-1)}v^k(\tau^{t-1}) + \frac{\delta}{K-\delta(K-1)}V_x. \tag{14}$$

Now $\tilde{\tau}(\omega^t)$ is defined implicitly by $V_k(\tau^{t-1}) = V_y$.[6] Define the function $H(\tau_k^{t-1}, \tilde{\tau}_k) = V_k(\tau^{t-1}) - V_y$. Then by the implicit function theorem

[5] Note that this is a special case of the general payoff given in the Appendix, in equation 16. Here $v^k\left(\tau^{t-1}\right) = \tau_k^{t-1}\frac{yK}{N} - \left(\frac{K}{2}-1\right)\tau_k^{t-1}\left[\frac{\tau_k^{t-1}}{2} + \frac{y}{N}\right] - \sum_{j\neq k}\tau_j^{t-1}\left[\frac{\tau_j^{t-1}}{2} + \frac{y}{N}\right] + \lambda$.

[6] Where $v^y\left(\tilde{\tau}\right) = \tilde{\tau}_k\frac{yK}{N} - \tilde{\tau}_{l^t}\left[\frac{\tilde{\tau}_{l^t}}{2} + \frac{y}{N}\right] - \left(\frac{K}{2}-1\right)\tilde{\tau}_k\left[\frac{\tilde{\tau}_k}{2} + \frac{y}{N}\right] - \frac{K}{2}\tau^z\left[\frac{\tau^z}{2} + \frac{y}{N}\right] + \lambda$.

$$\frac{d\tilde{\tau}_k}{d\tau_k^{t-1}} = -\frac{\partial H}{\partial \tau_k^{t-1}} / \frac{\partial H}{\partial \tilde{\tau}_k}.$$

This simplifies to

$$\frac{d\tilde{\tau}_k}{d\tau_k^{t-1}} = \frac{2[(K+2)y-(K-2)N\tau_k^{t-1}]}{K[2y(2-\delta)-(1-\delta)(K-2)N(\tau^z+\tilde{\tau}_k)]}.$$

The numerator is positive because a coalition member will not have a status quo tariff larger than $\frac{y}{N}$. This would imply that he was receiving a large share of the surplus in the previous period, hence would not be the cheapest coalition member. The denominator is positive also for the same reason.

■

Lemma 5. *The proposer's cherry-picking payoff, $v^x(\tilde{\tau}(\omega^t))$ is a decreasing function of a coalition member's status quo tariff, τ_k^{t-1}.*

Proof. By the chain rule, we have

$$\frac{\partial v^x\big(\tilde{\tau}(\omega^t)\big)}{\partial \tau_k^{t-1}} = \frac{\partial v^x\big(\tilde{\tau}(\omega^t)\big)}{\partial \tilde{\tau}_k} \frac{\partial \tilde{\tau}_k}{\partial \tau_k^{t-1}}.$$

By lemmas 3 and 4 this product is negative.

■

8.2 Proof of Proposition 3

Lemma 6. *The expected payoff in the low tariff class, $\underline{V}$, is an increasing function of the minimum tariff, τ^z.*

Proof. Differentiating $\underline{V}$ with respect to τ^z we have $\frac{d\underline{V}}{d\tau^z} = -\delta\tau^z(K-1)$. ■

Lemma 7. *The proposer's payoff to the cherry-picking proposal is a decreasing function of the minimum tariff, τ^z.*

Proof. The minimum tariff enters directly in the cherry picking proposal, so the total derivative with respect to the minimum tariff gives,

$$\frac{dv^x(\tilde{\tau})}{d\tau^z} = \frac{\partial v^x(\tilde{\tau})}{\partial \tilde{\tau}^k}\frac{\partial \tilde{\tau}^k}{\partial \tau^z} + \frac{\partial v^x(\tilde{\tau})}{\partial \tau^z}$$

This is equivalent to

$$\frac{dv^x(\tilde{\tau})}{d\tau^z} = -\frac{N^2\delta(K-1)(K-2)\tau^z(\tilde{\tau}^k+\tau^z)+2y[N(K(K-2\delta)+2\delta)\tau^z+yK^2(1-\delta)+\delta y]}{NK[2y(2-\delta)-(1-\delta)(K-2)N(\tau^z+\tilde{\tau}_k)]}$$

■

Lemma 8. *The payoff to a coalition member in the low tariff class, γ, is a decreasing function of the minimum tariff, τ^z.*

Proof. The payoff in the low tariff class is given by equation 4. Differentiating this with respect to τ^z gives.

$$\frac{d\gamma}{d\tau^z} = -\frac{y(K-1)(1-\delta)}{N[(K-1)(1-\delta)+\delta]} - \tau^z.$$

This value is negative. ■

Proposition 3 tells us what happens to the region of initial payoffs that allows for the low levels of protection as τ^z increases.

Proposition 3. *If a small amount of administered protection is allowed, the set of initial tariffs that lead to a low tariff outcome expands.*

Proof. From before we have the function $M((\tau_k^{t-1})^*, \tau^z) = V_x - \gamma$, that defines the boundary tariff, and we know that

$$\frac{d(\tau_k^{t-1})^*}{d\tau^z} = -\frac{\partial M}{\partial \tau^z} / \frac{\partial M}{\partial (\tau_k^{t-1})^*}.$$

The partial derivative of M with respect to the minimum tariff is

$$\frac{\partial M}{\partial \tau^z} = (1-\delta)\frac{dv^x(\tilde{\tau})}{d\tau^z} + \frac{dV}{d\tau^z} - \frac{d\gamma}{d\tau^z}.$$

From from lemma 6 $\frac{dV}{d\tau^z}$ is negative, lemma 7 we know that $\frac{dv^x(\tilde{\tau})}{d\tau^z}$ is negative, and from lemma 8 $\frac{\partial \gamma}{\partial \tau^z}$ is negative. Hence the sign on $\frac{\partial M}{\partial \tau^x}$ depends on the magnitudes of the these values, and is ultimately negative. We already know $\frac{\partial M}{\partial (\tau_k^{t-1})^*}$ is negative, so we have that the lower bound on the coalition member's status quo tariff is decreasing in the minimum tariff.

We must now examine the impact on the upper bound of the tariff. The upper bound is given by $v^k((\tau^{t-1})^{**}) = \gamma - \frac{\delta}{(1-\delta)K}[\gamma - V_x]$. Note that the expression in the brackets is equal to $-M$ hence define the function, $N((\tau_k^{t-1})^{**}, \tau^z) = \gamma + \frac{\delta}{(1-\delta)K} M - v^k((\tau^{t-1})^{**})$. Then we know that

$$\frac{d(\tau_k^{t-1})^{**}}{d\tau^z} = -\frac{\partial N}{\partial \tau^z} / \frac{\partial N}{\partial (\tau_k^{t-1})^{**}}.$$

We have

$$\frac{\partial N}{\partial \tau^z} = \frac{d\gamma}{d\tau^z} + \frac{\delta}{(1-\delta)K}\frac{\partial M}{\partial \tau^z}.$$

From lemma 8 we know that $\frac{d\gamma}{d\tau^z}$ is negative and from before we know that $\frac{\partial M}{\partial \tau^z}$ is negative. Last we have $\frac{\partial N}{\partial (\tau_k^{t-1})^{**}} = \frac{\delta(1-\delta)}{(1-\delta)K}\frac{\partial v^x}{\partial (\tau_k^{t-1})^{**}} - \frac{\partial v^k(\tau^{t-1})}{\partial (\tau^{t-1})^{**}}$ which we know from lemma 5 is negative. Hence the lower bound on the coalition member's tariff is also a decreasing function of the minimum tariff. The overall effect is an increase in the set of initial tariffs leading to a low tariff outcome. ■

8.3 Derivation of Γ

Rearranging the expression gives the condition

$$\begin{aligned}&\tfrac{(K-1)[K(1-\delta)+\delta]}{K[(K-1)(1-\delta)+\delta]}v^c(\tau^{cz})+\tfrac{\delta}{K[(K-1)(1-\delta)+\delta]}v^z(\tau^{cz})\\&\geq(1-\delta)v^x(\tilde{\tau}(\omega^t))+\tfrac{\delta y^2K}{N^2}\end{aligned}\tag{15}$$

Define the indicator function $\xi_k(\omega^t)$ that says whether or not this condition is satisfied if legislator j is the proposer. We have

$$\xi_k(\omega^t)\equiv\begin{cases}1 & \text{if condition (15) is met,}\\ 0 & \text{otherwise.}\end{cases}$$

If $\xi_k(\omega^t)=1$ this ensures that if $l^t=j$, then legislator j has an incentive to propose the compromise. This is condition (i) for Γ_j.

The status quo allocation is the same allocation which the proposer uses to determine his minimum winning coalition should he attempt a cherry picking proposal. Hence the members of his minimum winning coalition for the cherry-picking proposal are also those legislators that are most likely to accept a compromise proposal. We are interested in the status quo payoff for these legislators.

The current period payoff to the status quo allocation for legislator k is $v^k(\tau_k^{t-1})$, and the continuation payoff is γ if legislator k has an incentive to propose the compromise and he is the proposer next period. From before we have the indicator function $\xi_k(\omega^t)$ that determines, based on the status quo, whether or not legislator k would be willing to propose a compromise, but if legislator k is not the proposer in the next period, there is no guarantee that τ^{t-1} satisfies condition (i) for Γ_j for all other legislators $j\neq k$.

This idea is illustrated in Figure 9 for the case of three legislators. The first condition for Γ_1 implies a lower bound on the status quo tariff for legislators 2 and 3. If in addition legislator 1's tariff also meets this lower bound, the status quo lies in the darker shaded triangle as illustrated by the square. Being in this region, implies also being in Γ_k for $k=2,3$.

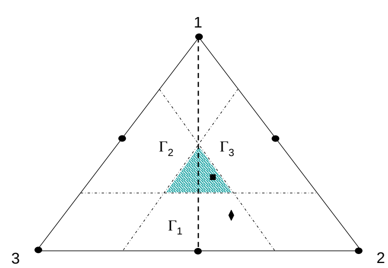

Figure 9: Status Quo Allocations in Γ_1

However, the allocation indicated by the diamond is an allocation where neither legislators 2 nor 3 would want to propose a compromise although legislator 1 would. This means that if either legislators 2 or 3 propose in the next period, they have a chance to grab a large enough share and head towards a biased outcome, hence the diamond is in neither Γ_2 nor Γ_3. In calculating the continuation payoffs to the status quo allocation it is necessary to capture this.

We denote the fraction of legislators who would propose a compromise other than legislator j as $\zeta_j(\omega^t)$ which is given by

$$\zeta_j(\omega^t) \equiv \tfrac{1}{K-1} \textstyle\sum_{k \neq j} \xi_k(\omega^t).$$

Now we can write down the dynamic payoff to any coalition member k given the status quo $\tau^{t-1} \in \mathbb{T}_{\theta < \frac{K}{2}-1} \backslash \overline{\mathbb{T}}_1$. This is

$$V_k(\tau^{t-1}) = (1-\delta)v^k(\tau^{t-1}) + \tfrac{\delta}{K}[\xi_k\gamma + (1-\xi_k)V_x + (K-1)(\zeta_k\gamma + (1-\zeta_k)V_{yi})]. \tag{16}$$

In continuation, legislator k is the proposer with probability $\frac{1}{K}$. If legislator k is the proposer and the conditions for Γ_k are met, i.e. $\xi_k = 1$, then he receives payoff γ in equilibrium, and if the conditions are not met, i.e. $\xi_k = 0$, legislator k receives V_x. If legislator k is not the proposer, then with probability $\zeta_k(\omega^t)$ the proposers for whom the conditions for Γ_j are met offer legislator k the payoff γ, and otherwise he becomes part of a cherry picking coalition and receives V_{yi}.

In equilibrium V_{yi} is such that legislator k is indifferent between V_{yi} and the status quo, hence $V_{yi} = V_k(\tau^{t-1})$. Simplifying (16) gives

$$V_k(\tau^{t-1}) = \tfrac{(1-\delta)K}{K-\delta(K-1)(1-\zeta_k)}v^k(\tau^{t-1}) + \tfrac{\delta}{K-\delta(K-1)(1-\zeta_k)}[(\xi_k + (K-1)\zeta_k)\gamma + (1-\xi_k)V_x]. \tag{17}$$

Now, as stated before, $V_k(\tau^{t-1})$ must be no bigger than γ for legislator k to accept the low tariff proposal. From (17) this implies that

$$v^k(\tau^{t-1}) \leq \gamma - \tfrac{\delta(1-\xi_k)}{(1-\delta)K}[V_x - \gamma].$$

If $\xi_k(\omega^t) = 1$ this condition simplifies to

$$v^k(\tau^{t-1}) \leq \gamma, \tag{18}$$

and if $\xi_k(\omega^{t-1}) = 0$, the condition simplifies to

$$v^k(\tau^{t-1}) \leq \gamma - \tfrac{\delta}{(1-\delta)K}[V_x - \gamma]. \tag{19}$$

The conditions given by equations (18) and (19) together form condition (ii) for Γ_j. These conditions place upper bounds on the tariffs of members of any coalition that would accept a low tariff proposal. Since $\xi_k(\omega^{t-1}) = 0$ to obtain (19) we know $V_x > \gamma$ so (19) represents a slightly lower upper bound than (18).

Now we fully define the set of tariffs, Γ_j, such that legislator j has an incentive to propose low tariffs. This is

$$\Gamma_j \equiv \{\tau^{t-1} \in \mathbb{T}_{\theta \leq \frac{K}{2}-1} : \text{conditions (i) and (ii) are satisfied}\}.$$

Conditions (i) and (ii) are given by:

$$\text{(i) } \xi_j(\tau^{t-1}) = 1, \text{ and}$$
$$\text{(ii) for } k \in C_j,\ v^k(\tau^{t-1}) \leq \begin{cases} \gamma & \text{if } \xi_k(\tau^{t-1}) = 1, \\ \gamma - \frac{\delta}{(1-\delta)K}[V_x - \gamma] & \text{if } \xi_k(\tau^{t-1}) = 0. \end{cases}$$

Since the value of $a_k(\omega^t)$'s are fully determined by the status quo tariffs, conditions (i) and (ii) are aggregate conditions on the status quo[7].

References

Anderson, J. E. (1992), 'Domino Dumping, I: Competitive Exporters', *The American Economic Review* **82**(1), 65–83.

Bagwell, K. and Staiger, R. W. (1990), 'A Theory of Managed Trade', *The American Economic Review* **80**(4), 779–795.

Baron, D. (1996), 'A Dynamic Theory of Collective Goods Programs', *American Political Science Review* **90**(2), 316–330.

Baron, D. and Ferejohn, J. A. (1989), 'Bargaining in Legislatures', *American Political Science Review* **83**(4), 1181–1206.

Bowen, T. R. and Zahran, Z. (2006), 'On Dynamic Compromise', *Georgetown University* . Working Paper.

Destler, I. M. (2005), *American Trade Politics*, 4 edn, Institute for International Economics.

Dixit, A., Grossman, G. M. and Gul, F. (2000), 'The Dynamics of Political Compromise', *Journal of Political Economy* **108**(3), 531–568.

Finger, J. M., Hall, H. and Nelson, D. R. (1982), 'The Political Economy of Administered Protection', *The American Economic Review* **72**(3), 452–466.

Grossman, G. M. and Helpman, E. (2004), 'A Protectionist Bias in Majoritarian Politics'. Working Paper.

Kalandrakis, T. (2003), 'Majority Rule Dynamics With Endogenous Status Quo'. Working Paper.

Kalandrakis, T. (2004), 'A Three-Player Dynamic Majoritarian Bargaining Game', *Journal of Economic Theory* **116**(2), 294–322.

[7]See Bowen and Zahran (2006) for a complete characterization of $a_k(\omega^t)$ for all k.