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the Rules of GATT/WTO**

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# Multilateral Trade Negotiations, Bilateral Opportunism and the Rules of GATT/WTO

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## Abstract

Trade negotiations occur through time and between the governments of many countries. An important issue is thus whether the value of concessions that a government wins in a current negotiation may be eroded in a future bilateral negotiation to which it is not party. We identify rules of negotiation that serve to protect the welfare of governments that are not participating in the bilateral negotiation. Our main finding is that the two central principles of GATT/WTO - non-discrimination (MFN) and reciprocity - preserve the welfare of non-participating governments and therefore offer a “first-line of defense” against bilateral opportunism. We argue that the GATT/WTO nullification-or-impairment rule then constitutes an important “second-line of defense.” Finally, we confirm that in the absence of rules, or under weaker rules (e.g., MFN alone), the potential for bilateral opportunism can be severe.

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## 1. Introduction

For over 50 years, GATT and now the WTO have successfully encouraged multi-lateral trade liberalization. This liberalization has been accomplished through a series of agreements negotiated among the member countries, and an important role of GATT/WTO has been to provide a continuous negotiating forum for this purpose. Each of these agreements amounts to a web of bilateral reciprocal exchanges of market access concessions between negotiating governments, secured by commitments to reduce tariffs and other trade barriers, and “multilateralized” by the most-favored-nation (MFN) rule, which requires that each member offer to every other member access to its markets on non-discriminatory terms (see Jackson, 1969, pp. 217-248, or Hoekman and Kostecki, 1995, pp. 56-83).

The liberalization that has been achieved through GATT/WTO negotiations is especially noteworthy in light of the fact that negotiations occur through time between the governments of various countries. This feature raises the possibility that the market access implied by existing tariff commitments may be altered by tariff commitments made at some point in the future. A particular concern is that the value of concessions that a government wins today may be eroded in a future bilateral negotiation to which it is not party. Taking the argument a step further, if governments recognize that current market access relations may be vulnerable to opportunistic bilateral agreements in the future, then they may exchange concessions with trepidation. A multilateral trade organization like the GATT/WTO is thus more likely to achieve its objectives, if it includes rules of negotiation that serve to protect the value of previous concessions won by governments that are not participating in current bilateral negotiations.

As a general matter, then, it is important to ask: How effective are the GATT/WTO principles that govern bilateral negotiations in protecting the welfare of non-participating governments? In this paper, we present a modeling framework within which to address this question, and we focus on three key GATT/WTO principles: non-discrimination, reciprocity and “nullification or impairment.”

The principle of non-discrimination is a first pillar of the GATT/WTO architecture. With certain exceptions (notably, preferential trading agreements, as allowed under GATT Article XXIV), this principle requires that tariff reductions achieved through a bilateral agreement are extended on an MFN basis to non-participants. Schwartz and Sykes (1997) consider the various costs and benefits of the MFN rule, and argue that the main benefit is that it protects the value of

concessions:

*“More important, the MFN obligation protects the value of concessions against future erosion through discrimination. If country A receives a concession from country B and is not entitled to MFN treatment from B, then the value of the concession can be undermined if country B later makes an even better concession to country C on the same goods (or close substitutes). Faced with this uncertainty, country A would offer less for the concession in the first place (as would country B for the reciprocal concession), and fewer valuable deals would be struck.”* (p. 62)

While the MFN rule can clearly offer protection of this kind, it remains to determine formally whether this rule fully eliminates the opportunism problem.

The second pillar of the GATT/WTO architecture is the principle of reciprocity. Under this principle, negotiations result in tariff adjustments that generate for each participant an equal change in the volume of its imports and exports.<sup>1</sup> This principle is often denounced as reflecting unsound mercantilist reasoning. But in fact it can promote efficient trade agreements, as it serves to fix the world price between negotiating partners, so that neither partner experiences a terms-of-trade loss when tariffs are reciprocally liberalized.

The third rule that warrants attention here is the nullification-or-impairment rule. GATT Dispute Panels have consistently recognized that the value of a tariff concession is the improved market access which it represents. Accordingly, when a government takes some action that nullifies or impairs a previous concession made to some trading partner, that partner has a potentially legitimate basis from which to file a complaint, even if no violation of GATT/WTO rules is alleged.<sup>2</sup>

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<sup>1</sup>The principle of reciprocity is represented in GATT/WTO practice in two ways. First, it is often associated with the broad manner in which government negotiators approach trade-policy negotiations. Second, it appears in GATT articles (e. g., GATT Article XXVIII) as a means of determining the “compensation” that may be sought when a trading partner modifies or withdraws a previous concession. We discuss the history and legal representation of reciprocity in detail elsewhere (Bagwell and Staiger, 2000).

<sup>2</sup>This view is exemplified by the following excerpt from a GATT panel report (concerning the US non-violation complaint regarding EEC subsidies for domestic oilseed producers):

“...the main value of a tariff concession is that it provides an assurance of better market access through improved price competition. Contracting parties negotiate tariff concessions primarily to obtain that advantage. They must therefore be assumed to base their tariff negotiations on the expectation that the price effect of the tariff concessions will not be systematically offset. If no right of redress were given to them in such a case, they would be reluctant to make tariff concessions and the General Agreement would no longer be useful as a legal framework for

As Petersmann (1997) details, these complaints are handled under GATT Article XXIII, and the three conditions established by dispute panels for a successful “non-violation” complaint of this kind are that: (1). a reciprocal concession was negotiated between two trading partners; (2). a subsequent action was taken by one government, which, though consistent with GATT articles, adversely affected the market access afforded to its trading partner; and (3). this action could not have been reasonably anticipated by this partner at the time of the negotiation of the original tariff concession. There are a variety of actions that have instigated complaints, including domestic subsidies, product re-classifications, changing regulatory regimes and bilateral trade negotiations with other partners. We focus on the latter possibility here.<sup>3</sup>

To assess the extent to which these rules prevent opportunistic bilateral agreements, we develop a general-equilibrium modeling framework in which a home country exports one good to two foreign countries in exchange for imports from them of a second good. We represent the objectives of each government as a general function of its local prices and terms of trade. This approach offers two important advantages. First, it is very general, including both the traditional representation in which governments maximize national income and the recent political-economy formulations in which governments are also sensitive to distributional issues. Second, this representation clarifies the channel through which one government’s tariff choices impose an externality on another government’s welfare, making transparent both the means through which negotiating governments may appropriate the welfare of a non-participating government and the manner in which various rules of negotiation may limit this endeavor.

We then develop our analysis of the featured GATT/WTO rules in three steps. First, we consider whether the principles of reciprocity and non-discrimination combine to ensure the *preservation* of the welfare of a non-participating government. This marks a useful initial step, since the potential for opportunistic bilateral agreements is surely eliminated, if participating governments are unable even to alter non-participant welfare.

In this regard, we begin with a theoretical perspective and establish that the welfare of the non-participating government is preserved if its country’s terms

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incorporating the results of trade negotiations.” (as quoted in Petersmann, 1997, p. 168)

<sup>3</sup>Examples of bilateral agreements that have led to non-violation nullification-or-impairment complaints are (i). the US complaint regarding tariff preferences negotiated by the EC on citrus products from certain Mediterranean countries, and (ii). the EC complaint regarding aspects of the bilateral agreement between the US and Japan concerning trade in semi-conductor products.

of trade (equivalently, export and import volumes) are unaltered. This finding extends the logic of the well-known Kemp-Wan (1976) theorem to settings with politically motivated governments that construct bilateral (but not necessarily free-trade) agreements.

We next show that neither reciprocity nor non-discrimination is sufficient, on its own, to preserve the welfare of the non-participating government. As our main finding, however, we establish that the welfare of the non-participating government is preserved, when a bilateral agreement must honor reciprocity *and* non-discrimination. The principles of reciprocity and non-discrimination therefore eliminate the potential for opportunistic bilateral agreements. The intuition is remarkably simple. Reciprocity ensures that the terms of trade are fixed between the participating governments, and under non-discrimination this implies in turn that the non-participant's terms of trade are also preserved.

Having shown that the rigid application of reciprocity and MFN ensures the preservation of non-participant welfare and is thus sufficient to preclude opportunistic bilateral agreements, we may still ask: Are these rules really necessary? Put differently, if there were weaker, or even no, rules that governed bilateral negotiations, so that non-participant welfare could be altered, would there exist a permitted bilateral agreement that resulted in lower welfare for the non-participating government *and* higher welfare for each participating government? The examination of this issue constitutes the second step of our analysis.

To begin, we suppose that bilateral negotiations are conducted in the absence of rules. We illustrate that the potential for bilateral opportunism is then pervasive: starting from any initial set of efficient tariffs, and holding fixed the tariff policy of foreign country  $j$ , the home country and foreign country  $i$  can always find a way to negotiate further changes in their tariffs on each other's imports which benefit them at the expense of country  $j$ . In this sense, when rules are absent, *every* efficient tariff vector is vulnerable to bilateral opportunism. The key point is that, by lowering the tariffs that they apply to one another, the governments of the home country and foreign country  $i$  cause a terms of trade loss for foreign country  $j$ . The governments of the home country and foreign country  $i$  then convert this loss into their own gain.

As a general matter, we show that this maneuver *cannot* be stopped by a reciprocity rule alone: provided that discrimination is allowed, there exists a wide range of efficient tariffs from which the home country and foreign country  $i$  can liberalize further in accordance with reciprocity and gain at the expense of country  $j$ . Hence, under the reciprocity rule, a significant set of efficient tariffs is

vulnerable to bilateral opportunism.

Next, we consider the potential for bilateral opportunism under the MFN rule. We find that the MFN rule alone *cannot* offer a full remedy to the bilateral opportunism problem: for a wide range of initial MFN-efficient tariffs, the home country and foreign country  $i$  can find a way to negotiate further changes in their tariffs on each other's exports which benefit them at the expense of country  $j$  - even when the home-country tariff cut is extended under the MFN rule to the non-participating foreign country  $j$ . Intuitively, the tariff reduction given by foreign country  $i$  raises the cost of home exports in foreign country  $j$ , and this negative effect may overwhelm the beneficial effect of a reduced home tariff on exports from foreign country  $j$ . Under the MFN rule, therefore, a significant set of MFN-efficient tariffs is vulnerable to bilateral opportunism. With the second step of our analysis, we thus confirm that, while reciprocity and non-discrimination can together solve the bilateral opportunism problem, neither alone will suffice.

Finally, while we model MFN and reciprocity as formal and rigid rules, their application in GATT/WTO practice is more qualified. This brings us to the third and final step of our analysis: we consider whether the nullification-or-impairment rule might provide a separate defense against bilateral opportunism, even when the reciprocity and MFN rules are not imposed. To this end, we propose a definition of market access and show that this is the case: starting from an efficient set of tariffs, any bilateral agreement that is attractive to the home country and foreign country  $i$  would violate the nullification-or-impairment rule. We therefore provide a formal basis from which to interpret the nullification-or-impairment rule as playing a potentially important role in solving the bilateral opportunism problem. But the nullification-or-impairment rule would by itself be a cumbersome solution to a (pervasive) problem. With this observation in mind, we propose that MFN and reciprocity be understood in GATT/WTO practice as providing a "first line of defense" against the problem of bilateral opportunism, thereby reducing the number of valid non-violation complaints and easing the judicial burden of the GATT/WTO dispute settlement procedures. The ability of governments to bring non-violation nullification-or-violation complaints then serves an important role as a "second line of defense" against this problem.<sup>4</sup>

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<sup>4</sup>The broad notion that explicit GATT/WTO rules serve as a primary guard against the erosion of concessions, and that non-violation complaints provide a useful but secondary backup procedure, is well-reflected in the writings of GATT/WTO legal scholars. For example, Petersmann (1997, p. 136) observes that "...the function of most GATT rules (such as Articles I-III and XI) is to establish conditions of competition and to protect trading opportunities..."

This paper builds on our previous work. In Bagwell and Staiger (1999a, 2001a), we represent each government's objective as a general function of its local prices and terms of trade, and we establish that the principles of non-discrimination and reciprocity can promote efficient trade agreements, by neutralizing the terms-of-trade implications of trade-policy changes.<sup>5</sup> In Bagwell and Staiger (2001b), we extend the framework to include labor and environmental standards, and we analyze the extent to which the nullification-or-impairment rule guards against a regulatory race-to-the-bottom. The innovation of the present paper is that we introduce and study the bilateral opportunism problem. We establish that the principles of non-discrimination and reciprocity and the nullification-or-impairment rule offer important protection against opportunistic bilateral agreements.

This paper is also related to an important literature in Industrial Organization that considers multi-party negotiations and the protection against opportunistic behavior that different legal rules offer.<sup>6</sup> We demonstrate here that a related concern arises in the context of trade-policy negotiations, and we identify and evaluate the protection offered by key GATT rules.

The paper proceeds as follows. Section 2 presents the basic model. Section 3 contains the welfare-preservation findings. Section 4 characterizes efficient tariffs in discriminatory environments, identifies in the no-rules case a severe bilateral opportunism problem, and shows that reciprocity alone does not provide a general solution to this problem. Section 5 considers an MFN environment and confirms that, without further rules, the problem of bilateral opportunism remains. Section 6 shows that the nullification-or-impairment rule can in principle provide a separate defense against the bilateral opportunism problem. Section 7 concludes.

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and then concludes his review of the 14 dispute settlement reports examining non-violation complaints as follows: "...These panel reports illustrated that the non-violation complaints can strengthen the function of GATT, as well as of the WTO, as a negotiating forum by offering additional safeguards against the impairment of...market access commitments through unforeseen subsequent policy measures that are not prohibited by GATT/WTO law." (p. 171).

<sup>5</sup>Given the central role played by the MFN rule in the GATT/WTO, there is surprisingly little formal analysis of this rule. For additional perspectives, see Bagwell and Staiger (1999b), Caplin and Krishna (1991), Choi (1995), Ludema (1991) and McCalman (1997). None of these papers consider the bilateral opportunism problem. Ethier (1998) independently raises some of the issues treated here. Horn and Mavroidis (2001) offer an excellent survey of research that addresses the economic aspects of the MFN rule.

<sup>6</sup>For example, McAfee and Schwartz (1994) and Segal (1999) consider the scope for bilateral opportunism, when a single seller contracts separately with different buyers. Non-discrimination clauses may mitigate against the bilateral opportunism problem.



## 2. The Model

In this section, we describe a two-good general-equilibrium model of trade between three countries.<sup>7</sup> We present as well a general set of preferences for governments that allows for both economic and political considerations.

### 2.1. The Economic Environment

We assume that there is one home country and two foreign countries who trade two goods,  $x$  and  $y$ , that are normal goods in consumption and produced under conditions of increasing opportunity costs. Production takes place under perfect competition, facing tariffs on imports by each country. To simplify the exposition of our findings, we suppose that each foreign country trades only with the home country, who imports  $x$  from each of its two foreign trading partners in exchange for exports of  $y$ . The home country is thus the only country that has the opportunity to set discriminatory tariffs across its trading partners.<sup>8</sup>

We now introduce price notation. The home local relative price is denoted as  $p \equiv p_x/p_y$ , where  $p_x$  ( $p_y$ ) is the local price of good  $x$  ( $y$ ) in the home country. Similarly, the local relative price in foreign country  $i$  is denoted as  $p^{*i} \equiv p_x^{*i}/p_y^{*i}$  for  $i = 1, 2$ . The ad valorem tariff that the home country places on imports of  $x$  from foreign country  $i$  is denoted as  $t^i$ , for  $i = 1, 2$ , and  $t^{*i}$  is the ad valorem tariff levied by foreign country  $i$  on imports of  $y$  from the home country.<sup>9</sup> Throughout, we assume that these tariffs are non-prohibitive. We define the “world” (i.e., untaxed) relative price for trade between the home country and foreign country  $i$  as  $p^{wi} \equiv p_x^{*i}/p_y$ . This is the ratio of exporter prices for trade between the home country and foreign country  $i$ . Letting  $\tau^i \equiv (1+t^i)$  and  $\tau^{*i} \equiv (1+t^{*i})$ , we then may represent local prices in terms of world prices and tariffs:  $p = \tau^i p^{wi} \equiv p(\tau^i, p^{wi})$

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<sup>7</sup>This model is developed in further detail in the Appendix.

<sup>8</sup>This trading pattern arises when the home (each foreign) country is a natural importer of  $x$  ( $y$ ), provided that discriminatory tariffs do not upset the natural pattern of trade. The latter is assured, e.g., if transportation costs between foreign countries are large as compared to the extent of discrimination in home tariffs, and indeed all of our propositions hold when there is a (iceberg) transportation cost associated with trade between the foreign countries. More generally, our assumptions serve only to ensure that it is possible for the home country to set discriminatory tariffs without prohibiting trade between it and its less-favored trading partner. We discuss a many-good extension in our working paper (Bagwell and Staiger, 1999c), in which trade between foreign countries might occur as well even absent discriminatory tariffs at home.

<sup>9</sup>The Lerner symmetry theorem ensures that trade taxes or subsidies can be equivalently depicted as applying to exports or to imports in this two-sector general-equilibrium setting.

and  $p^{*i} = p^{wi}/\tau^{*i} \equiv p^{*i}(\tau^{*i}, p^{wi})$ . As these expressions indicate, local prices are determined, once tariffs and world prices are given.

It is important to observe that world prices are linked across bilateral trading relationships:

$$p^{wi} = [\tau^j/\tau^i]p^{wj} \quad (2.1)$$

One possibility is that the tariff policy of the home country is non-discriminatory (i.e., the home country adopts MFN tariffs). In this case, we have that  $\tau^1 = \tau^2$  and hence there is a single world price:  $p^{wi} \equiv p^w$  for  $i = 1, 2$ . On the other hand, if the home country discriminates with its tariff policy, then  $\tau^1 \neq \tau^2$  and hence there are different world prices:  $p^{w1} \neq p^{w2}$ . Finally, we note that the terms of trade for foreign country  $i$  are given simply as  $p^{wi}$ .

We next introduce notation for import and export volumes in each country. For foreign country  $i$ , imports of  $y$  and exports of  $x$  are denoted as  $M^{*i}(p^{*i}, p^{wi})$  and  $E^{*i}(p^{*i}, p^{wi})$ , respectively. These functions represent differences between production and consumption in foreign country  $i$ , where production depends upon the local price while consumption is determined by the local price and also tariff revenue, where tariff revenue can itself be expressed as a function of the local price and the terms of trade.

The home country has multiple trading partners, with whom it may experience different terms of trade. Once again, domestic production depends upon the local price while domestic consumption is determined by the local price and tariff revenue. But the determination of tariff revenue is now more complex: if the home country's tariffs are discriminatory, then its tariff revenue depends upon the total volume of  $x$  that it imports *and* the composition of this volume across the foreign trading partners. As we show in the Appendix, we may again express tariff revenue in terms of the local price and the terms of trade, once the domestic country's multilateral terms of trade is appropriately defined as a trade-weighted average of the set of bilateral world prices:

$$T(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \equiv \sum_{i=1,2} s^{*i}(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \cdot p^{wi},$$

where

$$s^{*i}(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \equiv E^{*i}(p^{*i}, p^{wi}) / \sum_{j=1,2} E^{*j}(p^{*j}, p^{wj}).$$

With this definition, home-country imports of  $x$  and exports of  $y$  may be denoted as  $M(p, T)$  and  $E(p, T)$ , respectively. Henceforth, we refer to  $T$  simply as the

home country's terms of trade.<sup>10</sup> Using (2.1), if the home country adopts an MFN tariff policy, then  $T = p^{wi} \equiv p^w$ ; however, a discriminatory tariff policy implies that  $T \neq p^{wi}$  for all  $i$ .

Next, we consider the trade balance and market-clearing conditions. Home and foreign budget constraints imply that, for any prices, we have

$$T \cdot M(p, T) = E(p, T) \quad (2.2)$$

and

$$M^{*i}(p^{*i}, p^{wi}) = p^{wi} \cdot E^{*i}(p^{*i}, p^{wi}), i = 1, 2. \quad (2.3)$$

We now suppose that the vector of tariffs,  $\boldsymbol{\tau} \equiv (\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ , is given, and we consider the determination of the world prices. One restriction on world prices is given by the market-clearing requirement:

$$M(p, T) = \sum_{i=1,2} E^{*i}(p^{*i}, p^{wi}). \quad (2.4)$$

Combining the market-clearing requirement (2.4) with the linkage condition (2.1), we thus have two restrictions with which to determine the two equilibrium world prices as functions of the given tariffs. We represent the equilibrium world prices as  $\tilde{p}^{wi}(\boldsymbol{\tau})$  for  $i = 1, 2$ , and we assume that they are uniquely determined as functions of the four tariffs. Notice that market clearing in the  $y$  market is assured by (2.2) and (2.3). Summarizing, with their selections of tariffs, governments determine the equilibrium world prices; in turn, the tariffs and equilibrium world prices imply equilibrium values for all local prices, so that equilibrium import and export volumes are determined as well.

## 2.2. Prices and Tariffs

It is convenient now to present some basic assumptions that we maintain throughout the paper. We begin with the manner in which tariffs affect prices. We consider both the possibility that the home country is able to set discriminatory tariffs and the possibility that home tariffs must conform to the MFN rule.

Beginning with the discriminatory case, we impose the following assumptions: (i).  $\tilde{p}^{w1}$  is increasing in  $\tau^2, \tau^{*1}$  and  $\tau^{*2}$  and is decreasing in  $\tau^1$ , and (ii).  $\tilde{p}^{w2}$

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<sup>10</sup>Observe that  $T$  is in fact a measure of the reciprocal of domestic terms of trade: an improvement in the domestic country's terms of trade corresponds to a lower value for  $T$ .

is increasing in  $\tau^1, \tau^{*1}$  and  $\tau^{*2}$  and is decreasing in  $\tau^2$ . Thus, if foreign country  $i$  confronts a higher tariff on its exports, then it experiences a reduction in its terms of trade. On the other hand, if foreign country  $i$  raises its own tariff, or if the other countries raise tariffs on one another, then foreign country  $i$  experiences an improvement in its terms of trade. These restrictions direct attention to the “standard” case, ensuring that our model does not succumb to the Lerner paradox.

Next, we consider the case in which the home country selects among MFN tariffs:  $\tau \equiv \tau^1 = \tau^2$ . In this event, we may represent the equilibrium world price as  $\tilde{p}^w(\tau, \tau^{*1}, \tau^{*2})$ . Our assumption for this case is:  $\tilde{p}^w$  is increasing in  $\tau^{*1}$  and  $\tau^{*2}$  and is decreasing in  $\tau$ . As above, when foreign country  $i$  raises its own import tariff, or when foreign country  $j$  pursues a more protectionist policy, foreign country  $i$  experiences a terms of trade improvement. We assume further that an increase in the home (MFN) tariff results in an improvement in the home-country terms of trade.

### 2.3. Government Preferences

We next offer a general representation of government preferences. We equip government decision-makers with preferences that allow for a wide range of economic and political motivations. In particular, we represent the objectives of the home and foreign governments by the general functions  $W(p, T)$  and  $W^{*i}(p^{*i}, \tilde{p}^{wi})$  for  $i = 1, 2$ , where all prices and terms of trade are evaluated at their market-clearing levels. The basic assumption that we maintain is that, with local prices held fixed, each government strictly prefers an improvement in its terms of trade:  $\partial W(p, T)/\partial T < 0$  and  $\partial W^{*i}(p^{*i}, \tilde{p}^{wi})/\partial p^{wi} > 0$ .

To understand this assumption, it is useful to refer to Figure 1. There, we depict combinations of  $\tau^i$  and  $\tau^{*i}$  that preserve the relative local price in foreign country  $i$  and the world price between it and the home country. Given the relationships between prices and tariffs detailed above, the iso-world-price locus is positively sloped. For this illustration, we suppose further that an increase in  $\tau^{*i}$  results in a decrease in the local relative price in this country.<sup>11</sup> Now, let us suppose that we begin at point A. If the home country were to raise  $\tau^i$  at the same time that foreign country  $i$  were to lower  $\tau^{*i}$ , with the respective tariff changes undertaken in a fashion that preserved  $p^{*i}$ , then we would arrive at point B. Notice that the world price  $\tilde{p}^{wi}$  is lower at point B: our assumption that  $\partial W^{*i}(p^{*i}, \tilde{p}^{wi})/\partial p^{wi} > 0$  simply means that the implied income redistribution from

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<sup>11</sup>In other words, local relative prices do not succumb to the Metzler paradox.

foreign country  $i$  to the home country (associated with the movement from A to B) results in a loss of welfare for the government of foreign country  $i$ .

We emphasize that, as preferences over local prices are left unrestricted, this representation of government preferences is very general. It includes the standard possibility that governments maximize national income as well as the possibility that governments are motivated by distributional concerns. As we detail in our earlier work (Bagwell and Staiger, 1999a), the leading political-economy models of trade policy can all be captured within this formulation.<sup>12</sup>

### 3. Welfare Preservation

An important issue concerns the extent to which GATT/WTO rules prevent an opportunistic bilateral agreement. In this section, we take a first step in the investigation of this issue, by identifying rules on bilateral negotiations that *preserve* the welfare of the non-participating government. We also relate these rules to GATT/WTO practice.

Formally, we focus here on the following problem. Starting from an initial set of tariffs,  $\boldsymbol{\tau}_I \equiv (\tau_I^1, \tau_I^2, \tau_I^{*1}, \tau_I^{*2})$ , suppose that the governments of the home country and foreign country  $i$  enter into a bilateral negotiation that results in a new set of tariffs,  $\boldsymbol{\tau}_N \equiv (\tau_N^1, \tau_N^2, \tau_N^{*1}, \tau_N^{*2})$ , where  $\tau_I^{*j} = \tau_N^{*j}$  since the tariff of the non-participating country is outside of the bilateral negotiation. Let  $\tilde{p}_I^{wj}$  ( $\tilde{p}_N^{wj}$ ) denote the equilibrium value of  $p^{wj}$  under the initial (new) set of tariffs; likewise, let  $p_I^{*j} = \tilde{p}_I^{wj} / \tau_I^{*j}$  ( $p_N^{*j} = \tilde{p}_N^{wj} / \tau_N^{*j}$ ) denote the local price in foreign country  $j$  under the initial (new) set of tariffs. We seek rules on the manner that  $\boldsymbol{\tau}_N$  may be derived from  $\boldsymbol{\tau}_I$  and under which the welfare of the non-participating government is unaltered:  $W^{*j}(p_I^{*j}, \tilde{p}_I^{wj}) = W^{*j}(p_N^{*j}, \tilde{p}_N^{wj})$ .

#### 3.1. Terms of Trade

It might be expected that a welfare-preservation rule could be defined only with reference to the particular preferences held by the government of foreign country  $j$ . This is not the case, however, as the following proposition confirms:

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<sup>12</sup>As Baldwin (1987) notes, the political-economy models of trade policy proposed by Olson (1965), Caves (1976), Brock and Magee (1978), Findlay and Wellisz (1982), Feenstra and Bhagwati (1982) and Hillman (1982) all fit within this approach. Likewise, Mayer's (1984) median-voter model, the lobbying models of Grossman and Helpman (1994, 1995) and Dixit, Grossman and Helpman (1997), and Baldwin's (1985) political-constraint model can all be represented with government preferences of this form.

**Proposition 1 (Welfare Preservation: Terms of Trade):** *Any bilateral agreement between the governments of the home country and foreign country  $i$  that leaves unaltered foreign country  $j$ 's terms of trade also preserves the welfare of the government of foreign country  $j$ .*

To see the argument, observe that  $W^{*j}(p^{*j}, \tilde{p}^{wj})$  is preserved when  $p^{*j}$  and  $\tilde{p}^{wj}$  are unaltered. Proposition 1 posits that  $\tilde{p}_I^{wj} = \tilde{p}_N^{wj}$ , and with  $\tau^{*j}$  fixed it then follows as well that  $p_I^{*j} = p_N^{*j}$ .

The problem of non-participant welfare preservation thus may be recast in terms of the preservation of the non-participant's world price. We argue next that the problem equivalently may be recast in terms of the preservation of the non-participant's export and import volumes. Specifically, we observe that the bilateral negotiation preserves foreign country  $j$ 's terms of trade ( $\tilde{p}_I^{wj} = \tilde{p}_N^{wj}$ ) if and only if it preserves foreign country  $j$ 's export and import volumes:

$$E^{*j}(p_I^{*j}, \tilde{p}_I^{wj}) = E^{*j}(p_N^{*j}, \tilde{p}_N^{wj}) \text{ and } M^{*j}(p_I^{*j}, \tilde{p}_I^{wj}) = M^{*j}(p_N^{*j}, \tilde{p}_N^{wj}) \quad (3.1)$$

Given  $\tau_I^{*j} = \tau_N^{*j}$ , it is direct that  $\tilde{p}_I^{wj} = \tilde{p}_N^{wj}$  implies (3.1). Going the other way, if the bilateral negotiation satisfies (3.1), then the trade balance condition (2.3) for the non-participating country  $j$  ensures that  $\tilde{p}_I^{wj} = \tilde{p}_N^{wj}$ . We may thus restate Proposition 1 as:

**Proposition 2 (Welfare Preservation: Export and Import Volumes):** *Any bilateral agreement between the governments of the home country and foreign country  $i$  that leaves unaltered foreign country  $j$ 's export and import volumes equivalently leaves unaltered foreign country  $j$ 's terms of trade and thus also preserves the welfare of the government of foreign country  $j$ .*

Kemp and Wan (1976) make related observations, although they restrict attention to governments that maximize national income and negotiate bilaterally to free trade. As others have noted in this context, the practical merit of a rule that calls for world-price maintenance is not obvious.<sup>13</sup> Such a rule might require subtle adjustments in the tariff that the home country applies to exports from the non-participating country. At this point, Propositions 1 and 2 are best understood as offering theoretical insights that inform our search for welfare-preservation rules that have a firm grounding in GATT/WTO practice.

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<sup>13</sup>See, e.g., the discussion in McMillan (1993), Srinivasan (1998) and Winters (1997).

### 3.2. Reciprocity and MFN

Two of the central pillars of the GATT/WTO approach are the principles of reciprocity and non-discrimination. We consider now the extent to which these principles protect the welfare of a non-participating government.

We begin with the principle of reciprocity. Following our earlier work (Bagwell and Staiger, 1999a, 2001a), we say that a bilateral negotiation between the governments of the home country and foreign country  $i$  conforms to *the principle of reciprocity* whenever for each of these countries the change in the volume of its imports is of equal value to the change in the volume of its exports, where changes in trade volumes are valued at the existing world price. For foreign country  $i$ , the principle of reciprocity thus requires that:

$$M^{*i}(p_N^{*i}, \tilde{p}_N^{wi}) - M^{*i}(p_I^{*i}, \tilde{p}_I^{wi}) = \tilde{p}_I^{wi} \cdot [E^{*i}(p_N^{*i}, \tilde{p}_N^{wi}) - E^{*i}(p_I^{*i}, \tilde{p}_I^{wi})]. \quad (3.2)$$

We now record an important property of reciprocity:

**Lemma 1.** *Any bilateral agreement between the governments of the home country and foreign country  $i$  that satisfies the principle of reciprocity leaves unaltered the terms of trade between these countries.*

The proof is simple. Since foreign country  $i$ 's trade balance condition must hold at the initial tariffs, we may apply (2.3) to (3.2) and restate the reciprocity requirement as  $M^{*i}(p_N^{*i}, \tilde{p}_N^{wi}) = \tilde{p}_I^{wi} \cdot E^{*i}(p_N^{*i}, \tilde{p}_N^{wi})$ . But foreign country  $i$ 's trade balance requirement must hold also at the new tariffs, and so it follows that  $\tilde{p}_I^{wi} = \tilde{p}_N^{wi}$ .

Any bilateral negotiation that satisfies the principle of reciprocity thus preserves the world price between the negotiating governments. But the principle of reciprocity does not, on its own, ensure that the welfare of the non-participating government is preserved. Reciprocity fixes the world price  $\tilde{p}^{wi}$ , whereas the welfare of the government of foreign country  $j$  is preserved when the world price  $\tilde{p}^{wj}$  is fixed.

Similarly, the principle of non-discrimination does not, on its own, suffice to preserve the welfare of the non-participating government. As mentioned in Section 2, under the MFN requirement, the government of the home country sets a single tariff on both of its trading partners, and a single world price,  $\tilde{p}_k^w \equiv \tilde{p}_k^{w1} = \tilde{p}_k^{w2}$ , where  $k = I, N$ , is thus determined. But the governments of the home country and

foreign country  $i$  could potentially engage in a bilateral negotiation that changes this world price:  $\tilde{p}_N^w \neq \tilde{p}_I^w$ . In this case, their bilateral negotiation could alter the welfare of the government of foreign country  $j$ .

Finally, suppose that the bilateral negotiation between the governments of the home country and foreign country  $i$  must satisfy *both* the principles of reciprocity and non-discrimination. Then, reciprocity fixes the world price between the negotiating countries, which under the MFN requirement ensures as well that the non-participant's world price is fixed.

**Proposition 3 (Welfare Preservation: Reciprocity and MFN):** *Any bilateral agreement between the governments of the home country and foreign country  $i$  that satisfies the principles of reciprocity and non-discrimination leaves unaltered foreign country  $j$ 's terms of trade and therefore preserves the welfare of the government of foreign country  $j$ .*

In effect, reciprocity and MFN work in tandem to maintain the export and import volumes of the non-participating country. As noted above, an explicit volume-preservation rule could be cumbersome, as it is suggestive of subtle adjustments in the tariff that the home government applies to the non-participant. By contrast, the MFN restriction serves as a simple means by which to “multilateralize” bilateral negotiations, and, remarkably, reciprocity then ensures that the multilateral presence so achieved preserves non-participant welfare.

### 3.3. Remaining Issues

To this point, we have focused on rules for bilateral negotiation that *preserve* the welfare of a non-participating government. The tandem rules of reciprocity and non-discrimination have this welfare-preservation property, and they are therefore sufficient to preclude opportunistic bilateral agreements. An important remaining issue concerns the probable extent to which these rules are necessary.

Our investigation of this issue constitutes the second step in our analysis. We proceed by asking two questions. First, in the absence of any rules for bilateral negotiation, would there exist bilateral agreements that lower the welfare of the non-participating government *and* are attractive to the participating governments? In other words, how significant is the bilateral opportunism problem, anyway? Second, even if the problem is significant in the absence of rules, might it nevertheless be solved with “weak” rules (i.e., rules that do not go so far as to ensure the preservation of non-participant welfare)? For instance, as Schwartz and



Sykes (1997) suggest, it seems plausible that the principle of non-discrimination would constitute an effective solution to any such problem. But does it? In particular, if any bilateral negotiation were required only to honor the MFN rule, would there exist bilateral agreements that lower the welfare of the non-participating government *and* are attractive to the participating governments?

Conclusive answers to these questions are beyond the reach of any single model. As a general matter, the benefits to a bilateral agreement may be influenced by the position of the initial tariffs and by the participants' beliefs regarding the possible responses and/or agreements that a non-participating government might pursue in the future.<sup>14</sup> Nevertheless, we may gain some insight by characterizing the efficiency frontier, positioning the initial tariffs on this frontier, specifying the rules (if any) that govern bilateral negotiations, and then asking: Does there exist a permitted bilateral agreement for the governments of the home country and any foreign country  $i$  under which they each gain, when they take as fixed the tariff policy of foreign country  $j$ ?

A convenient feature of this approach is that, if such an agreement does exist, then it is assuredly opportunistic: starting at the efficiency frontier, the participating governments can gain only if the non-participating government is harmed. A limitation is that the non-participant's eventual response to the bilateral agreement is not modeled. On net, we believe that this approach represents a useful beginning towards an understanding of the potential significance of the bilateral opportunism problem when rules are absent or weak.<sup>15</sup>

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<sup>14</sup>A complete analysis would therefore specify the determination of the initial tariffs and the dynamic process through which coalitions endogenously form. The ideal modeling framework would be a repeated game, since trade agreements must be self enforcing, that allows for endogenous coalition formation over time. At present, however, there is no widely accepted theory of endogenous coalition formation among farsighted players. For different perspectives, see Bloch (1996), Chwe (1994), Ferreira (1999), Gomes (1999) and Ray and Vohra (1999). We note, too, that recent work in contracting theory (e.g., McAfee and Schwartz (1994) and Segal (1999)) explores the scope for bilateral opportunism, for settings in which binding contracts can be written and any bargaining sequence across players is exogenously given.

<sup>15</sup>A specific game that can provide formal justification for our focus is the following. Let us begin from an efficient vector of tariffs, which forms the status quo, and specify the rules (if any) that govern bilateral negotiations. Then in stage 1, the home government makes each foreign government  $i$  an offer  $(\tau^i, \tau^{*i})$  which is privately observed by foreign government  $i$ . In stage 2, each foreign government simultaneously decides whether to accept or reject, holding "passive beliefs" about the offer faced by the other foreign government (McAfee and Schwartz, 1994). It can be shown that the outcome of this game under the rules of negotiation associated with each of the Propositions 5, 6, 8 and 9 that follow will share the efficiency properties suggested by each proposition. This interpretation builds from Segal's (1999) analysis of contracting with

## 4. Discriminatory Environments

We start with a permissive setting, in which discriminatory tariffs are allowed.

### 4.1. Government Preferences in Reduced Form

To begin, we represent government welfare in reduced form as a direct function of tariffs. Let  $\widehat{W}(\boldsymbol{\tau}) \equiv W(p, T)$  and  $\widehat{W}^{*i}(\boldsymbol{\tau}) \equiv W^{*i}(p^{*i}, \widehat{p}^{wi})$ , where all prices and terms of trade are evaluated at their market-clearing levels.

We now strengthen our basic assumptions slightly, so as to focus on tariffs for which externalities can be unambiguously signed:

**Assumption 1 (Externalities):** *We restrict attention to tariffs for which, for  $i, j=1, 2$  and  $i \neq j$  :*

- (i).  $\partial \widehat{W} / \partial \tau^i > 0$  and  $\partial \widehat{W}^{*i} / \partial \tau^{*i} > 0$ ;
- (ii).  $\partial \widehat{W} / \partial \tau^{*i} < 0$  and  $\partial \widehat{W}^{*i} / \partial \tau^i < 0$ ; and
- (iii).  $\partial \widehat{W}^{*i} / \partial \tau^{*j} > 0$  and  $\partial \widehat{W}^{*i} / \partial \tau^j > 0$ .

Thus, we will consider initial tariffs that rest on the efficiency frontier at a point where (i) each government would prefer to unilaterally raise its tariff; (ii) each government experiences a welfare reduction when its export good is confronted with a higher tariff from a trading partner; and (iii) foreign government  $i$  is pleased when either the home government raises its tariff on the exports of foreign country  $j$  or foreign government  $j$  raises its tariff on the exports of the home country. These relationships follow directly from the model of Section 2, so long as government welfare at the initial tariffs is sufficiently sensitive to the terms-of-trade change that an adjustment in tariffs would imply.

We further note that Assumption 1 directs attention to the set of efficient trade agreements that are suggested by the nature of GATT tariff bindings. The essential legal commitment associated with GATT bindings is that governments agree not to raise their tariffs *above* bound levels. It would be difficult to reconcile the value that governments evidently place on such commitments with points on the efficiency frontier that did not satisfy assumptions (i) and (ii). And using the model of Section 2, it can be shown that assumption (iii) is in fact implied by (ii).<sup>16</sup> In addition, these assumptions yield a negotiation environment in which

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externalities.

<sup>16</sup>This can be seen by noting that the impact of a change in  $\tau^{*j}$  or  $\tau^j$  on the welfare of foreign country  $i$  travels through  $\widehat{p}^{wi}$ , as does the impact on the welfare of foreign country  $i$  of a change

each government views a tariff reduction on its part as a “concession” that is potentially appealing if a trading partner “reciprocates” with a tariff reduction of its own, in line with the behavior often attributed to government trade-policy negotiators (see, e.g., Krugman (1991, 1997)).<sup>17</sup>

#### 4.2. Characterization of Efficient Tariffs

At an efficient set of tariffs, no one government can gain from an adjustment in the tariff vector, without simultaneously reducing the welfare of at least one other government. An efficient vector of tariffs,  $\tau_e \equiv (\tau_e^1, \tau_e^2, \tau_e^{*1}, \tau_e^{*2})$ , must therefore solve the following program:

**Program W:** Choose  $\tau$  to maximize  $\widehat{W}(\tau)$

$$s.t. \widehat{W}^{*i}(\tau) \geq \widehat{W}^{*i}(\tau_e), \text{ for } i = 1, 2.$$

We omit a formal analysis of this program, as the solution may be easily characterized with the assistance of some simple figures. We begin with a characterization of the efficient tariffs:

**Proposition 4 (Efficient Tariffs):** *If  $\tau_e$  is an efficient vector of tariffs, then for  $i, j = 1, 2$  and  $i \neq j$ , we must have that*

$$-\frac{\partial \widehat{W} / \partial \tau^{*i}}{\partial \widehat{W} / \partial \tau^i} > -\frac{\partial \widehat{W}^{*i} / \partial \tau^{*i}}{\partial \widehat{W}^{*i} / \partial \tau^i} > 0 > -\frac{\partial \widehat{W}^{*j} / \partial \tau^{*i}}{\partial \widehat{W}^{*j} / \partial \tau^i}.$$

To interpret the characterization, we refer to Figure 2. With  $\tau^i$  on the vertical axis and  $\tau^{*i}$  on the horizontal axis, we observe first that the iso-welfare curve for  $\tau^i$ . Our assumptions relating tariffs to equilibrium world prices are then sufficient to establish that (ii) implies (iii).

<sup>17</sup>While there is broad agreement that negotiators appear to behave in this way, there is less agreement over whether this behavior makes economic sense. See, e.g., Krugman (1991, 1997) who argues that it does not. Our point here is simply that, within the model developed in Section 2, there is a set of efficient trade agreements consistent with this behavior, and these are the only trade agreements that are consistent as well with the basic structure of GATT tariff bindings. This interpretation is developed more fully in Bagwell and Staiger (1999a, 2001a).

the home-country government is positively sloped over the relevant region. This simply reflects that the home government trades off a higher own tariff (which is good) against a higher tariff from foreign country  $i$  (which is bad) when the home-country government's welfare is held fixed. The iso-welfare curve of the government of foreign country  $i$  is positively sloped for the same reason. Second, we observe that the iso-welfare curve for the government of foreign country  $j$  is negatively sloped, since it benefits from an increase in either tariff. Third, we observe that the home-government iso-welfare curve is steeper than that of foreign government  $i$  at the efficient point, and so an efficient tariff vector leaves a lens in which the governments of the home country and foreign country  $i$  could experience welfare gains. We note that the lens lies below the iso-welfare curve of the government of foreign country  $j$ .

To understand the location of the lens, it is instructive to entertain the opposite possibility in which the lens lies above the iso-welfare curve of the government of foreign country  $j$ . If this were the case, then it would be possible to raise the two tariffs in a way that offered gains to all three governments. The governments of the home country and foreign country  $i$  could obviously gain from such a maneuver. Moreover, when these governments impose higher tariffs on each other's exports, foreign country  $j$  experiences a terms-of-trade gain, and under Assumption 1 this results in a welfare improvement for the government of this country. A more subtle possibility is that there is no lens: the iso-welfare curves of the governments of the home country and foreign country  $i$  are tangent at the point at which they intersect the iso-welfare curve of the government of foreign country  $j$ . This arrangement fails to solve Program  $W$  as well, but a more involved alteration of tariffs is now required to produce Pareto improvements. For example, raising  $\tau^i$  and  $\tau^{*i}$  along the iso-welfare curve of foreign country  $i$  will cause the home-country government to experience a second-order welfare loss, while generating a first-order welfare benefit for the government of foreign country  $j$ . Adjustments to  $\tau^j$  and  $\tau^{*j}$  can then be found that ensure gains for all three governments.<sup>18</sup> Therefore, if the

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<sup>18</sup>In the tangency case, the welfares of the governments of the home country and foreign country  $j$  can be increased while maintaining the welfare of the government of foreign country  $i$  if we adjust tariffs according to the following procedure: (i). increase  $\tau^i$  and  $\tau^{*i}$  so as to preserve  $\widehat{W}^{*i}$ , thereby creating a second-order loss (first-order gain) for  $\widehat{W}$  ( $\widehat{W}^{*j}$ ); (ii). raise  $\tau^j$  and lower  $\tau^{*j}$  so as to preserve  $\widehat{W}^{*i}$ , thereby creating a first-order gain (first-order loss) for  $\widehat{W}$  ( $\widehat{W}^{*j}$ ); and (iii). ensure that the first adjustment is large as compared to the second, thereby creating a net gain for  $\widehat{W}^{*j}$ . Specifically, with subscripts denoting partial derivatives, it suffices to pick tariff changes that satisfy:  $d\tau^{*i} = \varepsilon^i > 0$ ,  $d\tau^i = -[\widehat{W}_{\tau^{*i}}^{*i}/\widehat{W}_{\tau^i}^{*i}]\varepsilon^i > 0$ ,  $d\tau^{*j} = -\varepsilon^j < 0$

vector of tariffs is efficient, then the lens indeed must lie below the iso-welfare curve of the government of foreign country  $j$ , as depicted in Figure 2.

### 4.3. Bilateral Opportunism

Starting with an efficient tariff vector, we now consider the possibility of a bilateral agreement in which the governments of the home country and some foreign country  $i$  adjust the tariffs under their control,  $(\tau^i, \tau^j)$  and  $\tau^{*i}$ . For a given set of rules for bilateral negotiations, we say that an initial efficient tariff vector is *vulnerable to bilateral opportunism* if there exists a foreign country  $i$  and a permitted bilateral agreement between this country and the home country such that the governments of the home country and foreign country  $i$  both gain. We establish next that the bilateral opportunism problem is potentially severe: without strong rules, *all* efficient tariff vectors are vulnerable to bilateral opportunism.

This conclusion follows immediately when there are no rules that govern bilateral negotiations. In that case, the home government could raise  $\tau^j$  as part of its bilateral negotiation with the government of foreign country  $i$ ; furthermore, under Assumption 1, the home government and the government of foreign country  $i$  would both gain when the home government raises  $\tau^j$ . Thus, in the absence of any rules governing bilateral negotiations, all efficient tariff vectors are vulnerable to bilateral opportunism.

As noted above, however, a tariff concession made in a previous GATT agreement is “bound,” and the tariff therefore cannot be raised above its bound level in a subsequent negotiation, unless the trading partner on whose exports the bound tariff applies is represented. This binding restriction eliminates the potential of the home government to raise  $\tau^j$  as part of its bilateral agreement with the government of foreign country  $i$ . Does the binding restriction suffice to eliminate the bilateral opportunism problem?

At this point we may refer to our characterization of the efficiency frontier in Figure 2. We then see that the binding restriction fails to eliminate the bilateral opportunism problem. The governments of the home country and foreign country  $i$  can still gain by *lowering* the tariffs that they apply to one another (i.e., by moving into the lens):

**Proposition 5 (Bindings and Efficient Tariffs):** *Whether or not a bind-*

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and  $d\tau^j = [\widehat{W}_{\tau^{*j}}^{*i} / \widehat{W}_{\tau^j}^{*i}] \varepsilon^j > 0$ , where  $\varepsilon^i / \varepsilon^j > [\widehat{W}_{\tau^j}^{*j} / \widehat{W}_{\tau^i}^{*j}] [\widehat{W}_{\tau^{*j}}^{*j} / \widehat{W}_{\tau^j}^{*j} - \widehat{W}_{\tau^{*j}}^{*i} / \widehat{W}_{\tau^j}^{*i}] / [\widehat{W}_{\tau^{*i}}^{*j} / \widehat{W}_{\tau^i}^{*j} - \widehat{W}_{\tau^{*i}}^{*i} / \widehat{W}_{\tau^i}^{*i}] > 0$ .

*ings restriction is imposed, every efficient tariff vector is vulnerable to bilateral opportunism.*

As Figure 2 indicates, the key point is that, by lowering the tariffs that they apply to one another, the governments of the home country and foreign country  $i$  cause a terms-of-trade loss for foreign country  $j$ . In effect, the governments of the home country and foreign country  $i$  convert this loss into their own gain, thereby rendering vulnerable any efficient tariffs, even when the tariff that the home government applies to exports from foreign country  $j$  is bound.

Would the principle of reciprocity block an opportunistic bilateral agreement of this kind? Recall from Lemma 1 that a bilateral agreement between the governments of the home country and foreign country  $i$  that satisfies the principle of reciprocity must leave unaltered the terms of trade between these two countries. It is thus evident from Figure 2 that the principle of reciprocity will fail to block an opportunistic agreement between the home country and foreign country  $i$  if and only if the (positively sloped) iso- $\tilde{p}^{wi}$  locus passing through the efficient point in Figure 2 enters the lens. As can be understood from Figure 2, when this is the case, both the home-country government and the government of foreign country  $i$  seek lower tariffs and greater trade volume at the given terms of trade between these two countries. Hence we have:

**Proposition 6 (Reciprocity and Efficient Tariffs):** *Under bindings and the principle of reciprocity, an efficient tariff vector is vulnerable to bilateral opportunism if and only if there exists  $i \in \{1, 2\}$  such that the home-country government and the government of foreign country  $i$  seek lower tariffs and greater trade volume at the given terms of trade between them.*

As Proposition 6 confirms, in the absence of an MFN rule, the principle of reciprocity can solve the bilateral opportunism problem at points on the efficiency frontier at which, for each bilateral relationship, one of the two governments would seek a (weakly) higher tariff and less trade volume at the given terms of trade between them. But at any point on the efficiency frontier where this condition is not met, there will exist a foreign government  $i$  with whom the home government can engage in opportunistic reciprocal liberalization. Through their liberalization, the government of foreign country  $i$  receives a beneficial increase in trade volume at a fixed terms of trade between it and the home country. The home government also benefits, and its benefit is made possible by the implied reduction in  $\tilde{p}^{wj}$  (i.e., the terms-of-trade improvement against foreign country  $j$ ).

Hence, when the principle of reciprocity is applied in a discriminatory environment, the bilateral opportunism problem remains for a significant set of points on the efficiency frontier. But might instead MFN alone suffice? We take this up in the next section.

## 5. Non-discriminatory Environment

We consider now the situation in which both the initial tariffs and the tariffs associated with any future bilateral negotiation must conform to the MFN rule. This rule alters both the efficiency frontier and the incentives for bilateral opportunism.

### 5.1. Government Preferences in Reduced Form

When the home government is restricted by the MFN requirement, the total number of tariffs is reduced to three:  $\tau \equiv \tau^1 = \tau^2$ ,  $\tau^{*1}$  and  $\tau^{*2}$ . For this situation, we may define the reduced-form preferences for governments as follows:  $\overline{W}(\tau, \tau^{*1}, \tau^{*2}) \equiv \widehat{W}(\tau, \tau, \tau^{*1}, \tau^{*2}) \equiv W(p, T)$  and  $\overline{W}^{*i}(\tau, \tau^{*1}, \tau^{*2}) \equiv \widehat{W}^{*i}(\tau, \tau, \tau^{*1}, \tau^{*2}) \equiv W^{*i}(p^{*i}, \tilde{p}^{wi})$ , where all prices and terms of trade are evaluated at their market-clearing levels. That is,  $\overline{W}$  and  $\overline{W}^{*i}$  are simply  $\widehat{W}$  and  $\widehat{W}^{*i}$ , respectively, with the MFN constraint  $\tau \equiv \tau^1 = \tau^2$  imposed. Recall from Section 2 that, under the MFN restriction, there will now be a single world price, and so we also have that  $T = \tilde{p}^{wi} \equiv \tilde{p}^w$ .

In analogy with Assumption 1 for discriminatory tariff environments, we now strengthen our basic assumptions, so as to focus on MFN tariffs for which externalities can be unambiguously signed:

**Assumption 1' (Externalities: MFN):** *We restrict attention to tariffs for which, for  $i, j=1,2$  and  $i \neq j$  :*

- (i).  $\partial \overline{W} / \partial \tau > 0$  and  $\partial \overline{W}^{*i} / \partial \tau^{*i} > 0$ ;
- (ii).  $\partial \overline{W} / \partial \tau^{*i} < 0$  and  $\partial \overline{W}^{*i} / \partial \tau < 0$ ; and
- (iii).  $\partial \overline{W}^{*i} / \partial \tau^{*j} > 0$ .

Thus, we consider negotiated MFN tariffs at which each government would prefer to unilaterally raise its tariff, each government experiences a welfare reduction when its export good is confronted with a higher tariff from a trading partner, and foreign government  $i$  is pleased when foreign government  $j$  raises its tariff on the exports of the home country. Again, this assumption directs attention

to (MFN-efficient) tariffs at which the welfare consequences of tariff changes are consistent with their terms-of-trade effects and with the nature of GATT bindings.

## 5.2. Characterization of MFN-Efficient Tariffs

We now characterize the set of tariffs that are efficient in the MFN class. The efficient tariffs characterized in the previous section for which  $\tau^1 = \tau^2$  are of course also efficient in the MFN class, but a tariff vector that is efficient in the MFN class need not be efficient in the full class of (discriminatory) tariff vectors. We continue to denote the vector of tariffs by  $\boldsymbol{\tau} \equiv (\tau, \tau^{*1}, \tau^{*2})$ , noting that in this MFN environment  $\boldsymbol{\tau}$  now has three elements. Formally, an MFN-efficient vector of tariffs,  $\boldsymbol{\tau}_m \equiv (\tau_m, \tau_m^{*1}, \tau_m^{*2})$ , must solve the following program:

**Program MFN – W:** Choose  $\boldsymbol{\tau}$  to maximize  $\overline{W}(\boldsymbol{\tau})$

$$s.t. \overline{W}^{*i}(\boldsymbol{\tau}) \geq \overline{W}^{*i}(\boldsymbol{\tau}_m), \text{ for } i = 1, 2.$$

As compared to the characterization of efficient tariffs when discrimination is allowed, the lack of two independent home-country tariffs under the restriction of MFN complicates somewhat the characterization of the set of MFN-efficient tariffs. Consequently, while we continue to rely heavily on a series of figures to illustrate the main points, we provide a formal analysis of this program in the Appendix. We establish there that:

**Proposition 7 (MFN-Efficient Tariffs):** *If  $\boldsymbol{\tau}_m$  is an MFN-efficient vector of tariffs, then for  $i, j = 1, 2$  and  $i \neq j$ , either:*

$$(i). \quad -\frac{\partial \overline{W}^{*j} / \partial \tau^{*i}}{\partial \overline{W}^{*j} / \partial \tau} > -\frac{\partial \overline{W} / \partial \tau^{*i}}{\partial \overline{W} / \partial \tau} > -\frac{\partial \overline{W}^{*i} / \partial \tau^{*i}}{\partial \overline{W}^{*i} / \partial \tau};$$

$$(ii). \quad -\frac{\partial \overline{W}^{*j} / \partial \tau^{*i}}{\partial \overline{W}^{*j} / \partial \tau} < -\frac{\partial \overline{W} / \partial \tau^{*i}}{\partial \overline{W} / \partial \tau} < -\frac{\partial \overline{W}^{*i} / \partial \tau^{*i}}{\partial \overline{W}^{*i} / \partial \tau}; \text{ or}$$

$$(iii). \quad -\frac{\partial \overline{W}^{*j} / \partial \tau^{*i}}{\partial \overline{W}^{*j} / \partial \tau} = -\frac{\partial \overline{W} / \partial \tau^{*i}}{\partial \overline{W} / \partial \tau} > -\frac{\partial \overline{W}^{*i} / \partial \tau^{*i}}{\partial \overline{W}^{*i} / \partial \tau}.$$



With  $\tau$  on the vertical axis and  $\tau^{*i}$  on the horizontal axis, Figures 3A, 3B and 3C depict the implications of conditions (i), (ii) and (iii) of Proposition 7, respectively. Each figure reflects, at the efficient point, the ranking of the iso-welfare-curve slopes of the three governments which is implied by the associated condition (all slopes are positive by Assumption 1'). The three cases are organized on the basis of whether the iso-welfare curve of the government of foreign country  $j \neq i$  is steeper than (case (i)), flatter than (case (ii)), or tangent to (case (iii)) the iso-welfare curve of the home government. The essential content of Proposition 7 may be seen with the aid of these figures, once it is observed that, in  $(\tau, \tau^{*i})$  space, the iso-welfare curve of the government of foreign country  $j \neq i$  is also the iso- $\tilde{p}^w$  locus, and that any movement to the right of this locus raises  $\tilde{p}^w$  or equivalently (by Assumption 1') benefits the government of foreign country  $j$ .

As a consequence, in case (i) the government of the home country seeks a higher tariff and less trade volume, given the world price (i.e., moving along the iso-welfare curve of foreign government  $j$ ), with its preferred outcome for the given world price occurring at the point of tangency H in Figure 3A. As we demonstrate in the Appendix, efficiency then requires that each foreign country would gain from lowering its tariff and achieving more trade volume, if the world price were fixed. Similarly, in case (ii) the government of the home country seeks a lower tariff and more trade volume, given the world price (i.e., moving along the iso-welfare curve of foreign government  $j$ ), with its preferred outcome for the given world price occurring at the point of tangency L in Figure 3B, and efficiency then requires that each foreign country seek a higher tariff and less trade volume at the given world price. Finally, in case (iii) the government of the home country achieves its preferred trade volume given the world price, and efficiency requires that at least one foreign government also achieve its preferred trade volume.

The downward lens in Figure 3A can be understood intuitively as follows. If the iso-welfare curve of the government of foreign country  $j \neq i$  is steeper than the iso-welfare curve of the home government (case (i)), then an upward lens between the home government and the government of foreign country  $i$  would have to contain, or lie to the right of, the iso-welfare curve of the government of foreign country  $j$ . But this would not be compatible with efficiency, because it would then be feasible to move into the lens and benefit all three governments. The absence of a lens (i.e., a tangency) between the home government and the

government of foreign country  $i$  is also incompatible with efficiency in case (i).<sup>19</sup>

The upward lens described in Figure 3B can be similarly understood. If the iso-welfare curve of the government of foreign country  $j \neq i$  is flatter than the iso-welfare curve of the home government (case (ii)), then a downward lens between the home government and the government of foreign country  $i$  would have to contain, or lie to the right of, the iso-welfare curve of the government of foreign country  $j$ . But again, this would not be compatible with efficiency, because it would then be feasible to move into the lens and benefit all three governments. The absence of a lens between the home government and the government of foreign country  $i$  is also incompatible with efficiency in case (ii).<sup>20</sup>

Finally, if the iso-welfare curve of the government of foreign country  $j \neq i$  is tangent to the iso-welfare curve of the home government (case (iii)), then the home government achieves its preferred trade volume at the given world price, and the presence of a lens between the home government and the government of foreign country  $i$  no longer signals the possibility of Pareto-improving tariff changes. As a consequence, each of the possibilities illustrated in Figure C (a downward lens, an upward lens, or no lens at all) can arise at points on the efficiency frontier. To see this, consider why the downward-lens case (illustrated in the top panel of Figure 3C) cannot be improved upon. In this case, the government of foreign country  $i$  seeks a lower tariff and greater trade volume at the given world price. A natural candidate for generating a Pareto improvement would be to first reduce  $\tau$  and  $\tau^{*i}$  slightly along the iso-welfare curve of the government of foreign country  $j$ , creating a first-order gain for the government of foreign country  $i$  and a second-order loss for the home government. The problem is, there are not sufficient instruments to then undo the home government's second-order loss, because the government of foreign country  $j$  cannot receive a lower world price without suffering a welfare decline, while the home government must receive a lower world price if its second-

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<sup>19</sup>To see this, hypothesize a tangency and consider the following two-step procedure. First, increase  $\tau$  and  $\tau^{*i}$  slightly along the iso-welfare curve of the government of foreign country  $i$ , creating a first-order gain for the government of foreign country  $j$  (via the rise in  $\tilde{p}^w$ ) and a second-order loss for the home government. Second, raise  $\tau$  and  $\tau^{*j}$  slightly along the iso-welfare curve of the government of foreign country  $i$  (i.e., along the new iso- $\tilde{p}^w$  locus), so as to eliminate the second-order welfare loss while preserving a first-order welfare gain for the government of foreign country  $j$  (recall that this is the direction preferred by the home government in case (i)). This two-step procedure would yield a Pareto improvement over the initial tariffs, and hence the absence of a lens between the home government and the government of foreign country  $i$  is also incompatible with efficiency in case (i).

<sup>20</sup>This can be seen by considering the two-step procedure described in note 19, with the direction of tariff movements reversed.

order loss is to be offset (while maintaining a first-order gain for the government of foreign country  $j$ ). Hence, no Pareto improvement is possible.

Observe that the bottom panel of Figure 3C depicts the case in which all governments are content with the trade volumes achieved at the given world prices. There is thus no lens in this case. The tariffs that support such an arrangement are of special interest, as they correspond to the tariffs that governments would choose were they to “ignore” any terms-of-trade effects of their tariff choices. Further, in the special case in which governments maximize national income, these tariffs correspond to multilateral free trade. In Bagwell and Staiger (1999a, 2001a), we interpret these tariffs in greater detail, and we refer to the MFN-tariff vector at which each government achieves its preferred trade volume given the world price as the *MFN politically optimal tariffs*. We follow that convention here as well.

### 5.3. Bilateral Opportunism

We now consider the circumstances under which an initial vector of MFN-efficient tariffs is vulnerable to bilateral opportunism, when the bilateral agreement must honor the MFN rule.

Consider first Figure 3A. In this case, the MFN-efficient tariff vector is vulnerable, as the home government and the government of foreign country  $i$  can negotiate a further reduction in  $\tau$  and  $\tau^{*i}$  which yields a Pareto gain for them (i.e., moves them into the lens in Figure 3A) at the expense of the government of foreign country  $j$ , who suffers a terms-of-trade decline. Hence, for MFN-efficient tariff vectors at which the home government seeks a higher tariff and reduced trade volume at the given world price, there is a bilateral opportunism problem. Notice, too, that this problem remains when the bilateral negotiations must honor the MFN rule as well as a bindings requirement.

This case is of some special interest. The government of foreign country  $j$  is harmed, even though it does not alter its own tariff and receives a non-discriminatory tariff *reduction* from the home country. And the governments of foreign country  $i$  and the home country are able to convert this loss into their own gain. Intuitively, foreign country  $j$  is harmed by a deterioration in its terms of trade: the tariff reduction given by foreign country  $i$  raises the cost of home exports in foreign country  $j$ , and this negative effect can be engineered to overwhelm the beneficial effect of a reduced home tariff on exports from foreign country  $j$ . The government of foreign country  $j$  thus experiences a welfare loss, despite the fact that its exports from foreign country  $j$  confront a lower home-country tariff.

To understand how the home government and the government of foreign country  $i$  can gain from this maneuver, recall that in this case the governments of the foreign countries each desire greater trade, given the world price, while the government of the home country does not. The home government, however, will accept a greater bilateral trade volume if this comes with an improved terms of trade. In a bilateral negotiation, this can be accomplished if the government of foreign country  $i$  reduces its tariff “more” than does the government of the home country (corresponding to a move into the lens in Figure 3A).

Consider next Figure 3B. Here the government of the home country seeks a reduced tariff and more trade volume at the given world price, while the government of each foreign country seeks less trade volume. In this case, the government of the home country will accept less bilateral trade volume as part of a bilateral trade agreement, if the volume reduction comes with an improved terms of trade. This will be the case, if the home country’s tariff increases “more” than does that of foreign country  $i$ . As a consequence of this bilateral maneuver, foreign country  $j$  experiences a terms of trade loss and a consequent welfare decline. In this way, the upward lens represents a gain that the governments of the home country and foreign country  $i$  may enjoy at the expense of the government of foreign country  $j$ . In the absence of bindings, therefore, this tariff vector is vulnerable to bilateral opportunism. On the other hand, in the presence of a bindings restriction,  $\tau$  cannot be increased, and hence the tariff vector is not vulnerable. Therefore, for MFN-efficient tariff vectors at which the home government seeks more trade volume at the given world price, there is a bilateral opportunism problem if and only if bindings are absent.

Finally, consider Figure 3C. In this case, the home government achieves its preferred trade volume at the given world price, and efficiency then requires as well that at least one of the foreign governments, say  $j$ , must achieve its preferred trade volume at the given world price as well. The top panel of the figure depicts the case in which foreign government  $i$  seeks greater trade volume at the given world price. The governments of the home country and foreign country  $i$  then face circumstances analogous to those of the home country and foreign country  $i$  in Figure 3A, and thus there is a bilateral opportunism problem with or without bindings. The middle panel of Figure 3C depicts the case in which foreign government  $i$  seeks reduced trade volume at the given world price, and here the governments of the home country and foreign country  $i$  face circumstances analogous to those of the home country and foreign country  $i$  in Figure 3B. Consequently, there is then a bilateral opportunism problem if and only if bindings

are absent. Finally, the bottom panel of Figure 3C depicts the case in which foreign government  $i$  also achieves its preferred trade volume at the given world price. This is the case of MFN politically optimal tariffs. As the bottom panel of Figure 3C makes clear, the MFN politically optimal tariff vector exhibits no lens, and hence it is not vulnerable to bilateral opportunism whether or not bindings are imposed. Hence, for MFN politically optimal tariffs, there is no bilateral opportunism problem, regardless of the presence of bindings.

We may now state:

**Proposition 8 (MFN and Efficient Tariffs):**

(A). *Under the MFN Rule, an MFN-efficient tariff vector is not vulnerable to bilateral opportunism if and only if it is politically optimal.*

(B). *Under bindings and the MFN Rule, an MFN-efficient tariff vector is not vulnerable to bilateral opportunism if and only if: (i) the home government seeks a lower tariff and greater trade volume, given the world price; or (ii) the home government achieves its preferred trade volume given the world price, and neither foreign country seeks a lower tariff and greater trade volume given the world price.*

As Proposition 8 indicates, the MFN rule on its own offers only a partial solution to the bilateral opportunism problem. In the absence of bindings, the MFN rule guarantees that exactly one MFN-efficient tariff vector is protected from bilateral opportunism; and even when the MFN rule is joined with a bindings restriction, a subset of MFN-efficient tariff vectors (namely, those in which the government of the home country seeks less trade volume at fixed world prices) remain vulnerable. As a general matter, then, if the welfare of non-participating governments is to be protected, the rules of bilateral negotiation must be strengthened beyond the MFN (plus bindings) requirement.

By contrast, if the MFN rule were combined with the reciprocity rule, then the welfare of the non-participating government would be preserved in the face of any bilateral agreement, and so *no* MFN-efficient tariff vector would be vulnerable to bilateral opportunism. In terms of Figures 3A-3C, reciprocity restricts bilateral negotiations between the domestic government and the government of foreign country  $i$  to remain along the iso- $\bar{W}^{*j}$  (equivalently, iso- $\hat{p}^w$ ) locus, which never enters the lens between them. When joined with Proposition 8, this observation suggests that the principle of reciprocity serves to enhance significantly the power of the principle of non-discrimination in dealing with bilateral opportunism.

## 6. Non-violation Nullification-or-Impairment

While we have above modeled MFN and reciprocity as formal and rigid rules, their application in GATT/WTO practice is more qualified. But non-participant welfare may also be protected through other GATT/WTO provisions. We analyze here the potential role of GATT Article XXIII non-violation nullification-or-impairment complaints in protecting non-participant welfare.<sup>21</sup> We ask whether the nullification-or-impairment rule might provide a separate defense against bilateral opportunism, even when the reciprocity and MFN rules are not imposed.<sup>22</sup>

Our analysis requires a definition of market access. To begin, we thus return to the underlying model in Section 2. Consider a given vector of tariffs,  $\tau$ . Using the linkage condition (2.1), we may define the function  $p_L^{wi}(\tau^i, \tau^j, p^{wj}) \equiv [\tau^j/\tau^i]p^{wj}$ . With this definition, the domestic country's terms of trade may be expressed as a function of  $\tau$  and  $p^{wj}$ :

$$T_L(\tau, p^{wj}) \equiv T(p^{*j}, p^{*i}, p^{wj}, p_L^{wi}),$$

where  $p^{*j} \equiv p^{*j}(\tau^{*j}, p^{wj})$  and  $p^{*i} \equiv p^{*i}(\tau^{*i}, p_L^{wi})$ . For a given vector of tariffs  $\tau$ , the *market access* that the domestic country affords to foreign country  $j$  at world price  $p^{wj}$  then may be defined as:

$$MA^j(\tau, p^{wj}) \equiv M(p, T_L) - E^{*i}(p^{*i}, p_L^{wi}) \quad (6.1)$$

where  $p \equiv p(\tau^j, p^{wj})$ .<sup>23</sup> Effectively, this amounts to the “residual” import demand

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<sup>21</sup>Nullification-or-impairment complaints may be lodged under Article XXIII, if it is alleged that an explicit GATT rule (e.g., MFN) has been broken (“violation complaints”) and even if no such allegation is made (“non-violation complaints”). In practice, when a measure is found to be GATT-illegal, it is presumed to cause nullification or impairment, and thus for a successful violation complaint no further conditions are required (see, e.g., Roessler, 1997, p. 129). We describe in the Introduction the conditions that must be met for a successful non-violation complaint (see, e.g., Petersmann, 1997, p. 162), and it is on this possibility that we focus.

<sup>22</sup>A second reason for considering non-violation nullification-or-impairment provisions in the context of bilateral opportunism problems is that new complications arise when many goods are considered. In our working paper (Bagwell and Staiger, 1999c), we show that MFN and reciprocity continue to solve the terms-of-trade driven bilateral opportunism problem, but an additional problem of bilateral opportunism (associated with local price movements) may still arise under these rules in limited circumstances. In this light, a limited role for non-violation complaints could arise in a many-good setting even if reciprocity and MFN were rigidly applied.

<sup>23</sup>We may similarly define the market access that foreign country  $j$  affords to exporters from the domestic country at world price  $p^{wj}$ . This is given simply by foreign country  $j$ 's import demand at  $p^{wj}$  in light of its tariff  $\tau^{*j}$ :  $MA^{*j}(\tau^{*j}, p^{wj}) \equiv M^{*j}(p^{*j}, p^{wj})$ .

faced by exporters from foreign country  $j$  at  $\tau$  and  $p^{wj}$ . Note that the market-clearing condition (2.4) now may be rewritten equivalently as:

$$MA^j(\tau, p^{wj}) = E^{*j}(p^{*j}, p^{wj}). \quad (6.2)$$

Under market clearing, the market access that the domestic country offers exporters from foreign country  $j$  equals the export supply from foreign country  $j$ .

We next observe a relationship between changes in the terms of trade and changes in market access. In a two-country model, the Marshall-Lerner (global) stability condition ensures that an inward shift of the domestic import demand curve at every world price results in a lower equilibrium world price. We assume the analogous stability condition in our three-country model.<sup>24</sup> In a discriminatory setting, this means that a reduction in the market access that the domestic country affords to foreign country  $j$  at every  $p^{wj}$  – engineered with any combination of changes in  $(\tau^i, \tau^j)$  and  $\tau^{*i}$  – results in a lower  $\tilde{p}^{wj}$ . In an MFN environment, this means that a reduction in the market access that the domestic country affords to foreign country  $j$  at every  $p^w$  – engineered with any combination of changes in  $\tau$  and  $\tau^{*i}$  – results in a lower  $\tilde{p}^w$ . In both environments, the Marshall-Lerner stability condition ensures that, for a given vector of tariffs, the equilibrium world price (i.e., the world price that satisfies (6.2)) is uniquely determined.

We now return to our consideration of bilateral negotiations, and consider the possible role of non-violation nullification-or-impairment complaints in preventing the problem of bilateral opportunism. As detailed in GATT Article XXIII, these complaints can be lodged when a government believes that market access it had previously won through negotiations is subsequently denied unexpectedly as a result of measures taken by its negotiating partner. In principle the ability to bring such complaints could prevent the domestic country and foreign country  $i$  from negotiating in a way which reclaimed from foreign country  $j$  a portion of the domestic market access that country  $j$  had previously negotiated. More formally, we may say that bilateral negotiations between the domestic country and foreign country  $i$  satisfy the *nullification-or-impairment rule* whenever

$$MA^j(\tau_N, \tilde{p}_I^{wj}) \geq MA^j(\tau_I, \tilde{p}_I^{wj}). \quad (6.3)$$

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<sup>24</sup>Formally, in a two-country setting the Marshall-Lerner stability condition requires that, at the equilibrium world price, the elasticity of the home-country's import demand must be less than the elasticity of the foreign country's export supply. We impose here the analogous condition that, at the equilibrium world price defined by (6.2), the elasticity of the market access that the home-country affords to foreign country  $j$  must be less than the elasticity of foreign country  $j$ 's export supply.

But under our stability condition, bilateral negotiations between the domestic country and foreign country  $i$  that satisfy the nullification-or-impairment rule in discriminatory environments must not diminish  $\widehat{p}^{wj}$ , while under the MFN rule such negotiations must not diminish  $\widehat{p}^w$ . As movement into the lens described in Figure 2 requires a diminished  $\widehat{p}^{wj}$ , while movement into the lens' described by 3A, 3B and 3C all require a diminished  $\widehat{p}^w$ , it follows that, beginning from the efficiency frontier, all opportunistic bilateral agreements are indeed precluded under the nullification-or-impairment rule. That is, starting from an efficient set of tariffs, any bilateral agreement that is attractive to the home country and foreign country  $i$  would violate the nullification-or-impairment rule. Thus we have:

**Proposition 9 (Nullification-or-Impairment Rule and Efficient Tariffs):**  
*Under the nullification-or-impairment rule, no efficient tariff vector is vulnerable to bilateral opportunism.*

Using Proposition 9, we have a formal basis from which to interpret the nullification-or-impairment rule as playing a potentially important role in solving the bilateral opportunism problem, regardless of whether the MFN and/or reciprocity rules are present. But the nullification-or-impairment rule would by itself be a cumbersome solution to a problem which, as Proposition 5 indicates, is pervasive. In this light, we may conclude from Propositions 3, 5, 6, 8 and 9 that MFN and reciprocity *together* can provide a *first line of defense* against the prospect of bilateral agreements that appropriate welfare from non-participants. The nullification-or-impairment rule can then be understood as providing a *second line of defense* against the prospect of non-participant welfare appropriation, as it need only be invoked when a bilateral negotiation does not conform with each of these principles.

## 7. Conclusion

Trade negotiations occur over time between many governments. Given the ongoing nature of such negotiations, a government may naturally fear that the extent of market access that it has secured in a current negotiation may be diminished in a future negotiation to which it is not party. Indeed, if a government recognizes the potential for an opportunistic bilateral negotiation in the future, then it may be unwilling to offer significant concessions in a current negotiation. As this discussion suggests, the degree to which the rules of a multilateral trading system



protect through time the value of concessions is of central importance to the functioning of the system.

In this paper, we offer a formal analysis that characterizes the scope for opportunistic bilateral agreements under different negotiation rules. Our main finding is that the welfare of a non-participating government is preserved in the presence of any bilateral agreement that respects the principles of reciprocity and non-discrimination. We thus argue that reciprocity and non-discrimination, two of the central pillars of the GATT/WTO architecture, constitute a powerful first-line of defense against the potential for opportunistic bilateral agreements.

We consider as well the possibilities for opportunism under weaker rules. We find that the potential for opportunistic bilateral agreements is severe when there are no rules: every efficient tariff vector is vulnerable to bilateral opportunism in the absence of rules for bilateral negotiation. In addition, we find that the possibility of bilateral opportunism remains when either reciprocity or non-discrimination (but not both) is imposed. Of particular interest, non-discrimination without reciprocity offers at best a partial solution to the bilateral opportunism problem: when tariffs on non-participants are bound, the non-discrimination principle ensures that many - but certainly not all - MFN-efficient tariff vectors are not vulnerable to bilateral opportunism. Thus, while our results confirm the general point raised by Schwartz and Sykes (1997) that the non-discrimination principle is beneficial as a means to protect the value of past concessions, our formal analysis reveals that this principle fully solves the bilateral opportunism problem only when it is applied in combination with the principle of reciprocity.

The findings here suggest that reciprocity, which is often maligned as a mercantilist distraction, in fact serves a key role in trade negotiations when exercised in the presence of non-discrimination. At the same time, preferential tariff agreements, which are permitted under the special exception to MFN granted by GATT's Article XXIV, represent a possible route to opportunistic bilateral agreements. In this light, preferential tariff agreements may present a natural and appropriate target for non-violation nullification-or-impairment complaints, and the ability to bring such complaints through Article XXIII may in turn play an important role in diminishing the attractiveness of preferential agreements as a route to bilateral opportunism. More generally, our analysis suggests that the potential for nullification-or-impairment complaints can constitute a valuable second-line of defense against bilateral opportunism.

## 8. References

- Bagwell, Kyle and Staiger, Robert W., "An Economic Theory of GATT," *American Economic Review*, 89 (1), 1999a, pp. 215-248.
- Bagwell, Kyle and Staiger, Robert W., "Regionalism and Multilateral Tariff Cooperation," in John Piggott and Alan Woodland, eds., **International Trade Policy and the Pacific Rim**, 1999b, MacMillan, 157-185.
- Bagwell, Kyle and Staiger, Robert W., "Multilateral Trade Negotiations, Bilateral Opportunism and the Rules of GATT," NBER Working Paper No. 7071, April 1999c.
- Bagwell, Kyle and Staiger, Robert W., "GATT-Think," NBER Working Paper 8005, November 2000.
- Bagwell, Kyle and Staiger, Robert W., "Reciprocity, Non-Discrimination and Preferential Agreements in the Multilateral Trading System," *European Journal of Political Economy*, 17 (2), June 2001a, pp. 281-325.
- Bagwell, Kyle and Staiger, Robert W., "Domestic Policies, National Sovereignty, and International Economic Institutions," *Quarterly Journal of Economics*, 116 (2), May 2001b, pp. 519-562.
- Baldwin, Richard E., "Politically Realistic Objective Functions and Trade Policy," *Economics Letters*, 24 (1), 1987, pp. 287-290.
- Baldwin, Robert E., **The Political Economy of U.S. Import Policy**. Cambridge, MA: The MIT Press, 1985.
- Bloch, Francis, "Sequential Formations of Coalitions in Games with Externalities and Fixed Payoff Division," *Games and Economic Behavior*, 14 (1), May 1996, 90-123.
- Brock, William A. and Magee, Stephen P., "The Economics of Special Interest Politics," *American Economic Review*, May 1978, 68 (2), pp. 246-250.
- Caplin, A. and K. Krishna, "Tariffs and the Most-Favored-Nation Clause: A Game Theoretic Approach," *Seoul Journal of Economics*, 1, (1988), pp. 267-289.
- Caves, Richard E., "Economic Models of Political Choice: Canada's Tariff Structure," *Canadian Journal of Economics*, May 1976, 9 (2), pp. 278-300.
- Choi, Jay Pil, "Optimal Tariffs and the Choice of Technology: Discriminatory Tariffs vs. the 'Most Favored Nation Clause,'" *Journal of International Economics*, January 1995, 143-160.
- Chwe, Michael, "Farsighted Coalitional Stability," *Journal of Economic Theory*, 63, 1994, pp. 299-325.

- Dixit, Avinash, Grossman, Gene M. and Elhanan Helpman, "Common Agency and Coordination: General Theory and Application to Government Policy Making," *Journal of Political Economy*, August 1997, 105 (4), pp. 752-769.
- Ethier, Wilfred J., "Reciprocity, Nondiscrimination, and a Multilateral World," unpublished mimeo, The University of Pennsylvania, October 15, 1998.
- Ferreira, Jose-Luis, "Endogenous Formation of Coalitions in Noncooperative Games," *Games and Economic Behavior*, 26 (1), January 1999, 40-58.
- Findlay, Ronald and Wellisz, Stanislaw, "Endogenous Tariffs, the Political Economy of Trade Restrictions and Welfare," in Jagdish Bhagwati (ed.), **Import Competition and Response**. Chicago: University of Chicago Press, 1982, pp. 223-243.
- Gomes, Armando, "A Theory of Negotiations and Formation of Coalitions," mimeo, The University of Pennsylvania, September 1999.
- Grossman, Gene M. and Helpman, Elhanan, "Protection for Sale," *American Economic Review*, September 1994, 84 (4), pp. 833-850.
- Grossman, Gene M. and Helpman, Elhanan, "Trade Wars and Trade Talks," *Journal of Political Economy*, August 1995, 103 (4), pp. 675-708.
- Hillman, Arye, L., "Declining Industries and Political-Support Protectionist Motives," *American Economic Review*, December 1982, 72 (5), pp. 1180-1187.
- Hoekman, B. and M. Kostecki, **The Political Economy of the World Trading System: From GATT to WTO**. Oxford University Press, 1995.
- Horn, Henrik and Petros C. Mavroidis, "Economic Aspects of the Most-Favored Nation Clause," *European Journal of Political Economy*, 17 (2), June 2001, pp. 233-279.
- Jackson, John H., **World Trade and the Law of GATT**. The Bobbs-Merrill Company, New York: (1969).
- Kemp, M. and H. Wan, Jr., "An Elementary Proposition Concerning the Formation of Customs Unions," *Journal of International Economics*, 6, 1976, pp. 95-98.
- Krugman, Paul R., "The Move Toward Free Trade Zones," in **Policy Implications of Trade and Currency Zones: A Symposium Sponsored by The Federal Reserve Bank of Kansas City**. Jackson Hole, Wyoming: The Federal Reserve Bank of Kansas, August 22-24, 1991, pp. 7-41.
- Krugman, Paul R., "What should Trade Negotiators Negotiate About?," *Journal*

- of Economic Literature*, March 1997, 35 (1), pp. 113-120.
- Ludema, R., "International Trade Bargaining and the Most-Favored-Nation Clause," *Economics and Politics*, 3, 1991, pp. 1-20.
- Mayer, Wolfgang, "Endogenous Tariff Formation," *American Economic Review*, December 1984, 74 (5), pp. 970-985.
- McAfee, Preston and Marius Schwartz, "Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity," *American Economic Review*, March 1994, 84 (1), pp. 210-230.
- McCalman, P., "Multilateral Trade Negotiations and the Most-Favored-Nation Clause," Ph.D. Dissertation, 1998, The University of Wisconsin.
- McMillan, John, "A Game-Theoretic View of International Trade Negotiations: Implications for the Developing Countries," in John Whalley (ed.) **Developing Countries and the Global Trading System: Volume 1**. Ann Arbor: The University of Michigan Press, 1989, pp. 26-44.
- McMillan, John, "Does Regional Integration Foster Open Trade: Economic Theory and GATT's Article XXIV," in K. Anderson and R. Blackhurst (eds.), **Regional Integration and the Global Trading System**. Harvester Wheatsheaf, Hemel Hempstead, 1993, pp. 292-309.
- Olson, Mancur, **The Logic of Collective Action**, Cambridge, MA: Harvard University Press, 1965.
- Petersmann, Ernst-Ulrich, **The GATT/WTO Dispute Settlement System: International Law, International Organizations and Dispute Settlement**, London: Kluwer Law International Ltd., 1997.
- Ray, Debraj and Rajiv Vohra, "A Theory of Endogenous Coalition Structures," *Games and Economic Behavior*, 26, 1999, 286-336.
- Roessler, Frieder, "The Concept of Nullification and Impairment in the Legal System of the World Trade Organization," in Ernst-Ulrich Petersmann (ed.), **International Trade Law and the GATT/WTO Dispute Settlement System**. London: Kluwer Law International, 1997, pp. 123-142.
- Schwartz, W. F. and Alan O. Sykes, "The Economics of the Most Favored Nation Clause," in **Economic Dimensions in International Law: Comparative and Empirical Perspectives**, eds. Jagdeep S. Bhandani and Alan O. Sykes, Cambridge University Press, 1997, pp. 43-79.
- Segal, Ilya, "Contracting with Externalities," *Quarterly Journal of Economics*, 114(2), May 1999, 337-88.
- Srinivasan, TN, "Regionalism and the WTO: Is Nondiscrimination Passe?," in

- Anne O. Krueger (ed.), **The WTO as an International Organization**. Chicago: The University of Chicago Press, 1998, pp. 329-349.
- Staiger, Robert W., "International Rules and Institutions for Trade Policy," in Gene M. Grossman and Kenneth Rogoff (eds.) **The Handbook of International Economics, Volume 3**. Amsterdam: North Holland, 1995, pp. 1495-1551.
- Winters, L. Alan, "Regionalism and the Rest of the World: The Irrelevance of the Kemp-Wan Theorem," *Oxford Economic Papers*, April 1997, pp. 228-234.

## 9. Appendix

### The Two-Good General-Equilibrium Model of Trade:

The import and export functions for foreign country  $i$  may be derived as follows. Production is determined by the local relative price:  $Q_k^{*i} = Q_k^{*i}(p^{*i})$  for  $k = x, y$ . Consumption is a function of the local relative price - which defines the trade-off faced by consumers and determines the level and distribution of factor income in the economy - and of tariff revenue  $R^{*i}$ , which is distributed lump-sum to the consumers in foreign country  $i$  and which we measure in units of their export good  $y$  at local prices:  $D_k^{*i} = D_k^{*i}(p^{*i}, R^{*i})$  for  $k = x, y$ . Tariff revenue is defined implicitly by  $R^{*i} = [D_y^{*i}(p^{*i}, R^{*i}) - Q_y^{*i}(p^{*i})][1/p^{*i} - 1/p^{wi}]$  or  $R^{*i} = R^{*i}(p^{*i}, p^{wi})$ , and is increasing in foreign country  $i$ 's terms of trade, under the assumption that goods are normal. National consumption for foreign country  $i$  can thus be written as  $C_k^{*i}(p^{*i}, p^{wi}) \equiv D_k^{*i}(p^{*i}, R^{*i}(p^{*i}, p^{wi}))$  for  $k = x, y$ . Finally, for foreign country  $i$ , imports of good  $y$  are represented as  $M^{*i}(p^{*i}, p^{wi}) \equiv C_y^{*i}(p^{*i}, p^{wi}) - Q_y^{*i}(p^{*i})$ , and exports of good  $x$  are given as  $E^{*i}(p^{*i}, p^{wi}) \equiv Q_x^{*i}(p^{*i}) - C_x^{*i}(p^{*i}, p^{wi})$ .

Consider next the home country. Domestic production is determined by the local price:  $Q_k = Q_k(p)$  for  $k = x, y$ . Domestic consumption of each good is likewise determined as a function of the local price and domestic tariff revenue:  $D_k(p, R)$  for  $k = x, y$ , where tariff revenue is distributed lump-sum to domestic consumers and measured in units of the domestic export good  $x$  in local prices. Using the definition of  $T$ , home tariff revenue may be represented as follows:

$$R = [D_x(p, R) - Q_x(p)] \cdot \sum_{i=1,2} s^{*i}(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \cdot (p - p^{wi}) = [D_x(p, R) - Q_x(p)] \cdot [p - T],$$

or  $R = R(p, T)$ . We now may represent the domestic country's consumption as  $C_k(p, T) \equiv D_k(p, R(p, T))$  for  $k = x, y$ . Home-country imports of  $x$  thus may be

denoted as  $M(p, T) \equiv C_x(p, T) - Q_x(p)$ , while home-country exports of  $y$  may be represented as  $E(p, T) \equiv Q_y(p) - C_y(p, T)$ .

**Proof of Proposition 7 (MFN-Efficient Tariffs):** To prove this proposition, we first identify some general relationships and then establish three lemmas. Here and throughout the Appendix, we denote partial derivatives by subscripts. We observe that for every  $i, j \in \{1, 2\}$  with  $i \neq j$ , we have:

$$\begin{aligned} \text{(A1). } & \bar{W}_\tau = [W_p \tau + W_{p^w}] \frac{\partial \tilde{p}^w}{\partial \tau} + W_p \hat{p}^w > 0 \\ \text{(A2). } & \bar{W}_{\tau^{*i}} = [W_p \tau + W_{p^w}] \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} < 0 \\ \text{(A3). } & \bar{W}_{\tau^{*i}}^{*i} = [W_{p^{*i}} \frac{1}{\tau^{*i}} + W_{p^w}^{*i}] \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} - W_{p^{*i}}^{*i} (\frac{1}{\tau^{*i}})^2 \tilde{p}^w > 0 \\ \text{(A4). } & \bar{W}_\tau^{*i} = [W_{p^{*i}} \frac{1}{\tau^{*i}} + W_{p^w}^{*i}] \frac{\partial \tilde{p}^w}{\partial \tau} < 0 \\ \text{(A5). } & \bar{W}_{\tau^{*j}}^{*i} = [W_{p^{*i}} \frac{1}{\tau^{*i}} + W_{p^w}^{*i}] \frac{\partial \tilde{p}^w}{\partial \tau^{*j}} > 0, \end{aligned}$$

where the expressions are signed in accordance with Assumption 1'. Using these expressions, we next derive that:

$$\begin{aligned} \text{(A6). } & \bar{W}_{\tau^{*i}} / \bar{W}_{\tau^{*j}} = \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} / \frac{\partial \tilde{p}^w}{\partial \tau^{*j}} > 0 \\ \text{(A7). } & \bar{W}_\tau^{*i} / \bar{W}_{\tau^{*j}}^{*i} = \frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*j}} < 0 \\ \text{(A8). } & \bar{W}_\tau / \bar{W}_{\tau^{*i}} - \bar{W}_\tau^{*j} / \bar{W}_{\tau^{*i}}^{*j} = \bar{W}_\tau / \bar{W}_{\tau^{*i}} - \frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} = W_p \hat{p}^w / \bar{W}_{\tau^{*i}} \\ \text{(A9). } & \bar{W}_\tau^{*i} / \bar{W}_{\tau^{*i}}^{*i} - \bar{W}_\tau^{*j} / \bar{W}_{\tau^{*i}}^{*j} = \bar{W}_\tau^{*i} / \bar{W}_{\tau^{*i}}^{*i} - \frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} = [W_{p^{*i}}^{*i} (\frac{1}{\tau^{*i}})^2 \tilde{p}^w / \bar{W}_{\tau^{*i}}^{*i}] [\frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*i}}] \\ \text{(A10). } & \bar{W}_{\tau^{*i}}^{*i} / \bar{W}_{\tau^{*j}}^{*i} - \bar{W}_{\tau^{*i}}^{*i} / \bar{W}_{\tau^{*j}}^{*i} = \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} / \frac{\partial \tilde{p}^w}{\partial \tau^{*j}} - \bar{W}_{\tau^{*i}}^{*i} / \bar{W}_{\tau^{*j}}^{*i} = W_{p^{*i}}^{*i} (\frac{1}{\tau^{*i}})^2 \tilde{p}^w / \bar{W}_{\tau^{*j}}^{*i}. \end{aligned}$$

We consider next the first-order conditions of Program  $MFN - W$ . At an MFN-efficient tariff vector, there must exist multipliers  $\lambda_1 \geq 0$  and  $\lambda_2 \geq 0$  such that:

$$\begin{aligned} \text{(A11). } & \bar{W}_\tau + \lambda_1 \bar{W}_\tau^{*1} + \lambda_2 \bar{W}_\tau^{*2} = 0, \\ \text{(A12). } & \bar{W}_{\tau^{*1}} + \lambda_1 \bar{W}_{\tau^{*1}}^{*1} + \lambda_2 \bar{W}_{\tau^{*1}}^{*2} = 0 \text{ and} \\ \text{(A13). } & \bar{W}_{\tau^{*2}} + \lambda_1 \bar{W}_{\tau^{*2}}^{*1} + \lambda_2 \bar{W}_{\tau^{*2}}^{*2} = 0. \end{aligned}$$

As we observed in the text discussion following Proposition 7, cases (i), (ii) and (iii) correspond to the cases in which the home government, respectively, seeks less, seeks more or achieves its desired trade volume at the given world price. In terms of our representation of government objective functions, these cases correspond to the conditions that:  $W_p > 0$ ,  $W_p < 0$  and  $W_p = 0$ . To characterize the MFN-efficiency frontier, we proceed exhaustively through these three cases. Our findings are summarized in the following three lemmas:

**Lemma A1:** *Suppose  $W_p > 0$  at an MFN-efficient set of tariffs. Then, for every  $i \in \{1, 2\}$ , and  $i \neq j$ ,*

$$(i). -\frac{\partial \overline{W}^{*j}/\partial \tau^{*i}}{\partial \overline{W}^{*j}/\partial \tau} > -\frac{\partial \overline{W}/\partial \tau^{*i}}{\partial \overline{W}/\partial \tau} > -\frac{\partial \overline{W}^{*i}/\partial \tau^{*i}}{\partial \overline{W}^{*i}/\partial \tau} \text{ and } W_{p^{*i}}^{*i} > 0.$$

**Proof:** Given  $W_p > 0$ , the first inequality follows directly from Assumption 1' and (A8), once it is observed that, in  $(\tau, \tau^{*i})$  space, the iso-welfare curve of the government of foreign country  $j \neq i$  is also the iso- $\tilde{p}^w$  locus. To establish the other inequalities, we use the first order conditions for  $\tau$  (i.e., (A11)) and  $\tau^{*i}$  (i.e., (A12) or (A13), as appropriate) to solve for  $\lambda_j$  and  $\lambda_i$ . Using (A7), these solutions may be written as:

$$(A14). \lambda_j = [\overline{W}_{\tau^{*i}}/\overline{W}_{\tau^{*i}}^{*j}][\overline{W}_{\tau}^{*i}/\overline{W}_{\tau^{*i}}^{*i} - \overline{W}_{\tau}/\overline{W}_{\tau^{*i}}]/[\frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}} - \overline{W}_{\tau}^{*i}/\overline{W}_{\tau^{*i}}^{*i}]$$

$$(A15). \lambda_i = [\overline{W}_{\tau^{*i}}/\overline{W}_{\tau^{*i}}^{*i}][\overline{W}_{\tau}/\overline{W}_{\tau^{*i}} - \frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}}]/[\frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}} - \overline{W}_{\tau}^{*i}/\overline{W}_{\tau^{*i}}^{*i}].$$

As  $\lambda_i$  must be non-negative and finite, the first inequality established above together with Assumption 1' imply that

$$(A16). \frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}} > \overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau}^{*i},$$

which under (A9) is equivalent to  $W_{p^{*i}}^{*i} > 0$ .

It remains to show that  $-\overline{W}_{\tau^{*i}}/\overline{W}_{\tau} > -\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau}^{*i}$ . Using (A14), (A16) and Assumption 1', we see that  $\lambda_i \geq 0$  requires  $-\overline{W}_{\tau^{*i}}/\overline{W}_{\tau} \geq -\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau}^{*i}$ , and so we have only to eliminate the case of equality. To this end, we use the first order conditions for  $\tau^{*j}$  and  $\tau^{*i}$  to solve for  $\lambda_j$  and  $\lambda_i$ . Then using (A6), we calculate that  $\lambda_j$  may also be expressed as

$$(A17). \lambda_j = [\overline{W}_{\tau^{*i}}/\overline{W}_{\tau^{*i}}^{*j}][\overline{W}_{\tau^{*j}}^{*i}/\overline{W}_{\tau^{*i}}^{*i} - \frac{\partial \tilde{p}^w}{\partial \tau^{*j}}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}}]/[\overline{W}_{\tau^{*j}}^{*j}/\overline{W}_{\tau^{*i}}^{*j} - \overline{W}_{\tau^{*j}}^{*i}/\overline{W}_{\tau^{*i}}^{*i}].$$

We next use (A14) and (A17) and derive that

$$(A18). [\frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}} - \overline{W}_{\tau}/\overline{W}_{\tau^{*i}}] = [\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau^{*j}}^{*i}][\overline{W}_{\tau^{*j}}^{*j}/\overline{W}_{\tau^{*i}}^{*j}][\overline{W}_{\tau}^{*i}/\overline{W}_{\tau^{*i}}^{*i} - \overline{W}_{\tau}/\overline{W}_{\tau^{*i}}] \\ + [\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau^{*j}}^{*i}][\frac{\partial \tilde{p}^w}{\partial \tau^{*j}}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}}][\frac{\partial \tilde{p}^w}{\partial \tau}/\frac{\partial \tilde{p}^w}{\partial \tau^{*i}} - \overline{W}_{\tau}^{*i}/\overline{W}_{\tau^{*i}}^{*i}].$$

Let us now suppose that  $-\overline{W}_{\tau^{*i}}/\overline{W}_{\tau} = -\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau}^{*i}$ . Then given (A16) we see that (A18) reduces to

$$(A19). \frac{\partial \tilde{p}^w}{\partial \tau^{*i}}/\frac{\partial \tilde{p}^w}{\partial \tau^{*j}} - \overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau^{*j}}^{*i} = 0,$$

which under (A10) requires  $W_{p^{*i}}^{*i} = 0$ . But this contradicts our finding above that  $W_{p^{*i}}^{*i} > 0$ . Hence,  $-\overline{W}_{\tau^{*i}}/\overline{W}_{\tau} > -\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau}^{*i}$ , and the lemma is proved.

**Lemma A2:** Suppose  $W_p < 0$  at an MFN-efficient set of tariffs. Then, for every  $i \in \{1, 2\}$ , and  $i \neq j$ ,

$$(ii). -\frac{\partial \overline{W}^{*j}/\partial \tau^{*i}}{\partial \overline{W}^{*j}/\partial \tau} < -\frac{\partial \overline{W}/\partial \tau^{*i}}{\partial \overline{W}/\partial \tau} < -\frac{\partial \overline{W}^{*i}/\partial \tau^{*i}}{\partial \overline{W}^{*i}/\partial \tau} \text{ and } W_{p^{*i}}^{*i} < 0.$$

**Proof:** Given  $W_p < 0$ , the first inequality follows directly from Assumption 1' and (A8). Using (A15),  $\lambda_i$  non-negative and finite then implies  $\overline{W}_\tau^{*i}/\overline{W}_{\tau^{*i}}^{*i} > \frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*i}}$ , which with (A9) yields  $W_{p^{*i}}^{*i} < 0$ . Next, (A14) now implies that  $-\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_\tau^{*i} \geq -\overline{W}_{\tau^{*i}}/\overline{W}_\tau$ . Finally, suppose  $-\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_\tau^{*i} = -\overline{W}_{\tau^{*i}}/\overline{W}_\tau$ . Then, using (A18) we may again derive that (A19) must hold, whence under (A10) it follows that  $W_{p^{*i}}^{*i} = 0$ , a contradiction.

**Lemma A3:** *Suppose  $W_p = 0$  at an MFN-efficient set of tariffs. Then for every  $i \in \{1, 2\}$ , and  $i \neq j$ ,*

$$(iii). \quad -\frac{\partial \overline{W}^{*j}/\partial \tau^{*i}}{\partial \overline{W}^{*j}/\partial \tau} = -\frac{\partial \overline{W}/\partial \tau^{*i}}{\partial \overline{W}/\partial \tau} > -\frac{\partial \overline{W}^{*i}/\partial \tau^{*i}}{\partial \overline{W}^{*i}/\partial \tau},$$

and there exists  $j \in \{1, 2\}$  such that  $W_{p^{*j}}^{*j} = 0$ .

**Proof:** Given  $W_p = 0$ , the first equality follows directly from (A8). Consider next the second equality. Using the first equality just derived, the necessary MFN-efficiency condition (A18) may be rewritten as

$$0 = [\overline{W}_{\tau^{*j}}^{*j}/\overline{W}_{\tau^{*i}}^{*j}][\overline{W}_\tau^{*j}/\overline{W}_{\tau^{*j}}^{*j} - \frac{\partial \tilde{p}^w}{\partial \tau} / \frac{\partial \tilde{p}^w}{\partial \tau^{*j}}][\overline{W}_{\tau^{*i}}^{*i}/\overline{W}_{\tau^{*j}}^{*i} - \frac{\partial \tilde{p}^w}{\partial \tau^{*i}} / \frac{\partial \tilde{p}^w}{\partial \tau^{*j}}]$$

But the first term is positive, under (A9) (after reversing the “i’s” and “j’s”) the second term is zero if and only if  $W_{p^{*j}}^{*j} = 0$ , and under (A10) the third term is zero if and only if  $W_{p^{*i}}^{*i} = 0$ . Since the second or third term (or both) must be zero, the lemma follows.



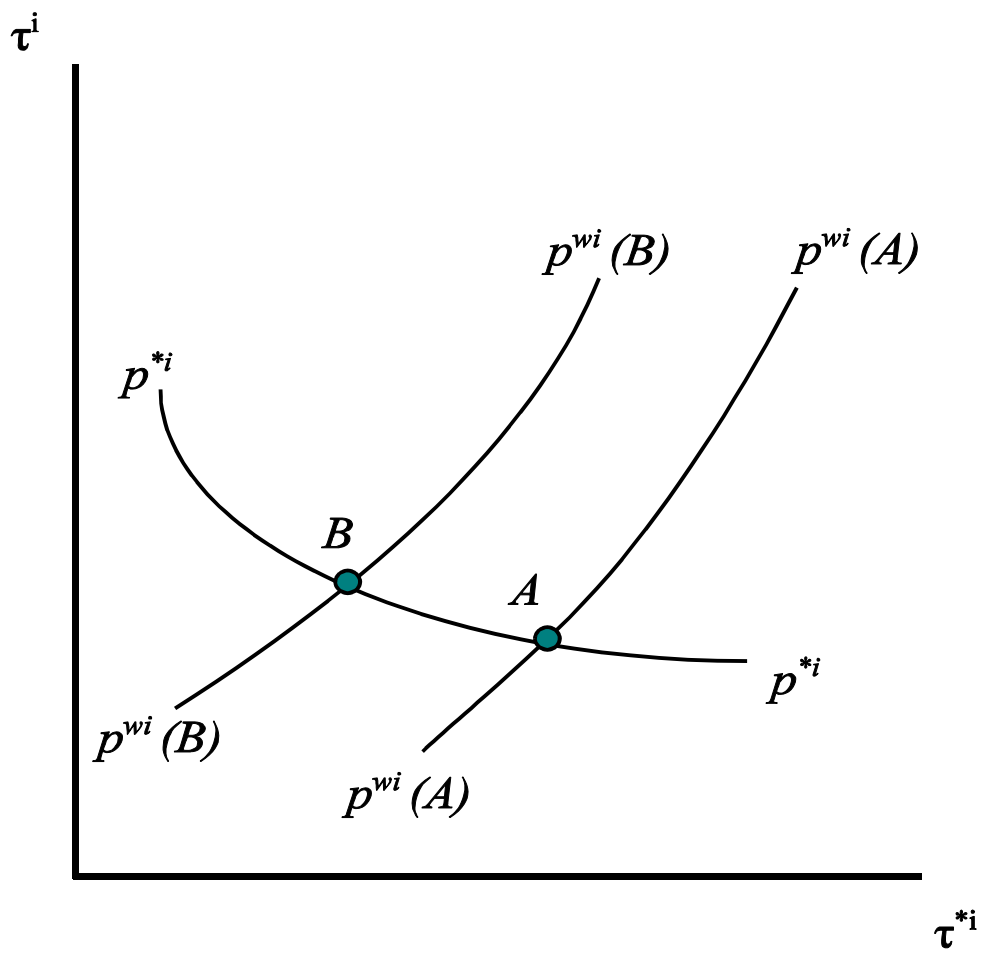


Figure 1

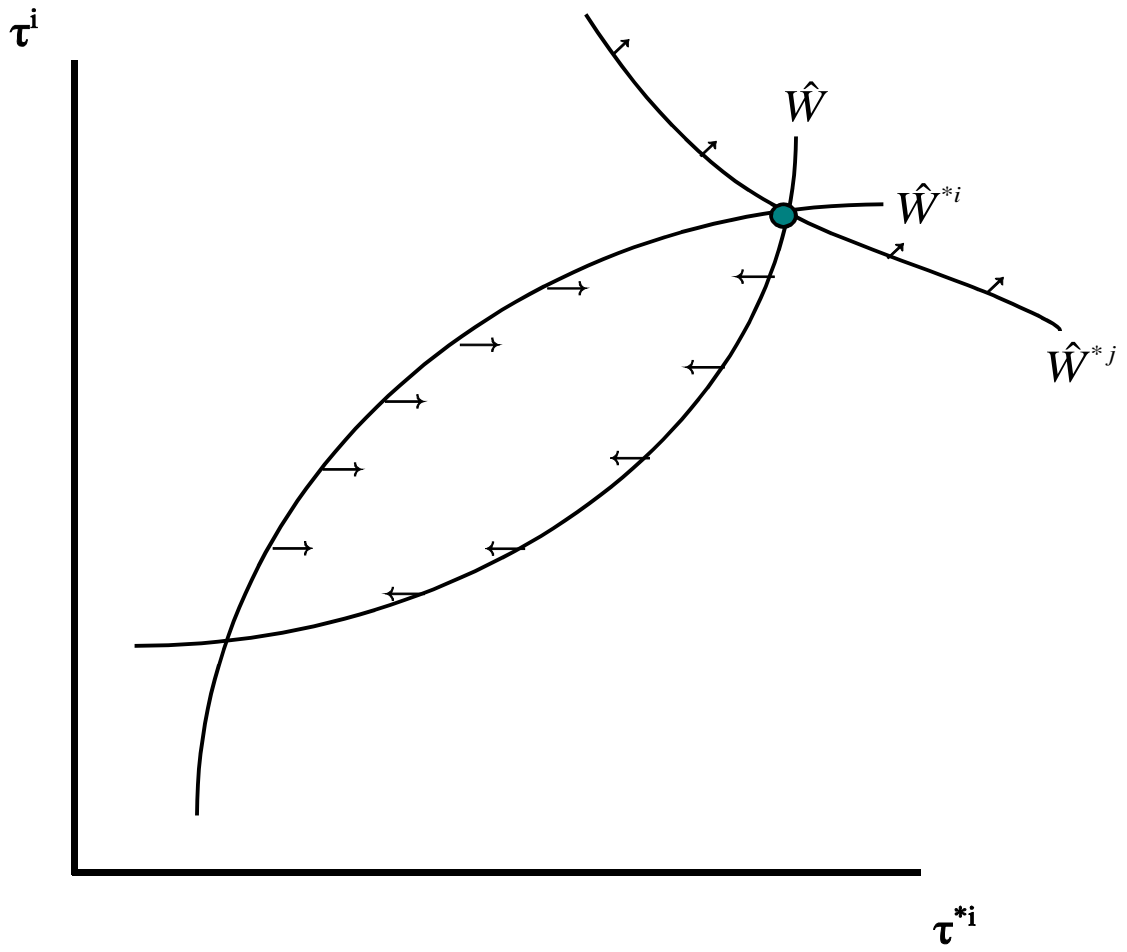


Figure 2

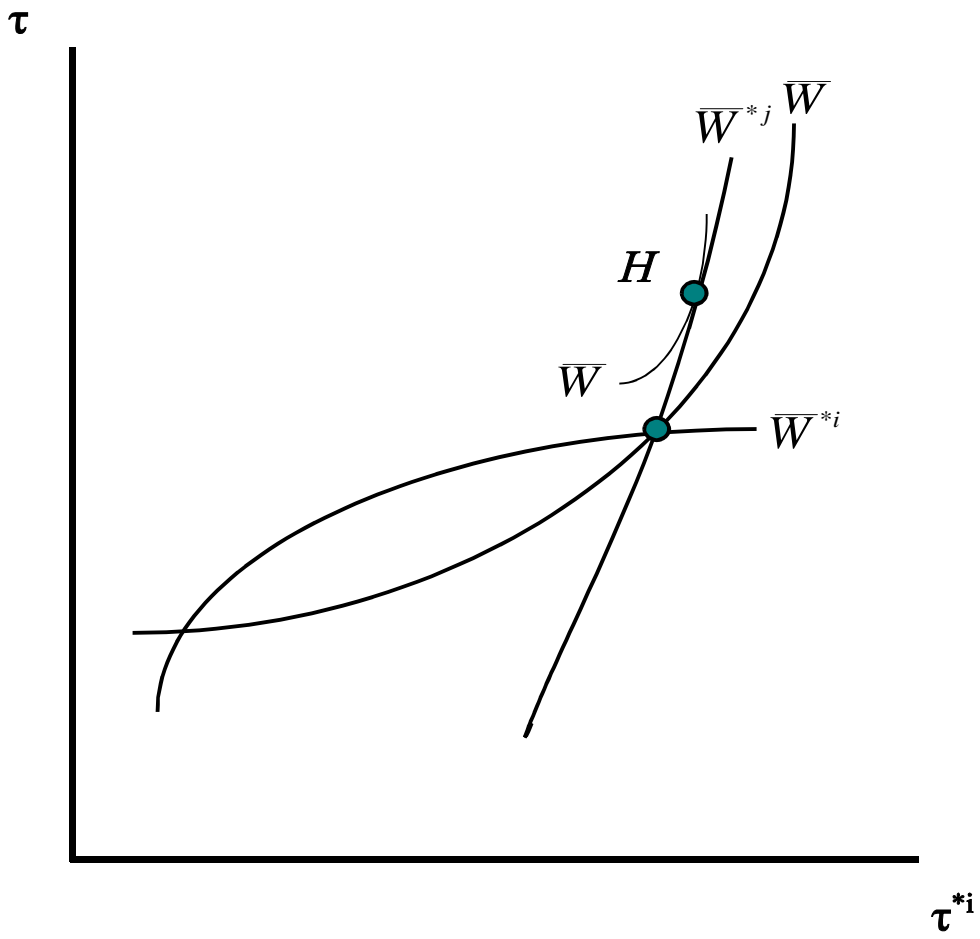


Figure 3A

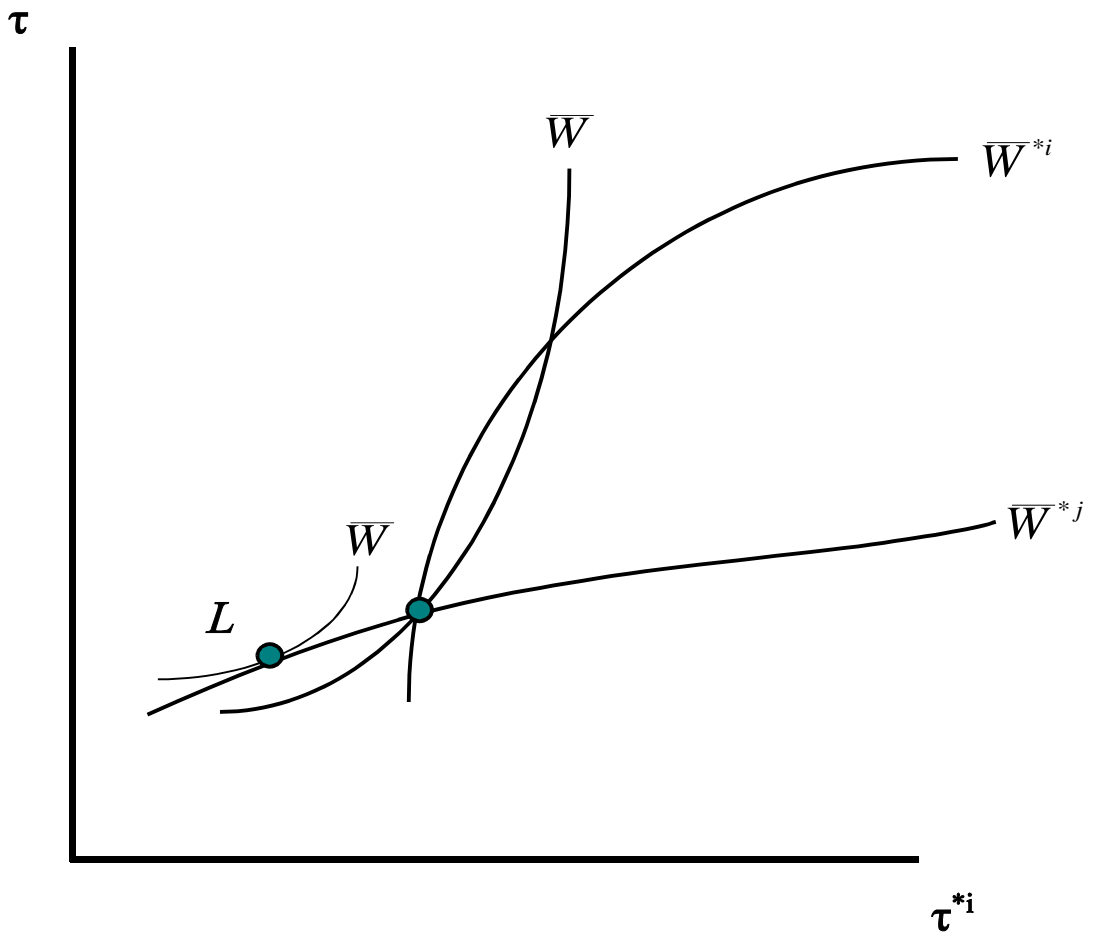


Figure 3B

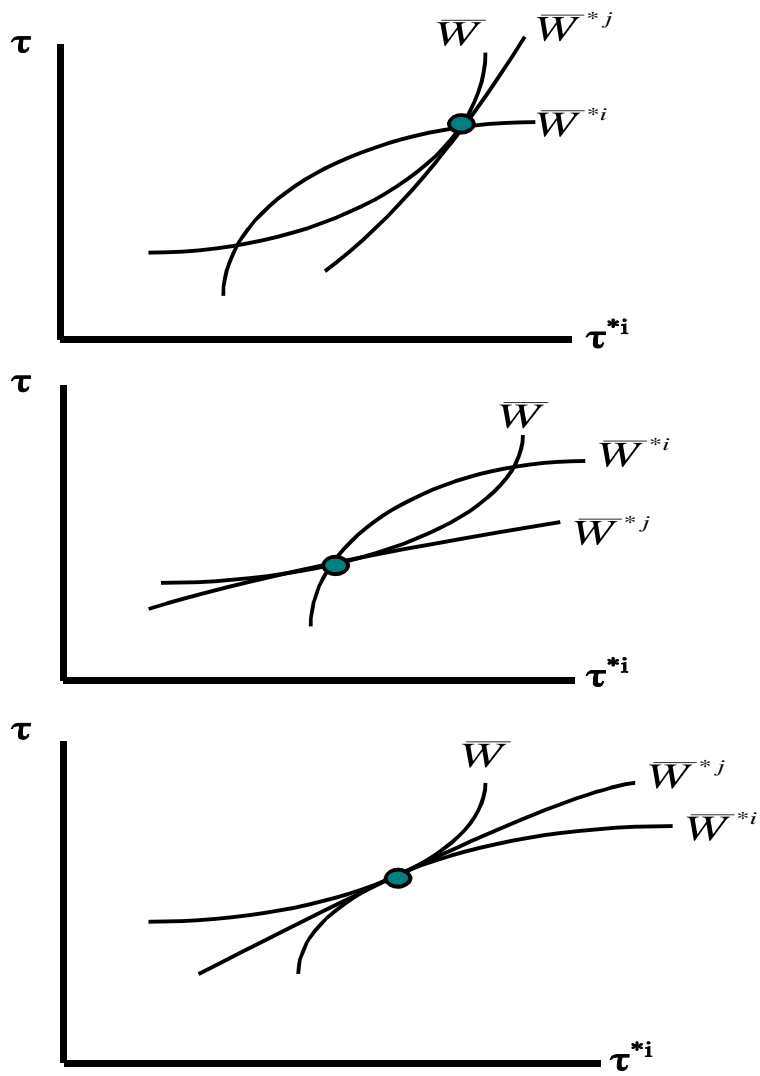


Figure 3C