NBER WORKING PAPER SERIES

MULTILATERAL TRADE NEGOTIATIONS, BILATERAL OPPORTUNISM AND THE RULES OF GATT

Kyle Bagwell
Robert W. Staiger

Working Paper 7071
http://www.nber.org/papers/w7071

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 1999

We thank Giovanni Maggi, John McLaren, and seminar participants at Michigan State University, Princeton University, and the University of Chicago for helpful comments. The views expressed in this paper are those of the authors and do not reflect those of the National Bureau of Economic Research.

© 1999 by Kyle Bagwell and Robert W. Staiger. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Multilateral Trade Negotiations, Bilateral Opportunism and the Rules of GATT

Kyle Bagwell and Robert W. Staiger

NBER Working Paper No. 7071
April 1999
JEL No. F02, F13, F15

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. In the absence of rules that govern the bilateral negotiation, we first show that the potential for opportunistic bilateral agreements is indeed severe. We next identify rules of negotiation that serve to protect the welfare of governments that are not participating in the bilateral negotiation. The "reciprocal market access" rule ensures that the market access of a non-participating country is unaltered, and we show that this rule eliminates the potential for opportunistic bilateral negotiations. This rule, however, has practical limitations, and so we next consider the negotiation rules that are prominent in GATT practice and discussion. Our main finding is that the two central rules of GATT -- non-discrimination (MFN) and reciprocity -- effectively mimic the reciprocal market access rule, and therefore offer a practical means through which to protect non-participant welfare and thereby eliminate the potential for opportunistic bilateral negotiations.

Kyle Bagwell
Department of Economics
Columbia University
420 West 188th Street, IAB
New York, NY 10027
and NBER
kw8@columbia.edu

Robert W. Staiger
Department of Economics
The University of Wisconsin
1180 Observatory Drive
Madison, WI 53705
and NBER
rstaiger@facstaff.wisc.edu

Multilateral Trade Negotiations, Bilateral Opportunism and the Rules of GATT

Kyle Bagwell and Robert W. Staiger*

Last Revised: March, 1999

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. In the absence of rules that govern the bilateral negotiation, we first show that the potential for opportunistic bilateral agreements is indeed severe. We next identify rules of negotiation that serve to protect the welfare of governments that are not participating in the bilateral negotiation. The "reciprocal market access" rule ensures that the market access of a non-participating country is unaltered, and we show that this rule eliminates the potential for opportunistic bilateral negotiations. This rule, however, has practical limitations, and so we next consider the negotiation rules that are prominent in GATT practice and discussion. Our main finding is that the two central rules of GATT - non-discrimination (MFN) and reciprocity - effectively mimic the reciprocal market access rule, and therefore offer a practical means through which to protect non-participant welfare and thereby eliminate the potential for opportunistic bilateral negotiations.

1. Introduction

Over its 50 year history, GATT has served remarkably well to encourage multilateral trade liberalization. This liberalization has been accomplished through

*Columbia University and NBER (Bagwell) and The University of Wisconsin and NBER (Staiger). We thank Giovanni Maggi, John McLaren and seminar participants at Michigan State University, Princeton University and The University of Chicago for helpful comments.

a series of agreements negotiated among the member countries, and an important role of GATT has been to provide a continuous negotiating forum for this purpose. Each of these agreements amounts essentially 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) principle, which requires that each GATT member offer to every other GATT 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 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 such as GATT (now the WTO) is thus more likely to effectively 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.

This discussion suggests a pair of interesting theoretical questions. First, in the absence of rules that govern the nature of negotiations, to what extent are governments engaged in a bilateral negotiation able to appropriate welfare from non-participating governments? In other words, is there a robust theoretical basis from which to conclude that the possibility of a future bilateral agreement between other governments represents an important concern for a given government? Second, if this concern is indeed legitimate, then how effective are GATT's rules in protecting the welfare of non-participating governments and thereby alleviating this concern?

These questions are of more than theoretical interest. GATT Dispute Panels consistently recognize 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.[1]

[1]This view is exemplified by the following excerpt from a GATT panel report (concerning

These complaints are handled under GATT Article XXIII, and they may take several forms. A "violation complaint" occurs when a government is alleged to have broken an explicit GATT rule. A second possibility is a "non-violation" complaint. As Petersmann (1997) details, the three conditions established by GATT panels for a successful non-violation complaint 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 (of either form), including domestic subsidies, product re-classifications, and bilateral trade negotiations with other partners. We focus on the latter possibility here.[2]

To address these questions, we develop a general-equilibrium model of trade in two goods between three countries. In particular, we assume that a home country exports one good to two foreign countries in exchange for imports from them of a second good. Following our earlier work (Bagwell and Staiger, forthcoming), we represent the objectives of each government as a general function of its local prices and terms of trade. This approach has several advantages. For instance, it is very general, being consistent both with the traditional view that governments maximize national income by their tariff choices and with the view embodied in leading political-economy models that governments are concerned about the distributional impacts of their tariff choices as well. In addition, by representing government preferences in this way, the channel through which one government's

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

[2]A recent example of a bilateral agreement that has led to a violation nullification-and-impairment complaint is the on-going US-EC dispute over the EC trade policy with respect to bananas. Examples of bilateral agreements that have led to non-violation nullification-and-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.

tariff choices impose an externality on another government's welfare is made clear. This helps to make 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.

Within this framework, we hypothesize that the governments have achieved an initial multilateral trade agreement, and we then consider the scope for a subsequent mutually-beneficial bilateral agreement between the home country and one of its foreign trading partners. We are especially interested in opportunistic bilateral agreements, in which the bilateral gains come at the expense of the welfare of the non-participating foreign government. We thus focus primarily upon initial agreements that are efficient (given governments' preferences), as then a bilateral gain is possible only if the welfare of the excluded foreign government is diminished. As a by-product, our analysis therefore also answers a more specific question: If governments are able to achieve an efficient multilateral trade agreement, is this agreement "stable" against future bilateral negotiations?

From this perspective, we assess the stability of an initial multilateral trade agreement among the three countries to the possibility of future bilateral trade agreements between the home country and either of its two trading partners. We explore this issue in the context of a variety of different rules that may govern the structure of the bilateral agreement. To begin, we consider a most-basic set of rules that do no more than capture the essential meaning of a bilateral negotiation. In particular, these basic rules recognize that the tariff of foreign country j does not change as part of any bilateral agreement between the home country and foreign country i. Otherwise, the basic rules with which we begin are very permissive: they allow that the home country can impose discriminatory tariffs against the imports from its trading partners, and even that the home country's tariff on imports from foreign country j is not bound by the initial agreement when it negotiates with foreign country i. Not surprisingly, in this permissive setting, we observe that the welfare of the non-participating foreign government is poorly protected. Indeed, under these basic rules, no initial efficient agreement is stable.

We next strengthen the rules of negotiation and impose that a tariff concession made in the initial agreement is "bound" and cannot be reversed in a subsequent bilateral negotiation, unless the trading partner on whose exports the bound tariff applies is represented. We note that bindings may be either strict (a commitment to a particular tariff level) or weak (a commitment to a maximum tariff level), where the latter is the interpretation of bindings adopted in GATT. But despite this additional restriction, we confirm that a fundamental problem of bilateral

opportunism still accompanies any efficient set of tariffs: starting from any initial set of efficient tariffs, 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. 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 unstable any efficient tariff combination, even when the tariff that the home government applies to exports from foreign country j is bound (strictly or weakly).

Having demonstrated that the bilateral opportunism problem is not resolved by a bindings restriction alone, we next consider further restrictions on the rules of negotiation. We first consider a "reciprocal market access rule." This rule, which is closely related to the Kemp-Wan rule (Kemp and Wan, 1976) that has been developed for preferential trading agreements, requires that bilateral negotiations between the home government and the government of foreign country i not upset the "market access relations" (i.e., bilateral trade volumes) between the home country and foreign country j. Whatever the particular representation of the welfare of the government of foreign country j, we find that bilateral tariff adjustments that conform to this rule preserve the welfare of the non-participating government. The reciprocal market access rule therefore directly precludes the possibility that a future bilateral agreement may appropriate welfare from a non-participating government. An immediate consequence is that every initial efficient tariff vector is stable when any future bilateral negotiation must conform to this rule, and hence the reciprocal market access rule "solves" the bilateral opportunism problem.

While the reciprocal market access rule has this desirable property, we note that this rule also has some practical limitations. Primary among them is that this rule implants a multilateral element into a bilateral negotiation. For instance, if the governments of the home country and foreign country i form a bilateral agreement in which they lower the tariffs that they apply to one another's exports, then the reciprocal market access rule requires as well that the government of the home country appropriately lowers the tariff that applies to exports from the non-participating foreign country j. Ideally, one would prefer a set of rules for bilateral negotiations that do not require subtle adjustments in the tariffs that apply to non-participants. Indeed, GATT does not contain an explicit reciprocal market access rule. It might be argued that Article XXIII serves as an implicit

reciprocal market access rule, as it permits a government to file a non-violation complaint if it believes that its market access has been compromised by the (lawful) negotiations of others, but this approach is likely to prove cumbersome as a general solution to the problem of bilateral opportunism. With such considerations in mind, we therefore turn to the rules that are actually imposed in GATT and investigate whether they might be interpreted as offering a more practical solution to the bilateral opportunism problem. Two of GATT's central rules are non-discrimination and reciprocity. The former refers to the requirement that all tariffs conform to the MFN principle. The latter refers to the convention that negotiations result in tariff adjustments that generate equal changes in import and export volumes across negotiating partners. We are interested in the extent to which these essential elements of GATT law and practice may limit the ability of negotiating governments to appropriate welfare from non-participating governments.

We first consider the MFN rule. This rule changes the tariff-setting environment in a direct way: owing to the common treatment of foreign trading partners that the MFN rule requires, efficient outcomes that would require discriminatory tariffs are no longer feasible. This is a potential cost of MFN, which must be weighed against any potential stability benefits. However, despite the requisite common treatment of foreign trading partners, we find that the potential stability benefits of the MFN rule are limited. For example, in the absence of bindings, we find that every MFN-efficient tariff vector save one (corresponding to multilateral free trade when governments maximize national income) is unstable. The addition of bindings restrictions enhances the stabilizing properties of MFN, but even with bindings a range of MFN-efficient tariff vectors continue to be unstable under the MFN rule. Hence, the MFN requirement partially resolves the bilateral opportunism problem, but it alone cannot solve this problem completely.

We then introduce a further restriction on bilateral negotiations, and suppose that the initial tariff vector conforms to the MFN requirement and that any future bilateral negotiation must satisfy both the MFN rule and the rule of reciprocity. Our central finding is that, together, these two rules effectively mimic the reciprocal market access rule, serving to stabilize *every* MFN-efficient tariff vector. In essence, while the emphasis that governments place on reciprocity is often criticized as reflecting unsound "mercantilist" reasoning, we demonstrate that in the presence of MFN the rule of reciprocity is transformed into the reciprocal market access rule, and thus has the desirable by-product of maintaining the welfare of any unrepresented government. In this way, GATT's rules of MFN and reciprocity

can be understood to provide a solution to the problem of bilateral opportunism.

If GATT's rules solve the bilateral opportunism problem, then what are we to make of non-violation nullification-and-impairment complaints against countries who have undertaken bilateral negotiations with other partners? After all, under such complaints there is no allegation that any of GATT's rules have been broken. We make two observations which help to place our results in context. First, while we model MFN and reciprocity as formal and rigid rules, their application in GATT practice is more qualified. For example, GATT Article XXIV embodies an important exception to the MFN rule, as this article stipulates conditions under which the formation of discriminatory preferential agreements is permitted. Likewise, the application of reciprocity in GATT has elements of both formal rules and informal norms. A second observation in this regard is that new complications arise when many goods are considered. In the penultimate section of the paper, 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.

With these observations in mind, we interpret our results as describing the broad role that MFN and reciprocity may play in limiting the scope for bilateral opportunism. Our findings also identify important exceptions to these rules (e.g., preferential agreements) under which opportunism may be a heightened concern. More generally, we conclude from these observations that the rules of MFN and reciprocity may be understood in GATT 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 dispute settlement procedures, and that the ability of governments to bring non-violation complaints can serve an important role as a "second line of defense" against this problem.

This paper is related to a growing literature concerned with interpreting the institutional features of GATT.[3] Papers by Caplin and Krishna (1988), Ludema (1991), and McCalman (1997) focus on evaluating the properties of tariff negotiations under MFN, but they do not consider the bilateral opportunism problem that is our focus here, nor do they explore the effects of reciprocity (see Staiger, 1995,

[3]Our paper is also related to recent work in contract theory where one player negotiates contracts with each of several other players, and the final actions by these other players impose externalities upon one another (see McAfee and Schwartz, 1994, for an early application in which a manufacturer negotiates with two retailers).

for a review of this literature). Our earlier paper (Bagwell and Staiger, forthcoming) takes as its focus GATT's rules of reciprocity and non-discrimination, but emphasizes other applications of the reciprocity rule in GATT, and develops the related but distinct view that reciprocity and non-discrimination offer governments a path of escape from a terms-of-trade-driven Prisoners' Dilemma. Finally, Ethier (1998) independently raises some of the issues we consider here.

The paper proceeds as follows. Section 2 presents the model in a discriminatory tariff-setting environment. Section 3 defines a criterion with which different negotiation rules might be assessed. Section 4 then characterizes the set of efficient tariffs in discriminatory environments, identifies the fundamental bilateral opportunism problem, and evaluates the reciprocal market access rule as a possible solution to this problem. Section 5 considers an MFN environment, confirms that the problem of bilateral opportunism remains, and shows that reciprocity and MFN together provide the solution. An illustrative 2-stage negotiation game is presented in Section 6 to more fully evaluate the implications of our findings for bargaining outcomes. A many-goods extension of our main results is contained in Section 7. Finally, Section 8 concludes. Omitted proofs are collected in an Appendix section.

2. The Model

In this section, we define a two-good general-equilibrium model of trade between three countries. We describe as well a general set of preferences for governments that allows for both economic and political considerations. The model and preferences are similar to those presented in Bagwell and Staiger (forthcoming).

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.[4]

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.[5] 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 $p^{wi} \equiv p_x^{*i}/p_y$. 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: $p = \tau^i p^{wi} \equiv p(\tau^i, p^{wi})$ 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:

$$p^{wi} = [\tau^j/\tau^i]p^{wj}. \tag{2.1}$$

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 is given simply as p^{wi}.

We consider next the production, consumption, import and export volumes in each country. We begin with foreign country i. Production in this country is determined by selecting the point on its production possibilities frontier at which the marginal transformation between x and y is equal to the local relative price: $Q_z^{*i} = Q_z^{*i}(p^{*i})$ for $z = x, y$. 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

[4]This trading pattern will arise 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 will be assured, for example, if there exist transportation costs between foreign countries that are large when compared to the extent to which home tariffs may be discriminatory. 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.

[5]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.

which we measure in units of the export good y at local prices. We represent consumption as $D_z^{*i} = D_z^{*i}(p^{*i}, R^{*i})$ for $z = x, y$. 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 we note that tariff revenue is an increasing function of 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 $C_z^{*i}(p^{*i}, p^{wi}) \equiv D_z^{*i}(p^{*i}, R^{*i}(p^{*i}, p^{wi}))$ for $z = x, y$. Finally, for foreign country i, imports of good y are represented as $M_y^{*i}(p^{*i}, p^{wi}) \equiv C_y^{*i}(p^{*i}, p^{wi}) - Q_y^{*i}(p^{*i})$, and exports of good x are given as $E_x^{*i}(p^{*i}, p^{wi}) \equiv Q_x^{*i}(p^{*i}) - C_x^{*i}(p^{*i}, p^{wi})$. In this way, for each foreign country, the production, consumption, import and export quantities are determined, once tariffs and world prices (and thus foreign local prices) are given.

We turn now to the corresponding volumes in the home country. The home country has multiple trading partners, with whom it may experience different terms of trade, and this complicates somewhat the expression of domestic quantities. This complication does not affect the determination of domestic production, which is found at the point on the domestic production possibilities frontier where the marginal transformation between x and y is equal to the local relative price: $Q_z = Q_z(p)$ for $z = x, y$. And domestic consumption of each good is likewise determined as a function of the local relative price and domestic tariff revenue: $D_z(p, R)$ for $z = x, y$, where tariff revenue is distributed lump-sum to domestic consumers and measured in units of the export good x in local prices. But, in light of the possibility of discriminatory tariffs, domestic tariff revenue depends upon both the total volume of x imported by the domestic country and the composition of this given volume across the foreign trading partners.

To construct an expression for domestic tariff revenue, we define bilateral trade shares by

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

We then define the domestic country's *multilateral terms of trade* by the trade-weighted average of the set of bilateral world prices:

$$T(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \equiv \sum_{i=1,2} s_x^{*i}(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \cdot p^{wi}.^{6}$$

With this definition, domestic tariff revenue can be represented implicitly as

[6] 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.

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

or $R = R(p, T)$.

We now may represent the domestic country's consumption as $C_z(p, T) \equiv D_z(p, R(p, T))$ for $z = x, y$. Home country imports of x thus may be denoted as $M_x(p, T) \equiv C_x(p, T) - Q_x(p)$, while home country exports of y may be represented as $E_y(p, T) \equiv Q_y(p) - C_y(p, T)$. In what follows, we will refer to T simply as the home country's terms of trade. Notice from (2.1) that, 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. Observe that domestic production, consumption, import and export volumes are all implied, once the world prices and tariffs (and thus the local prices and terms of trade) are given.

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

$$T(p^{*1}, p^{*2}, p^{w1}, p^{w2}) \cdot M_x(p, T(p^{*1}, p^{*2}, p^{w1}, p^{w2})) = E_y(p, T(p^{*1}, p^{*2}, p^{w1}, p^{w2})); \tag{2.2}$$

and

$$M_y^{*i}(p^{*i}, p^{wi}) = p^{wi} \cdot E_x^{*i}(p^{*i}, p^{wi}), i = 1, 2 \tag{2.3}$$

We now suppose that domestic and foreign tariffs, $\{\tau^1, \tau^2\}$ and $\{\tau^{*1}, \tau^{*2}\}$ respectively, are given, and consider the determination of the world prices. One restriction on world prices is given by the market-clearing requirement:

$$M_x(p, T(p^{*1}, p^{*2}, p^{w1}, p^{w2})) = \sum_{i=1,2} E_x^{*i}(p^{*i}, p^{wi}) \tag{2.4}$$

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 $\tilde{p}^{wi}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ for i=1,2. 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, and this in turn implies the equilibrium values for all local prices and quantities.

2.2. Prices and Tariffs

Our next step is to impose some structure on 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 principle. We now impose some basic assumptions, which are maintained in the interpretation of the analysis that follows in subsequent sections.

Beginning with the discriminatory case, we impose the following assumptions: (i). $\widetilde{p}^{w1}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ is increasing in τ^2, τ^{*1} and τ^{*2} and is decreasing in τ^1, and (ii). $\widetilde{p}^{w2}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ is increasing in τ^1, τ^{*1} and τ^{*2} and is decreasing in τ^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 $\widetilde{p}^{w}(\tau, \tau^{*1}, \tau^{*2})$. Our assumption for this case is: $\widetilde{p}^{w}(\tau, \tau^{*1}, \tau^{*2})$ is increasing in τ^{*1} and τ^{*2} and is decreasing in τ. 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 a deterioration of the terms of trade for foreign country i. This amounts to an assumption that the direct effect of a higher home tariff on foreign country i's exports outweighs the indirect effect of the higher home tariff on foreign country j's exports.

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 $W^{*i}(p^{*i}, \widetilde{p}^{wi})$ for i = 1,2, where all prices and terms of trade are evaluated at their market-clearing levels. The assumption that we impose is that, with local prices held fixed, each government strictly prefers an improvement in its terms of trade: $W_T(p, T) < 0$ and $W^{*i}_{p^{wi}}(p^{*i}, \widetilde{p}^{wi}) > 0$.

To understand this assumption, it is useful to refer to Figure 1. There, we

depict combinations of τ^i and τ^{*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 the purpose of this illustration, we suppose further that an increase in τ^{*i} results in a decrease in the local relative price in this country.[7] Now, let us suppose that we begin at point A. If the home country were to raise τ^i at the same time that foreign country i were to lower τ^{*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, and so our assumption that $W^{*i}_{p^{wi}}(p^{*i}, \tilde{p}^{wi}) > 0$ simply means that the implied income redistribution from 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 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 paper (Bagwell and Staiger, forthcoming), the leading political-economy models of trade policy can all be captured within this formulation.[8]

3. Negotiation Rules and Stable Trade Agreements

With the basic economic model now described, we are prepared to evaluate different rules under which trade agreements may be negotiated. In the present section, our goal is to put forth a criterion with which different negotiation rules might be assessed. Using this criterion, we evaluate a variety of negotiation rules in subsequent sections.

In our earlier work (Bagwell and Staiger, forthcoming), we explored how GATT's rules may help to protect weak governments from exploitation in negotiations with their stronger trading partners, thereby solving a hold-up problem that could otherwise diminish the participation of weaker governments in GATT.

[7] In other words, local relative prices do not succumb to the Metzler paradox.

[8] 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.

Here, we ask whether GATT's rules also serve to protect governments from exploitation in future negotiations to which they are not party. In particular, we are interested in whether the rules of negotiation protect the value of the concessions secured by one government as part of an initial multilateral agreement, when other governments may later enter into further bilateral negotiations.[9]

As mentioned in the Introduction, the extent to which the rules of negotiation protect through time the value of concessions is of central importance for the functioning of the GATT system. Indeed, if the rules of negotiation were inadequate in this regard, then forward-looking governments would approach an initial multilateral negotiation with caution, with the likely consequence that only modest concessions would be exchanged. Of course, a complete analysis of this possibility requires a dynamic model, in which the specific structure of negotiations and the patience (and probable tenure) of governments are detailed. In a later section of the paper, we develop a simple dynamic model of negotiations along these lines. For now, however, we take the initial multilateral agreement as given. Our purpose is to assess the stability of this multilateral agreement to the possibility of future bilateral trade agreements between the home country and either of its two trading partners, when the nature of the future bilateral agreement is constrained by rules of negotiation. In the remainder of this section, we prepare for this analysis, by offering formal definitions for a "negotiation rule" and a "stable" trade agreement.

A negotiation rule R is defined by a triplet $\{A_R, r_1, r_2\}$, where $A_R \subset \Re^4$ is the set of exogenous initial tariff vectors, $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$, that is feasible under the rule R and $r_i : A_R \rightarrow S(A_R)$ is a mapping from each vector of initial tariffs to the set of all subsets of A_R, which we denote as $S(A_R)$. We note that the rules of negotiation operate at two levels. First, the rules may restrict the initial tariffs that are considered. For example, under the MFN rule, the initial tariffs must satisfy $\tau^1 = \tau^2$, and we may capture this with the requirement that $A_R \equiv \{(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \mid \tau^1 = \tau^2\}$. Second, the rules of negotiation may restrict the manner in which the home government and foreign government i may *change* the existing tariffs, $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$, into a vector of new tariffs, $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2})$, as part of their bilateral negotiation. These restrictions are captured by the mapping r_i. Notice that r_i maps into subsets of A_R; thus, if, for example, the initial tariffs are restricted via A_R to satisfy the MFN rule, then the new tariff vector must also

[9]In practice, bilateral trade negotiations are prominent both within official multilateral negotiation "rounds" and outside of such rounds. In either case, the negotiations must conform to GATT/WTO rules of negotiation (see Jackson, 1969, pp. 217- 248).

satisfy this rule.

We place restrictions on bilateral negotiations in two steps. First, we impose some "basic" restrictions on the mapping r_i that simply capture the meaning of a bilateral negotiation. These restrictions are maintained throughout the analysis that follows. Next, in subsequent sections, we refer to particular negotiation rules that are prominent in GATT practice and discussion. These rules correspond to further restrictions that may be imposed on bilateral negotiations.

We impose three basic restrictions on the bilateral negotiation mapping, r_i. They are contained in the following:

Assumption 1 (Basic Restrictions): *The following basic restrictions are imposed on r_i, for i,j=1,2 and $i \neq j$:*[10]
(i). if $(\tau^1,\tau^2,\tau^{*1},\tau^{*2}) \in A_R$, *then* $(\tau^1,\tau^2,\tau^{*1},\tau^{*2}) \in r_i(\tau^1,\tau^2,\tau^{*1},\tau^{*2})$.
(ii). $(\tilde{\tau}^1,\tilde{\tau}^2,\tilde{\tau}^{*1},\tilde{\tau}^{*2}) \in r_1(\tau^1,\tau^2,\tau^{*1},\tau^{*2})$ *if and only if* $(\tilde{\tau}^2,\tilde{\tau}^1,\tilde{\tau}^{*2},\tilde{\tau}^{*1}) \in r_2(\tau^2,\tau^1,\tau^{*2},\tau^{*1})$.
(iii). if $(\tilde{\tau}^1,\tilde{\tau}^2,\tilde{\tau}^{*1},\tilde{\tau}^{*2}) \in r_i(\tau^1,\tau^2,\tau^{*1},\tau^{*2})$, *then* $\tilde{\tau}^{*j} = \tau^{*j}$.

In words, we assume that the bilateral negotiation between the governments of the home country and foreign country i are constrained by certain basic rules, which may be represented by a mapping r_i that (i). permits these governments to maintain the initial agreement; (ii). applies symmetrically across the two foreign trading partners; and (iii). recognizes that τ^{*j} does not change as part of any bilateral agreement between the home country and foreign country i.[11]

The full family of negotiation rules consistent with Assumption 1 is quite large and includes a number of important candidate rules for consideration. For example, as mentioned above, the negotiation rule which always requires MFN tariffs from the home country is in this family. In this case, the set of feasible initial tariffs is given as $A_R = \{(\tau^1,\tau^2,\tau^{*1},\tau^{*2}) \mid \tau^1 = \tau^2\}$, and, in light of the basic restrictions just defined, the bilateral negotiation between the governments of the home country and foreign country i must select tariffs from the subset $\{(\tilde{\tau}^1,\tilde{\tau}^2,\tilde{\tau}^{*1},\tilde{\tau}^{*2}) \mid \tilde{\tau}^1 = \tilde{\tau}^2, \tilde{\tau}^{*j} = \tau^{*j}\}$, for i, j=1,2 and $i \neq j$.

With the definition of a negotiation rule R in hand, we turn next to a formal definition of stability.

[10] For any tariff vector, the first (second) argument is the tariff placed by the home country on imports from foreign country 1 (2), and the third (fourth) argument is the tariff placed by foreign country 1 (2) on imports from the home country.

[11] Notice that we do not here restrict whether the government of the home country can alter τ^j as part of a bilateral negotiation with the government of foreign country i. We consider the corresponding issue of "bindings" in subsequent sections, when we impose further restrictions.

Definition (Stability): *A vector of tariffs* $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ *is stable under negotiation rule* R *if*
(i). $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \in A_R$, *and*
(ii). there does not exist $i \in \{1,2\}$ *and* $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2}) \in r_i(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ *such that* $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2})$ *offers a Pareto gain to the governments of the home-country and foreign-country* i *as compared to* $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$.

In other words, a vector of tariffs is stable under negotiation rule R if the tariffs are consistent with the rule, and the rule precludes future mutually-beneficial bilateral negotiations between the home government and either foreign government.[12] As mentioned in the Introduction, we are especially interested in the extent to which a given set of rules serves to stabilize *efficient* tariff vectors, for then any mutually-beneficial negotiation would be "opportunistic," i.e., come at the expense of the excluded government.

Finally, let us be clear about what we are *not* doing. We are not seeking to determine the "optimal" rule within the full family of negotiation rules consistent with Assumption 1. Were we attempting to do so, we might for example consider a negotiation rule under which governments can only select efficient tariffs in their initial negotiations (i.e., A_R is the efficiency frontier), and then are allowed only to maintain their initial selection in any subsequent bilateral negotiation (i.e., r_i is the identity function). This negotiation rule clearly delivers an efficient outcome, but this is achieved at the cost of a dramatic over-simplification of the negotiation process. Alternatively, governments might be given veto power over any subsequent bilateral agreement to which they are not party. This, too, would ensure that opportunistic bilateral negotiations do not take place, but a moment's reflection suggests that a unanimous-consent rule has its own important shortcomings. In sum, we acknowledge that (unmodeled) concerns may make some rules more practical than others, and we therefore take as our focus the stability properties of trade agreements reached under the particular negotiation rules that are prominent in GATT practice and discussion.

[12]The stability criterion that we employ bears a loose analogy to the concept of Coalition-Proof Nash Equilibrium (CPNE), as formally defined by Bernheim, Peleg and Whinston (1987), in that we fix the tariff of the country outside the bilateral coalition and then consider possible gains within the coalition. Important differences exist, however. First, we are interested in bilateral negotiations between trading partners; thus, we do not consider all coalitions, and there are no subcoalitions (other than singletons). Second, we restrict the behavior of the coalition members with rules of negotiation, and then ask only if there exist tariffs under which each of the two coalition members may gain.

4. Efficient Tariffs and Negotiation Rules in Discriminatory Environments

In this section, we represent government preferences in "reduced form" and strengthen slightly our basic assumptions. We then characterize the set of efficient tariffs among the three countries, under the assumption that discriminatory tariffs are permitted. With this characterization in hand, we next establish that *no* efficient tariffs are stable without further restrictions on the rules of negotiation. We then consider further restrictions on the rules of negotiation under which efficient tariffs may become stable.

4.1. Government Preferences in Reduced Form

To begin, we represent government welfare in reduced form as a direct function of tariffs. In particular, let $\widehat{W}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \equiv W(p, T)$ and $\widehat{W}^{*i}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \equiv W^{*i}(p^{*i}, \tilde{p}^{wi})$, where all prices and terms of trade are evaluated at their market-clearing levels.

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

Assumption 2 (Externalities): *We restrict A_R to include only tariffs for which, for i, j=1,2 and $i \neq j$:*
(i). $\widehat{W}_{\tau^i} > 0$ and $\widehat{W}^{*i}_{\tau^{*i}} > 0$;
(ii). $\widehat{W}_{\tau^{*i}} < 0$ and $\widehat{W}^{*i}_{\tau^i} < 0$; and
(iii). $\widehat{W}^{*i}_{\tau^{*j}} > 0$ and $\widehat{W}^{*i}_{\tau^j} > 0$.

Thus, we consider negotiated tariffs at which (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 assumptions yield a negotiation environment in which 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. Further, foreign government i gains when the level of protection between foreign country j and the home country is increased.

These reduced-form preferences are broadly consistent with those attributed to government trade-policy negotiators (see, e.g., Krugman (1991, 1997)). But

do these preferences make "economic sense?" Krugman (1991, 1997) has argued forcefully that they do not.[13] We therefore emphasize that Assumption 2 may be related back to the model developed in Section 2, and that in this context these preferences do indeed admit a simple economic interpretation. In essence, our interpretation requires that each government's preferences are sufficiently sensitive to the terms-of-trade implications of trade-policy choices at all tariff vectors in A_R.[14]

To see this interpretation, consider the preferences of the government of foreign country i, and observe that part (i) may be re-written for this government as:

$$\widehat{W}^{*i}_{\tau^{*i}} \equiv W^{*i}_{p^{*i}} \frac{dp^{*i}}{d\tau^{*i}} + W^{*i}_{p^{wi}} \frac{\partial \widetilde{p}^{wi}}{\partial \tau^{*i}} > 0.$$

As this expression reveals, a government's welfare is affected by its own tariff through the effects that this tariff has on its local relative price and terms of trade. The natural case (i.e., the case arising absent the Metzler paradox) is one in which a higher tariff imposed by the government of foreign country i leads to a lower local relative price in foreign country i (i.e., $\frac{dp^{*i}}{d\tau^{*i}} < 0$). Under the assumptions of our basic economic model, it then follows that the government of foreign country i prefers to increase its own tariff provided that $W^{*i}_{p^{*i}}$ is not too positive, so that the beneficial terms-of-trade consequences of such an act overwhelm any possible negative effects that the associated local relative price movements imply.

The sign of $W^{*i}_{p^{*i}}$ in turn indicates whether this government would prefer a higher or lower local relative price, were mutual tariff adjustments undertaken that maintained its world price. This evaluation is illustrated in Figure 1, where the point C corresponds to the preferred local relative price for foreign government i, given the world price (i.e., at point C, $W^{*i}_{p^{*i}} = 0$). When $W^{*i}_{p^{*i}}$ is positive, the local relative price is lower than preferred, which is to say that the foreign government of country i would prefer more trade at the given world price (i.e., the tariffs rest at a point such as point D). With Assumption 2 we thus ensure that, for all tariff vectors in A_R, the government of foreign country i is never so

[13] Ethier (1998) adopts this perspective as well. He imposes the behavioral assumption that governments "do what they claim to be doing," but he does not attempt to develop an economic interpretation for the presumed preferences.

[14] This interpretation is developed more fully in our earlier paper (Bagwell and Staiger, forthcoming). It bears emphasis that the role of Assumption 2 is not to further restrict preferences (beyond the restrictions described in Section 2), but rather to restrict the set of trade agreements to which our stability analysis applies.

eager to achieve more trade that it would be willing even to unilaterally lower its own tariff and experience the corresponding terms-of-trade loss (i.e., Assumption 2 ensures that a movement from D to D' in Figure 1 is not appealing). We have been careful to explain this reasoning in terms of the underlying local and world price effects, since an understanding of these effects is important for what follows. More broadly, however, we are simply requiring in part (i) of Assumption 2 that tariffs are below their best-response values. The interpretation of the remaining parts of Assumption 2 may be seen analogously.

Proceeding with this assumption and our reduced-form representation of government preferences, we now characterize efficient tariffs and assess the potential for opportunistic bilateral agreements. We return to emphasize the underlying interpretation developed above when we consider possible rules that may address the opportunism problem.

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, $(\tau_e^1, \tau_e^2, \tau_e^{*1}, \tau_e^{*2})$, must therefore solve the following program:

Program W: *Choose* $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ *to maximize* $\widehat{W}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$

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

We omit a formal analysis of this program, as the solution may be easily characterized with the assistance of some simple figures. We begin by stating our first proposition:

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

$$\frac{\widehat{W}^{*j}_{\tau^i}}{\widehat{W}^{*j}_{\tau^{*i}}} > 0 > \frac{\widehat{W}_{\tau^i}}{\widehat{W}_{\tau^{*i}}} > \frac{\widehat{W}^{*i}_{\tau^i}}{\widehat{W}^{*i}_{\tau^{*i}}}.$$

To interpret the characterization, we refer to Figure 2. With τ^i on the vertical axis and τ^{*i} on the horizontal axis, we observe first that the iso-welfare curve for

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 an efficient tariff vector leaves a lens in which the governments of the home country and foreign country i could experience welfare gains.[15] Importantly, 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 2 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 τ^i and τ^{*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 τ^j and τ^{*j} can then be found that ensure gains for all three governments.[16] Therefore, if the 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.

[15] For each iso-welfare curve, the depicted arrows indicate the direction in which welfare rises.

[16] 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 τ^i and τ^{*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 τ^j and lower τ^{*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, it suffices to pick tariff changes that satisfy: $d\tau^{*i} = \varepsilon_i > 0, d\tau^i =$

4.3. The Stability of Efficient Tariffs

We next consider the stability of efficient tariffs. We begin by noting that, under Assumptions 1 and 2, no tariffs in A_R are stable. This finding is immediate, since the restrictions allowed in these assumptions permit the home government to raise τ^j as part of its bilateral negotiation with the government of foreign country i. Further, under Assumption 2, the home government and the government of foreign country i both gain when the home government raises τ^j.

This observation motivates a further restriction on the rules of bilateral negotiations. In particular, a natural rule of negotiation is that a tariff concession made in a previous agreement is "bound" and cannot be reversed in a subsequent negotiation, unless the trading partner on whose exports the bound tariff applies is represented. Such a restriction might be imposed in either of two ways. First, it may be that the binding is *strict*: in any future bilateral negotiation with the government of foreign country i, the home government is not allowed to *alter* the tariff that it had previously agreed to apply to exports from foreign country j. Alternatively, the binding may be *weak*, specifying only that the home government is not allowed in such a future bilateral negotiation to *raise* the tariff that it had previously agreed to apply to exports from foreign country j. The weak binding case grants governments more freedom when conducting their bilateral negotiations, and it is this restriction that is encoded in GATT (see Jackson, 1969, pp. 201-211). Either form of the binding restriction eliminates the potential of the home government to "destabilize" an efficient agreement by later raising τ^j.

The following definition formalizes the two forms that the binding restriction may take:

Definition (Bindings): *Bindings impose the further restrictions on r_i, for i,j=1,2 and $i \neq j$:*
(A). if $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2}) \in r_i(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$, then $\tilde{\tau}^j = \tau^j$.
(B). if $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2}) \in r_i(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$, then $\tilde{\tau}^j \leq \tau^j$.

Part (A) of this definition captures the further restriction of a strict binding, while part (B) corresponds to the further restriction of a weak binding. Below, when we refer only to "bindings," we describe results that apply in either situation.

$-[\frac{\widehat{W}^{*i}_{\tau^{*i}}}{\widehat{W}^{*i}_{\tau^i}}]\varepsilon_i > 0, d\tau^{*j} = -\varepsilon_j < 0$ and $d\tau^j = [\frac{\widehat{W}^{*i}_{\tau^{*j}}}{\widehat{W}^{*i}_{\tau^j}}]\varepsilon_j > 0$, where $\frac{\varepsilon_i}{\varepsilon_j} > \{\frac{\widehat{W}^{*j}_{\tau^j}}{\widehat{W}^{*j}_{\tau^i}}\} \frac{\{\frac{\widehat{W}^{*j}_{\tau^{*j}}}{\widehat{W}^{*j}_{\tau^j}} - \frac{\widehat{W}^{*i}_{\tau^{*j}}}{\widehat{W}^{*i}_{\tau^j}}\}}{\{\frac{\widehat{W}^{*j}_{\tau^{*i}}}{\widehat{W}^{*j}_{\tau^i}} - \frac{\widehat{W}^{*i}_{\tau^{*i}}}{\widehat{W}^{*i}_{\tau^i}}\}} > 0.$

While the binding restriction prevents the government of the home country from opportunistically raising τ^j, this in itself is not sufficient to stabilize any efficient tariff vector. As the discussion in the previous subsection suggests, the governments of the home country and foreign country i can also gain in comparison to an initial efficient tariff arrangement by lowering the tariffs that they apply to one another (i.e., by moving into the lens). Formally:

Proposition 2 (Instability of Efficient Tariffs): *Whether or not bindings are imposed, no efficient tariff vector in A_R is stable.*

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 unstable any efficient tariff combination, even when the tariff that the home government applies to exports from foreign country j is bound (whether weakly or strictly).[17]

At this point, we have identified a problem of bilateral opportunism that emerges in tariff negotiations across multiple partners. The restrictions on negotiations that we have heretofore imposed upon the negotiation process are incapable of preventing this problem; indeed, *every* efficient tariff arrangement is unstable. This motivates the search for additional rules by which negotiations might be required to abide.

4.4. The Reciprocal Market Access Rule

Among the candidate rules that might be considered to solve the problem of bilateral opportunism, perhaps the most natural rule is one which directly prohibits a bilateral agreement that alters the welfare of any non-participating government. In terms of Figure 2, such a rule would allow bilateral negotiations between the

[17] In light of Proposition 2, it is interesting to consider as well whether *any* tariff vectors in A_R are stable in the presence of bindings. For inefficient tariffs in A_R, there are three possible cases to consider: we may have a downward directional lens, an upward directional lens, or no lens at all between the home country and foreign country i. Instability clearly arises in the first two cases. On the other hand, if there is no lens between the home country and either of its foreign trading partners, then the initial agreement is stable in the presence of bindings. Figure 2 suggests that such an initial agreement is likely to involve excessive (i.e., supra-efficient) liberalization. This observation is analogous to findings reported by McAfee and Schwartz (1994) in their analysis of bilateral contracting and manufacturer-retailer relationships.

home country and foreign country i only over a set of tariffs that preserve the welfare of the government of foreign country j. While such a rule is appealing in the abstract, its practical merit is much less clear. In view of the many forms that government welfare functions may take, could a rule of this nature ever be defined in a practical way?

Progress in answering this question can be made by referring to the underlying model of Section 2. Recall first that Assumption 1 places τ^{*j} outside the reach of any bilateral agreement between the home country and foreign country i. We may thus conclude that the welfare of the government of foreign country j will be unaffected by bilateral negotiations between the governments of the home country and foreign country i, provided only that these negotiations do not alter $\widetilde{p}^{wj}$: with τ^{*j} untouched by any bilateral negotiation to which foreign country j is not party, the fixed $\widetilde{p}^{wj}$ implies as well a fixed p^{*j}, and therefore fixed welfare for the government of foreign country j. In terms of Figure 2, the underlying model of Section 2 therefore implies that the iso-welfare curve for the government of foreign country j is simply the $iso - \widetilde{p}^{wj}$ locus in this figure.[18]

This suggests the consideration of an additional rule of negotiation which would allow bilateral negotiations between the home country and foreign country i only over a set of tariffs that preserve $\widetilde{p}^{wj}$. This restriction would preserve the welfare of the unrepresented government whenever two governments negotiate bilaterally. Moreover, it can be given a simple interpretation as a "reciprocal market access rule." This is because, with τ^{*j} determined outside the bilateral negotiations between the home country and foreign country i, $\widetilde{p}^{wj}$ will be preserved if and only if the bilateral export and import volumes between the home country and foreign country j (i.e., the "market access" that each affords to the other) are left unaltered.[19]

[18] Formally, the slope of the iso-welfare curve of foreign country j in (τ^i, τ^{*i}) space is

$$-\frac{\widehat{W}^{*j}_{\tau^{*i}}}{\widehat{W}^{*j}_{\tau^i}} = -\frac{[W^{*j}_{p^{*j}}\frac{1}{\tau^{*j}} + W^{*j}_{p^{wj}}]\frac{\partial \widetilde{p}^{wj}}{\partial \tau^{*i}}}{[W^{*j}_{p^{*j}}\frac{1}{\tau^{*j}} + W^{*j}_{p^{wj}}]\frac{\partial \widetilde{p}^{wj}}{\partial \tau^{i}}} = -\frac{\frac{\partial \widetilde{p}^{wj}}{\partial \tau^{*i}}}{\frac{\partial \widetilde{p}^{wj}}{\partial \tau^{i}}},$$

from which we may confirm that the iso-welfare locus of the government of foreign country j is given by the $iso - \widetilde{p}^{wj}$ locus.

[19] If $\widetilde{p}^{wj}$ and τ^{*j} are held fixed, then $p^{*j} = \widetilde{p}^{wj}/\tau^{*j}$ is also fixed, and so both exports from foreign country j to the home country (i.e., $E^{*j}_x(p^{*j}, \widetilde{p}^{wj})$) and exports from the home country to foreign country j (i.e., $M^{*j}_y(p^{*j}, \widetilde{p}^{wj})$) are fixed as well. Going the other way, (2.3) for foreign country j implies that, if both exports from foreign country j to the home country and exports from the home country to foreign country j are fixed, then $\widetilde{p}^{wj}$ is fixed, too. Finally, we note that

We therefore consider the following definition:

Definition (Reciprocal Market Access Rule): *The Reciprocal Market Access Rule imposes the further restriction on r_i, for i,j=1,2 and $i \neq j$: if $(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2}) \in r_i(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$, then $\tilde{p}^{wj}(\tilde{\tau}^1, \tilde{\tau}^2, \tilde{\tau}^{*1}, \tilde{\tau}^{*2}) = \tilde{p}^{wj}(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$.*

We may now state:

Proposition 3 (Stability and the Reciprocal Market Access Rule): *Under the Reciprocal Market Access Rule, every efficient tariff vector in A_R is stable.*

Proposition 3 implies that a negotiation rule which serves to prevent governments from altering their market access relationships with countries not represented in the negotiations stabilizes every efficient tariff vector. As Figure 2 reveals, starting from an efficient tariff vector, a mutually beneficial bilateral agreement between the governments of the home country and foreign country i is possible only if they each lower their tariffs. This is not possible when we impose as well the reciprocal market access rule, since the welfare of the government of foreign country j is then preserved only if a reduction in τ^i is balanced against an increase in τ^{*i} (or vice versa). Any initial tariff agreement that is efficient is thus stable.

Notice that the effectiveness of this rule does not require a bindings restriction. If the government of the home country were to increase τ^j, then the reciprocal market access rule would require that the level of protection between the home country and foreign country i be increased in offsetting fashion so as to stabilize $\tilde{p}^{wj}$, and the welfare of the government of foreign country j would still be maintained. The reciprocal market access rule therefore protects the welfare of the non-participating government directly, and a bindings restriction is thus redundant. Simply, bindings or not, there is no way for the governments of the home country and foreign country i to experience mutual welfare gains through a bilateral agreement, when the initial agreement is efficient and the welfare of the government of foreign country j can not be reduced.

An interesting consequence of Proposition 3 is that the fascination of actual negotiators with "market access" concerns admits a simple economic interpretation. In the present context, we may understand this concern as reflecting a

---

the market access rule must be reciprocal: as Srinivasan (1998) and Winters (1997) note in their critique of McMillan's (1993) discussion of preferential trading agreements, if the negotiation rule requires only that exports from foreign country j to the home country are unaltered, then it need not follow that $\tilde{p}^{wj}$ is fixed.

desire to ensure that bilateral negotiations do not erode the value of existing concessions. More broadly, our analysis suggests that governments have a legitimate basis from which to approach their multilateral trading relationships with the goal of securing and then maintaining stable market access relationships with each of their important trading partners.

While we emphasize throughout the stability properties of efficient tariff vectors, it is interesting to observe that the reciprocal market access rule also destabilizes every inefficient tariff vector. In other words, under the reciprocal market access rule, a tariff vector in A_R is stable if and only if it is efficient. To see this, let us consider an inefficient tariff vector that gives rise to a downward directional lens (as in Figure 2) for the governments of the home country and foreign county i. The home government then has sufficient flexibility to create a mutually-beneficial bilateral agreement, while still respecting the reciprocal market access rule. In particular, it can lower τ^j and then enjoy bilateral gains with the government of foreign country i as they reduce their tariffs down into the lens. These adjustments have competing effects for the government of foreign country j, and these effects can be arranged to ensure that, on net, the welfare of foreign country j is unaltered. The governments of the home country and foreign country i can thus engineer a bilateral agreement that enables them to enjoy some of the remaining efficiency gains, without harming the welfare of the government of foreign country j. As a similar argument applies when the lens is upward directional, we conclude that every inefficient tariff vector is unstable under the reciprocal market access rule.[20] The reciprocal market access rule is thus in some respects ideal: it ensures that any initial efficient agreement is stable, and at the same time it does not encumber efficiency-enhancing bilateral agreements.[21]

[20] If there is no lens (in either direction) for either bilateral relationship, then (i). the governments of the home country and foreign country i may increase τ^i and τ^{*i} so as to maintain $\widehat{W}^{*i}$, thereby creating a first-order gain (second-order loss) for $\widehat{W}^{*j}$ ($\widehat{W}$); and (ii). the government of the home country may raise τ^j so as to achieve on net no overall change in $\widehat{W}^{*j}$, thereby creating a first-order gain for $\widehat{W}$ and $\widehat{W}^{*i}$. These adjustments satisfy the reciprocal market access rule and offer first-order gains to $\widehat{W}$ and $\widehat{W}^{*i}$.

[21] When coupled with a bindings restriction, however, the reciprocal market access rule does not destabilize all inefficient arrangements. For example, when negotiations are restricted by the reciprocal market access rule and a strict bindings rule, *all* tariffs in A_R are stable. This is because the government of the home country is prevented under strict bindings from entering into a bilateral agreement and then adjusting τ^j to preserve the welfare of the non-participating foreign government. Under the reciprocal market access rule and a weak bindings rule, inefficient tariff vectors are stable when they are characterized by an upward directional lens. The weak binding restriction then precludes a welfare-preserving tariff increase that applies to the exports

Nevertheless, there are important practical problems with the reciprocal market access rule. Primary among them is that the implementation of this rule would require something akin to multilateral representation in bilateral negotiations. This is because, when negotiating a bilateral agreement between themselves, the governments of the home country and foreign country i must consider the consequences of this agreement for the import and export volumes of the non-participating foreign country j, and any negotiated changes in τ^i and τ^{*i} must be accompanied by potentially subtle changes in τ^j to preserve existing market access relations between the home country and foreign country j.[22]

The "multilateralization" of bilateral bargains that is effectively required by the reciprocal market access rule is not necessarily an insurmountable problem. Indeed, though GATT does not contain an explicit reciprocal market access rule, it may be argued that member governments can gain representation to a bilateral negotiation implicitly through Article XXIII:1 (b). Under this Article, a member government is entitled to redress if it can show that a GATT benefit accruing to it is being nullified or impaired as the result of "...the application by another contracting party of any measure, whether or not it conflicts with the provisions of this Agreement...". Hence, a government may resort to filing a "non-violation" complaint if it believes that its interests have been compromised by the (lawful) negotiations of others, and in this way Article XXIII:1 (b) might serve as an implicit reciprocal market access rule.[23] However, while such complaints may provide a useful second line of defense, they are likely to be cumbersome as a means to provide the primary assurance that market access relations implied by existing tariff commitments won't be eroded by tariff commitments made at some point in the future. It is therefore important to search for more practical alternatives to an explicit reciprocal market access rule which, if adopted as rules of negotiation, might supply this primary assurance.[24]

---

of the non-participating foreign country.

[22] In this respect, the reciprocal market access rule shares the same problems that are often attributed to the Kemp-Wan (1976) rule that has been proposed for the treatment of preferential trade agreements.

[23] Alternatively, a government might be able to obtain multilateral representation directly, by securing a "third seat" at an essentially bilateral bargaining table. A good example of this may be found in Canada's decision to participate in the US-Mexico FTA negotiations, a decision which led to the creation of NAFTA. As Canada already had a free-trade pact with the United States and is not a major trading partner with Mexico, we may interpret Canada's participation as reflecting its desire to influence the bilateral negotiation directly and thereby preserve its market access with the United States.

[24] In fact, the broader notion that explicit GATT rules are in place to serve as a primary guard

In this regard, an intriguing candidate rule by which to stabilize market access relations against erosion in future negotiations is the MFN rule. After all, by requiring that $\tau^i = \tau^j$, the rule of MFN introduces a direct and readily verifiable link between the market access concessions that the home government offers to foreign country i in bilateral negotiations between them, and the market access concessions that the home government must extend as well to foreign country j. And intuitively, the implied promise to extend to j any future tariff concessions negotiated with i would seem to go a long way toward assuring j of its existing market access relations with the home country, thereby perhaps replicating the essential feature of the reciprocal market access rule. The success of the MFN rule in performing this function is the topic of the next section.

5. Efficient Tariffs and Negotiation Rules in MFN Environments

We turn now to the situation in which both the initial tariffs and the tariffs associated with any future bilateral negotiation must conform to the MFN rule. We begin by representing the government welfare functions for the MFN environment in reduced form.

5.1. Government Preferences in Reduced Form

We first formally define the restriction of MFN:

Definition (MFN Rule): *The MFN Rule imposes the further restriction that* $A_R = \{(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \mid \tau^1 = \tau^2 \equiv \tau\}$.

Notice that the MFN rule operates at two levels. First, we consider only initial tariff vectors that conform with the MFN requirement. Second, any future bilat-

against the erosion of concessions, and that recourse to non-violation complaints provides a useful but secondary backup procedure, is well-reflected in the writings of GATT 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...", 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).

eral negotiation that is conducted under the MFN rule is also restricted to include only MFN tariffs (since r_i maps to subsets of A_R).

When the home government is restricted by the MFN requirement, the total number of tariffs is reduced to three: $\tau \equiv \tau^1 = \tau^2$, τ^{*1} and τ^{*2}. For this situation, we may define the reduced-form preferences for governments as follows: $\widetilde{W}(\tau, \tau^{*1}, \tau^{*2}) \equiv \widehat{W}(\tau, \tau, \tau^{*1}, \tau^{*2}) \equiv W(p, T)$ and $\widetilde{W}^{*i}(\tau, \tau^{*1}, \tau^{*2}) \equiv \widehat{W}^{*i}(\tau, \tau, \tau^{*1}, \tau^{*2}) \equiv W^{*i}(p^{*i}, \tilde{p}^{wi})$, where all prices and terms of trade are evaluated at their market-clearing levels. 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 2 for discriminatory tariff environments, we now add to our basic restrictions (Assumption 1) an additional assumption in order to restrict attention to MFN tariffs for which externalities can be unambiguously signed:

Assumption 2' (Externalities: MFN): *We restrict A_R to include only tariffs for which, for i, j=1,2 and $i \neq j$:*
(i). $\widetilde{W}_{\tau} > 0$ *and* $\widetilde{W}^{*i}_{\tau^{*i}} > 0$;
(ii). $\widetilde{W}_{\tau^{*i}} < 0$ *and* $\widetilde{W}^{*i}_{\tau} < 0$; *and*
(iii). $\widetilde{W}^{*i}_{\tau^{*j}} > 0$.

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. As before, these assumptions are consistent with the preferences which governments take into trade negotiations, and the assumptions admit an economic interpretation if governments' preferences are sufficiently sensitive to the terms-of-trade implications of trade-policy choices at all tariff vectors in A_R.

5.2. Characterization of MFN-Efficient Tariffs

Our goal is to assess the stability of tariffs that are efficient in the MFN environment. We must therefore 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. Formally, an MFN-efficient vector of tariffs, $(\tau_m, \tau_m^{*1}, \tau_m^{*2})$, must solve the following program:

Program MFN – W: *Choose* $(\tau, \tau^{*1}, \tau^{*2})$ *to maximize* $\widetilde{W}(\tau, \tau^{*1}, \tau^{*2})$

$$s.t.\ \widetilde{W}^{*i}(\tau, \tau^{*1}, \tau^{*2}) \geq \overline{W}^{*i} \equiv \widetilde{W}^{*i}(\tau_m, \tau_m^{*1}, \tau_m^{*2}),\ for\ i = 1, 2$$

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 4 (MFN-Efficient Tariffs): *If* $(\tau_m, \tau_m^{*1}, \tau_m^{*2})$ *is an MFN-efficient vector of tariffs, then we must have that either:*

(i). $W_p > 0$, *and for every* $i \in \{1, 2\}$, $\frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial p^w}{\partial \tau^{*i}}} > \frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} > \frac{\widetilde{W}_\tau^{*i}}{\widetilde{W}_{\tau^{*i}}^{*i}}$ *and* $W_{p^{*i}}^{*i} > 0$;

(ii). $W_p < 0$, *and for every* $i \in \{1, 2\}$, $\frac{\widetilde{W}_\tau^{*i}}{\widetilde{W}_{\tau^{*i}}^{*i}} > \frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} > \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial p^w}{\partial \tau^{*i}}}$ *and* $W_{p^{*i}}^{*i} < 0$; *or*

(iii). $W_p = 0$, *and*

(a). for every $i \in \{1, 2\}$, $\frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial p^w}{\partial \tau^{*i}}}$, *and*

(b). there exists $i \in \{1, 2\}$ *such that* $\frac{\widetilde{W}_\tau^{*i}}{\widetilde{W}_{\tau^{*i}}^{*i}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial p^w}{\partial \tau^{*i}}}$ *and* $W_{p^{*i}}^{*i} = 0$.

To interpret this proposition, let us first suppose that $W_p > 0$. In the MFN setting, this means that the government of the home country prefers a higher local relative price and thus less trade volume, taking as given the world price. Proposition 4 then requires that $W_{p^{*i}}^{*i} > 0$ for each $i \in \{1, 2\}$, which is to say that the government of each foreign country prefers a higher local relative price and thus greater trade volume, taking as given the world price. The cases in which $W_p < 0$ and $W_p = 0$ can be interpreted similarly. The essential content of the proposition is thus that, for an MFN-efficient vector of tariffs, if the government of the home country seeks less (seeks greater) trade volume, then the government of each

foreign country seeks greater (seeks less) trade volume, while if the government of the home country achieves its preferred trade volume, then the government of at least one of the foreign countries must achieve its preferred trade volume as well.

Why is this so? We can understand the essential logic with reference to the illustrations in Figures 3A, B, and C. With τ on the vertical axis and τ^{*i} on the horizontal axis, we depict in these illustrations the iso-welfare curves of the governments of the home country and foreign country i. These curves are upward sloping under Assumption 2'. Depicted as well is the corresponding iso-$\widetilde{p}^w$ locus. When τ and τ^{*i} are adjusted in a fashion that maintains the world price, the welfare of the government of foreign country j is unaltered. In other words, the iso-$\widetilde{p}^w$ locus represents the iso-welfare curve of the government of foreign country j.[25] This curve is also upward sloping under Assumption 2'.

Consider now the relationship between the slope of the iso-$\widetilde{p}^w$ locus and the slopes of the iso-welfare curves for the governments of the home country and foreign country i. The iso-$\widetilde{p}^w$ locus is steeper than the iso-welfare curve of the government of the home country if and only if $-[\widetilde{W}_{\tau^{*i}}/\widetilde{W}_\tau] < -[\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}/\frac{\partial \widetilde{p}^w}{\partial \tau}]$, or equivalently $[\widetilde{W}_\tau/\widetilde{W}_{\tau^{*i}}] < [\frac{\partial \widetilde{p}^w}{\partial \tau}/\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}]$. The relationship between the slope of the iso-$\widetilde{p}^w$ locus and that of the iso-welfare curve of the government of foreign country i can be characterized in exactly analogous fashion. Furthermore, as Figure 3A suggests, the iso-$\widetilde{p}^w$ locus is steeper than the iso-welfare curve of the home government if and only if the government of the home country would seek less trade, when taking as given the world price (corresponding to point H).[26] Generalizing this logic, we find that the iso-welfare curve of the government of the home country is flatter than (steeper than) (tangent to) the iso-$\widetilde{p}^w$ locus if and only if $W_p > 0$ ($W_p < 0$) ($W_p = 0$). In analogous fashion, we may verify that the iso-welfare curve of the government of foreign country i is flatter than (steeper

[25] To confirm this, observe that the slope of the iso-welfare curve of the government of foreign country j is given by $-\frac{\widetilde{W}^{*j}_{\tau^{*i}}}{\widetilde{W}^{*j}_{\tau}} = -\frac{[W^{*j}_{p^{*j}}\frac{1}{\tau^{*j}}+W^{*j}_{p^w}]\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}{[W^{*j}_{p^{*j}}\frac{1}{\tau^{*j}}+W^{*j}_{p^w}]\frac{\partial \widetilde{p}^w}{\partial \tau}} = -\frac{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}{\frac{\partial \widetilde{p}^w}{\partial \tau}}$.

[26] Formally, the iso-welfare curve of the government of the home country is flatter than the iso-$\widetilde{p}^w$ locus if and only if $-[\widetilde{W}_{\tau^{*i}}/\widetilde{W}_\tau] < -[\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}/\frac{\partial \widetilde{p}^w}{\partial \tau}]$. Under the assumptions of our basic economic model and Assumption 2', we may state this inequality in equivalent form as $\widetilde{W}_{\tau^{*i}}\frac{\partial \widetilde{p}^w}{\partial \tau} < \widetilde{W}_\tau \frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}$. But exploiting the structure of the model, this is in turn equivalent to

$$[W_p\tau + W_{p^w}]\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}\frac{\partial \widetilde{p}^w}{\partial \tau} < \{[W_p\tau + W_{p^w}]\frac{\partial \widetilde{p}^w}{\partial \tau} + W_p\widetilde{p}^w\}\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}},$$

which under the assumptions of the basic economic model is true if and only if $W_p > 0$.

than) (tangent to) the iso-$\widetilde{p}^w$ locus if and only if $W_{p^{*i}}^{*i} > 0$ ($W_{p^{*i}}^{*i} < 0$) ($W_{p^{*i}}^{*i} = 0$).

Finally, we consider the relationship between the slopes of the iso-welfare curves for the governments of the home country and foreign country i. In τ/τ^{*i} space, the home iso-welfare curve is steeper if and only if $-[\widetilde{W}_{\tau^{*i}}/\widetilde{W}_{\tau}] > -[\widetilde{W}_{\tau^{*i}}^{*i}/\widetilde{W}_{\tau}^{*i}]$, or equivalently $[\widetilde{W}_{\tau}/\widetilde{W}_{\tau^{*i}}] > [\widetilde{W}_{\tau}^{*i}/\widetilde{W}_{\tau^{*i}}^{*i}]$. Thus, part (i) of Proposition 4, for example, describes a situation in which the iso-$\widetilde{p}^w$ locus is steeper than the iso-welfare curves of the governments of the home country and foreign country i, and the iso-welfare curve of the government of the home country is steeper than that of the government of foreign country i.

With these relationships in place, we now consider Figure 3A. This figure illustrates the case in which $W_p > 0$. The government of the home country seeks less trade volume, given the world price, with its preferred outcome for the given world price occurring at the point of tangency H. Proposition 4 then implies that the government of foreign country i seeks more trade volume given the world price, and this is also reflected in Figure 3A. Finally, Proposition 4 further requires that the iso-welfare curve for the government of foreign country i is flatter than that of the government of the home country, and as a consequence Figure 3A depicts a lens that lies below the initial tariffs. Figure 3B presents the case where $W_p < 0$. Here, the home-country government seeks more trade volume at the given world price, with its preferred outcome for the given world price occurring at the point of tangency labelled L. Proposition 4 then implies that the government of foreign country i seeks less trade volume at the given world price, as Figure 3B indicates. Finally, Proposition 4 indicates as well that the iso-welfare curve for the government of foreign country i is now the steepest, and so Figure 3B depicts a lens that lies above the initial tariffs.

The remaining case, in which $W_p = 0$, is represented in Figure 3C. The home-country government achieves its preferred trade volume given the world price, and Proposition 4 requires that at least one foreign government also achieve its preferred trade volume. The three panels of Figure 3C depict the three possibilities for the remaining foreign government.[27] The bottom panel of Figure 3C depicts

[27] As the panels reveal, it is possible that an MFN-efficient tariff vector is characterized by one bilateral relationship that is described by a tangency and another bilateral relationship that is described by a lens. Alternative tariff arrangements can then be constructed that offer a first-order gain to the welfare of the "no-tangency" foreign government, while imposing only second-order losses upon the welfare of the other two governments. Given the restriction to MFN tariffs, however, there are insufficient instruments to compensate both the home government and the "tangency" foreign government for their second-order losses, and so the new arrangement does not Pareto dominate the original arrangement.

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 (forthcoming), 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. The Stability of MFN-Efficient Tariffs

We now consider the stability of an initial vector of efficient tariffs in the presence of the MFN requirement. An immediate observation is that there is no risk of bilateral opportunism if tariffs are required to conform to the MFN rule and bindings are strict: in this case, the home government cannot alter its tariff in subsequent bilateral negotiations, and so all tariff vectors in A_R are stable. The more interesting question is whether a bilateral opportunism problem arises when bindings are weak, or when there are no bindings. This question may be answered with reference to Figures 3A, 3B, and 3C.

Consider first Figure 3A. In this case, the MFN-efficient tariff vector cannot be stable, so long as bindings are not strict, as the home government and the government of foreign country i can negotiate a further reduction in τ and τ^{*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 reduction in $\widetilde{p}^w$ (a terms-of-trade decline). Hence, for MFN-efficient tariff vectors satisfying $W_p > 0$, there is a bilateral opportunism problem with or without (weak) bindings.

This case is of some special interest. Notice in particular that 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. To understand, recall that in this case the governments of the foreign countries each desire greater trade, while the government of the home country does not. The government of the home country, 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). This expansion in bilateral trade volume between the home country and foreign country i, however, may "crowd out" trade volume between the home country and foreign country j.[28] In the end, therefore, the government of foreign country j experiences a terms of trade loss and also a possible reduction in trade volume. Its welfare thus falls, despite the fact that its exports confront a lower home-country tariff.

Consider next Figure 3B. Here the government of the home country seeks more trade volume, 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 for the home country. 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 both a terms of trade loss and a possible undesired increase in its trade volume. 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 unstable. On the other hand, with weak bindings, τ cannot be increased, and hence weak bindings ensures the stability of this tariff vector. Hence, for MFN-efficient tariff vectors satisfying $W_p < 0$, there is a bilateral opportunism problem if and only if bindings are absent.

Finally, consider Figure 3C. In this case, $W_p = 0$, and efficiency then requires as well that $W^{*i}_{p^{*i}} = 0$ for some $i = \{1, 2\}$, but not necessarily for both foreign countries. The top panel of the figure depicts the case in which $W^{*j}_{p^{*j}} > 0$. The governments of the home country and foreign country j 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 (weak) bindings. The middle panel of Figure 3C depicts the case in which $W^{*j}_{p^{*j}} < 0$, and here the governments of the home country and foreign country j 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 $W^{*j}_{p^{*j}} = 0$. 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

[28] The export volume from foreign country j falls if the reduction in domestic production in this country is not overwhelmed by the reduction in domestic consumption that the terms-of-trade loss implies.

hence it is stable whether or not (weak) bindings are imposed. Hence, for MFN politically optimal tariffs, there is no bilateral opportunism problem, regardless of the nature of bindings.

We may now state:

Proposition 5 (Stability and the MFN Rule):
(A). Under the MFN Rule, an MFN-efficient tariff vector in A_R is stable if and only if it is politically optimal.
(B). Under weak bindings and the MFN Rule, an MFN-efficient tariff vector in A_R is stable if and only if: (i) $W_p < 0$; or (ii) $W_p = 0$ and $W^{*i}_{p^{*i}} \leq 0$ for every $i = \{1, 2\}$.

As Proposition 5 indicates, the MFN rule offers a partial solution to the problem associated with bilateral opportunism. In the absence of bindings, the MFN rule stabilizes only one MFN-efficient tariff vector; and when joined with a weak bindings restriction, this rule stabilizes a subset of MFN-efficient tariff vectors (namely, those in which the government of the home country seeks more trade volume at fixed world prices). 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.

5.4. MFN and the Reciprocity Rule

It is instructive at this point to recall the essential feature of the reciprocal market access rule, and to assess why MFN fails to protect the welfare of non-participating governments to the same degree. Under the reciprocal market access rule, the welfare of the government of foreign country j is unaffected by any bilateral negotiation between the home government and the government of foreign country i because $\tilde{p}^{wj}$ is unaltered. The restriction of MFN ensures that $\tilde{p}^{wj} = \tilde{p}^{wi} \equiv \tilde{p}^{w}$, but it does not guarantee that $\tilde{p}^{w}$ is preserved as a result of a bilateral negotiation between the governments of the home country and foreign county i, and thus it cannot guarantee the welfare of the government of foreign country j. This suggests that, in the presence of MFN, what is needed to replicate the essential feature of the reciprocal market access rule is an additional rule which serves to stabilize $\tilde{p}^{w}$. As we now establish, GATT's rule of reciprocity can serve just such a purpose.

As we have observed in Bagwell and Staiger (forthcoming), the GATT rule of reciprocity can be naturally defined as a restriction under which governments

consider tariff adjustments that generate equal changes in import and export volumes for each negotiating partner when valued at existing world prices.[29] An important implication of tariff changes that conform to reciprocity is that these changes imply fixed world prices between negotiating partners. Hence, in a discriminatory environment, if the home government and foreign government i were constrained in a bilateral negotiation to consider tariff choices that conform to reciprocity, then their negotiations would be over tariff combinations that preserve the world price $\widetilde{p}^{wi}$.[30] In discriminatory environments, therefore, reciprocity is clearly distinct from the reciprocal market access rule, since the former fixes $\widetilde{p}^{wi}$ whereas the latter fixes $\widetilde{p}^{wj}$. But when reciprocity is joined with the MFN restriction, the effects of reciprocity are multilateralized, so that $\widetilde{p}^{wj} = \widetilde{p}^{wi} \equiv \widetilde{p}^{w}$ is then also preserved. It is therefore not surprising that, when governments are held to MFN tariffs, reciprocity works just like the reciprocal market access rule in addressing the problem of bilateral opportunism.

To state this formally, we first define the tandem restrictions of MFN and reciprocity with the following additional restrictions:

Definition (MFN and Reciprocity Rules): *The MFN and Reciprocity Rules together impose the further restrictions that* $A_R = \{(\tau^1, \tau^2, \tau^{*1}, \tau^{*2}) \mid \tau^1 = \tau^2 \equiv \tau\}$, and *for i=1,2, if* $(\widetilde{\tau}, \widetilde{\tau}, \widetilde{\tau}^{*1}, \widetilde{\tau}^{*2}) \in r_i(\tau, \tau, \tau^{*1}, \tau^{*2})$, *then* $\widetilde{p}^{w}(\widetilde{\tau}, \widetilde{\tau}^{*1}, \widetilde{\tau}^{*2}) = \widetilde{p}^{w}(\tau, \tau^{*1}, \tau^{*2})$.

In analogy with the reciprocal market access rule, we may now state the properties of reciprocity in the presence of MFN:

Proposition 6 (Stability under the MFN and Reciprocity Rules): *Under the MFN and Reciprocity Rules, every MFN-efficient tariff vector in* A_R *is stable.*

The formal correspondence between the reciprocal market access rule and the combined rules of reciprocity and MFN may be seen by comparing Propositions

[29] Reciprocity arises in GATT both as a norm in trade liberalization negotiations and as an explicit rule when bindings are renegotiated to higher levels. We discuss further the role of reciprocity in GATT in our forthcoming paper.

[30] To see this, we may observe that an equal change in the volume imported from the home country by foreign country i (i.e., $M_y^{*i}(p^{*i}, \widetilde{p}^{wi})$) and the volume exported to the home country by foreign country i (i.e., $E_x^{*i}(p^{*i}, \widetilde{p}^{wi})$, given market clearing and valued at the existing world price, $\widetilde{p}^{wi}$) must from the balanced trade condition (2.3) preserve the world price between these trading partners (i.e., $\widetilde{p}^{wi}$).

3 and 6. Proposition 6 restricts consideration to MFN-efficient tariffs, but aside from this it is identical to Proposition 3.

We may thus conclude that the rules of reciprocity and MFN may be viewed as working in tandem to mimic the effects of the reciprocal market access rule and thereby serve to stabilize any efficient initial tariff vector. While the reciprocal market access rule ensures that all efficient tariff vectors are stable without restricting the instruments at the disposal of governments, it does demand something akin to multilateral representation in bilateral negotiations. This requirement is avoided with the combination of reciprocity and MFN, albeit at the cost of restricting the available set of government policy instruments. In effect, the MFN restriction serves as a simple means by which to "multilateralize" bilateral negotiations, and reciprocity then ensures that the multilateral presence so achieved is just sufficient to solve the problem of bilateral opportunism.[31]

6. An Illustrative Two-Stage Negotiation Game

In this section we describe a simple two-stage multilateral negotiation game with which to evaluate more fully the negotiation rules developed above. We posit that the first stage involves a multilateral tariff negotiation among the three governments, while in the second stage the home government may choose a willing partner for a further bilateral tariff negotiation. The tariffs implemented by the three countries are those that result from this two-stage process, and we explore the consequences of different negotiation rules for the outcome of the two-stage negotiation game.

We begin by describing the two-stage multilateral negotiation game. We suppose that, in the first stage, the governments of the three countries bargain over tariffs, and an initial tariff vector $(\tau^1, \tau^2, \tau^{*1}, \tau^{*2})$ in A_R is determined. Then, in the second stage, the home government chooses a foreign government with which to engage in an additional round of bilateral negotiations. We assume that the outcome of the bilateral negotiation is determined by the Nash Bargaining Solu-

[31] It is also interesting to observe the role played by bindings. When the rules of negotiation are sufficiently developed so that the welfare of non-participating governments is preserved in any bilateral negotiation, then bindings play no useful role. However, if the rules fall short of securing the welfare of non-participating governments, as for example in the case of MFN without reciprocity, then bindings can play a useful role, in that they can prevent governments from opportunistically raising tariffs on trading partners in future bilateral negotiations from which these trading partners are excluded.

tion, as applied to a bilateral bargaining environment in which (i). disagreement results in the selection of the status quo (i.e., first-stage) tariff vector, and (ii). the feasible set of negotiated tariffs is defined by the basic restrictions and any further restrictions that we impose through the mapping r_i. The tariff vector $(\widetilde{\tau}^1, \widetilde{\tau}^2, \widetilde{\tau}^{*1}, \widetilde{\tau}^{*2})$ that results from the bilateral negotiation is then the outcome of the two-stage negotiation game. In this way, second-stage negotiations determine an outcome once first-stage tariffs are given. We thus say that a tariff vector is *attainable* if it can be achieved as an outcome for some first-stage tariff vector. For forward-looking (and patient) governments, we may thus simplify and represent the first-stage bargain by the multilateral Nash Bargaining Solution, as directly applied to the set of attainable tariff vectors.[32]

Consider now the nature of the bargaining outcomes under the specific negotiation rules introduced above. Let us examine first the attainable tariff vectors under the bindings restriction. If the first-stage negotiations yield a tariff vector that rests on the efficiency frontier, as characterized in Proposition 1, then by Proposition 2 this tariff vector will be destabilized by a further bilateral negotiation between the home government and one of its foreign trading partners in stage 2. Further, this stage-2 bilateral will leave the home government and its bilateral negotiation partner at a tangency, which is inconsistent with multilateral efficiency according to Proposition 1. An analogous argument confirms that the efficiency frontier cannot be reached by negotiating in the first stage to a point off the frontier. Consequently, when bindings alone are added to the basic negotiation restrictions, no efficient tariff vector is attainable, and so our two-stage negotiation game must yield an inefficient tariff vector.

If instead the reciprocal market access rule is imposed, then second-stage negotiations must preserve the reciprocal market access relations between the home government and the non-participating foreign government, and by Proposition 3 it follows that any efficient tariff vector negotiated in stage 1 will not be altered through a bilateral negotiation in stage 2. Consequently, the entire efficiency frontier is attainable under the reciprocal market access rule, and our two-stage negotiation game must yield an efficient tariff vector when this rule is in place.

Finally, suppose that the tandem rules of MFN and reciprocity are imposed. Now the home government is restricted to MFN tariff selections in both the first-

[32]For the points that we make below, it is not necessary to specify the disagreement point that is associated with the first-stage bargaining process. One possibility would be the status quo tariffs from a preceding and unmodeled round. Note as well that we do not restrict the first-stage tariffs to bear some relationship (e.g., through r_i) to any preceding tariff arrangement.

and second-stage negotiations, while second-stage negotiations must conform to reciprocity. But then Proposition 6 implies that any MFN-efficient tariff vector negotiated in stage 1 will not be altered through a bilateral negotiation in stage 2. Consequently, the entire MFN-efficiency frontier is attainable under the MFN and reciprocity rules, and our two-stage negotiation game must yield an efficient tariff vector within the class of MFN tariffs when these rules are imposed in tandem.

We may now state:

Proposition 7: *In the Two-Stage Multilateral Negotiation Game, governments will select inefficient tariffs when bindings alone are added to the basic negotiation restrictions contained in Assumption 1, but they will select efficient tariffs when the basic negotiation restrictions are strengthened to include the reciprocal market access rule, and they will select tariffs that are efficient within the class of MFN tariffs when the basic negotiation restrictions are strengthened to include the tandem rules of MFN and reciprocity.*

As Proposition 7 formalizes, the bilateral opportunism problem that we have highlighted in previous sections can lead naturally to inefficient bargaining outcomes, and the reciprocal market access rule and the tandem rules of MFN and reciprocity can each be viewed as providing a solution to this problem.

7. Many Goods

We now briefly consider the extension of our analysis to a many-good setting. For our purposes, the novel feature of this setting is that there are many relative world prices even when MFN is imposed (i.e., under MFN, there are $n-1$ relative world prices in an n-good world). In this section, we briefly explore the implications of this new feature.

To make our points as simply as possible, we restrict our attention to MFN environments and consider the addition of a third good z to the two-good three-country model analyzed above. We suppose that, like good y, good z is exported by the home country to each of its two foreign trading partners. For the home country, there are now two local relative prices, $p_1 \equiv p_x/p_y$ and $p_2 \equiv p_z/p_y$; furthermore, with tariffs restricted to conform to MFN, there are also two world relative prices, $p_1^w \equiv p_x^w/p_y^w$ and $p_2^w \equiv p_z^w/p_y^w$. Local relative prices for foreign country i are similarly denoted by $p_1^{*i} \equiv p_x^{*i}/p_y^{*i}$ and $p_2^{*i} \equiv p_z^{*i}/p_y^{*i}$ for $i = 1,2$. By Lerner's symmetry theorem, we may represent the home-country tariff policy

with the ad valorem trade taxes t_x and t_z, with $t_z > 0$ ($t_z < 0$) denoting an export subsidy (tax). Letting $\tau_x \equiv (1 + t_x)$ and $\tau_z \equiv (1 + t_z)$,we may then represent home local prices in terms of world prices and tariffs: $p_1 = \tau_x p_1^w \equiv p_1(\tau_x, p_1^w)$ and $p_2 = \tau_z p_2^w \equiv p_2(\tau_z, p_2^w)$. Similarly, for foreign country i, we represent tariff policy with the ad valorem trade taxes t_x^{*i} and t_z^{*i} for i = 1,2, with $t_x^{*i} > 0$ ($t_x^{*i} < 0$) denoting an export subsidy. With $\tau_x^{*i} \equiv (1 + t_x^{*i})$ and $\tau_z^{*i} \equiv (1 + t_z^{*i})$, we may then write $p_1^{*i} = \tau_x^{*i} p_1^w \equiv p_1^{*i}(\tau_x^{*i}, p_1^w)$ and $p_2^{*i} = \tau_z^{*i} p_2^w \equiv p_2^{*i}(\tau_z^{*i}, p_2^w)$ for i = 1,2. As these expressions indicate, local prices are determined, once tariffs and world prices are given.

As in our two-good model, each country's production, consumption, import and export quantities are determined, once tariffs and world prices (and hence local prices) are given. Under a set of tariffs satisfying MFN, the balanced-trade conditions are given by

$$p_1^w M_x(p_1, p_2, p_1^w, p_2^w) = p_2^w E_z(p_1, p_2, p_1^w, p_2^w) + E_y(p_1, p_2, p_1^w, p_2^w); \qquad (7.1)$$

and

$$p_1^w E_x^{*i}(p_1^{*i}, p_2^{*i}, p_1^w, p_2^w) = p_2^w M_z^{*i}(p_1^{*i}, p_2^{*i}, p_1^w, p_2^w) + M_y^{*i}(p_1^{*i}, p_2^{*i}, p_1^w, p_2^w),\ i = 1, 2 \qquad (7.2)$$

Equilibrium world prices, $\widetilde{p}_1^w(\tau_x, \tau_z, \tau_x^{*1}, \tau_z^{*1}, \tau_x^{*2}, \tau_z^{*2})$ and $\widetilde{p}_2^w(\tau_x, \tau_z, \tau_x^{*1}, \tau_z^{*1}, \tau_x^{*2}, \tau_z^{*2})$, are then determined by the x- and z-market-clearing conditions:

$$M_x(p_1, p_2, p_1^w, p_2^w) = \sum_{i=1,2} E_x^{*i}(p_1^{*i}, p_2^{*i}, p_1^w, p_2^w);\ E_z(p_1, p_2, p_1^w, p_2^w) = \sum_{i=1,2} M_z^{*i}(p_1^{*i}, p_2^{*i}, p_1^w, p_2^w) \qquad (7.3)$$

As before, market clearing in the y market is assured by (7.1), (7.2) and (7.3). Summarizing, with their selections of tariffs, governments determine the equilibrium world prices, and this in turn implies the equilibrium values for all local prices and quantities.

Finally, we extend our representation of government preferences to the three-good case. Under MFN, this representation takes the form of $W(p_1, p_2, \widetilde{p}_1^w, \widetilde{p}_2^w)$ for the home government and $W^{*i}(p_1^{*i}, p_2^{*i}, \widetilde{p}_1^w, \widetilde{p}_2^w)$ for foreign government i= 1,2. As in our two-good model, we suppose that, with local prices held fixed, each government strictly prefers an improvement in its terms of trade: $W_{p_1^w}(p_1, p_2, \widetilde{p}_1^w, \widetilde{p}_2^w) < 0$; $W_{p_2^w}(p_1, p_2, \widetilde{p}_1^w, \widetilde{p}_2^w) > 0$ and $W_{p_1^w}^{*i}(p_1^{*i}, p_2^{*i}, \widetilde{p}_1^w, \widetilde{p}_2^w) > 0$; $W_{p_2^w}^{*i}(p_1^{*i}, p_2^{*i}, \widetilde{p}_1^w, \widetilde{p}_2^w) < 0$ for i = 1,2. In addition, we now assume that these world price movements are valued

by governments for their monetary implications alone. With this additional structure, we rule out the possibility that a government might care about the level of a particular world price for reasons (e.g., "national status") that are independent of its revenue consequences.

We are now ready to establish three results. We begin by showing that reciprocity in combination with MFN continues to eliminate the opportunities for two countries to destabilize an MFN-efficient multilateral trade agreement for terms-of-trade advantages. In the two-good case, this followed directly from the observation that, in the presence of MFN, reciprocity fixes $\widetilde{p}^w$. With more than two goods, individual world prices may change even when reciprocity is satisfied. However, we now establish that the permissible changes in world prices that result from the negotiations can have no direct welfare consequences for the negotiating governments.

To see this, suppose that the governments of the home country and foreign country i were to consider further negotiations starting from a set of MFN-efficient tariffs for the three governments. Denoting by " ' " the new magnitudes to which these governments negotiate, reciprocity imposes the following restrictions on the outcome of their negotiations:

$$\widetilde{p}_1^w[M_x^{'} - M_x] = [E_y^{'} - E_y] + \widetilde{p}_2^w[E_z^{'} - E_z]; \tag{7.4}$$

and

$$\widetilde{p}_1^w[E_x^{*i'} - E_x^{*i}] = [M_y^{*i'} - M_y^{*i}] + \widetilde{p}_2^w[M_z^{*i'} - M_z^{*i}]. \tag{7.5}$$

Utilizing the balanced-trade conditions that must hold before and after the bilateral negotiations, the reciprocity restrictions can be rewritten as:

$$[\widetilde{p}_1^{w'} - \widetilde{p}_1^w]M_x^{'} - [\widetilde{p}_2^{w'} - \widetilde{p}_2^w]E_z^{'} = 0; \tag{7.6}$$

and

$$[\widetilde{p}_1^{w'} - \widetilde{p}_1^w]E_x^{*i'} - [\widetilde{p}_2^{w'} - \widetilde{p}_2^w]M_z^{*i'} = 0. \tag{7.7}$$

Clearly these conditions are met when both $\widetilde{p}_1^w$ and $\widetilde{p}_2^w$ are unchanged as a result of the bilateral negotiations. These conditions may also be satisfied when both $\widetilde{p}_1^w$ and $\widetilde{p}_2^w$ are changed as a result of the bilateral negotiations, but all of the permissible world price changes share a special feature. Specifically, (7.6) and (7.7) imply that, in combination with the new local prices, the new world prices must deliver the same tariff revenue to each negotiating country as would have been

delivered if these new local prices had been combined with the old world prices.[33] As a consequence, the permissible changes in world prices that result from bilateral negotiations under reciprocity can have no direct welfare consequences for the negotiating governments. In this way, reciprocity and MFN continue to eliminate the opportunities for countries to destabilize an MFN-efficient multilateral trade agreement for terms-of-trade advantages in a many-good world, just as these tandem rules did in the two-good case.

We now come to the second result of this section: with many goods, there arises an additional problem of bilateral opportunism. This new problem of bilateral opportunism is conceptually distinct from the terms-of-trade problem, and it is related instead to the desire to achieve mutually advantageous changes in local prices through a bilateral negotiation. The point is simply that, while the permissible changes in world prices that result from bilateral negotiations under reciprocity can have no direct welfare consequences for the negotiating governments, these world price changes may nevertheless have indirect welfare effects through the local-price movements that they make possible. It is therefore conceivable that, starting from a set of MFN-efficient tariffs for all three governments, the home government and that of foreign country i could undertake bilateral negotiations to lower their tariffs in accordance with MFN and subject to reciprocity in a way that yielded mutually beneficial changes in local prices, of course at the expense of foreign country j.[34] As a consequence, even while MFN and reciprocity continue to solve the terms-of-trade problem of bilateral opportunism in a many-good world, there are now additional "local-price" advantages that can in principle tempt countries into destabilizing bilateral negotiations.

Our third result is to establish that, under MFN and reciprocity, the remaining opportunities for destabilizing bilateral negotiations in a many-good world are relatively limited, in the sense that they arise only at certain points on the efficiency frontier. To see this, note that, beginning from any set of MFN-efficient

[33] This can be seen by adding and subtracting p_1' (p_2') inside the first (second) bracket of (7.6), and adding and subtracting $p_1^{*i'}$ ($p_2^{*i'}$) inside the first (second) bracket of (7.7), and then rearranging these expressions.

[34] For example, suppose that, owing to the bargaining power of foreign country j, the government of foreign country i had failed through multilateral negotiations to secure a mix of imports from the home country which were tilted away from one of its most politically sensitive sectors. In this case, the government of foreign country i might, through further bilateral negotiations with the home government, be able to "worsen" the mix of imports that foreign country j receives, and thereby achieve a more favorable import mix for itself while still satisfying reciprocity.

tariffs, a necessary condition for the home government and that of foreign country i to gain from a bilateral agreement is that world prices do in fact change as a result of their negotiations (since otherwise no welfare is appropriated from foreign country j). In this case, the two restrictions (7.6) and (7.7) implied by reciprocity may be combined, together with the balanced trade condition, to yield:

$$M_y^{*i'}/E_y^{'} = M_z^{*i'}/E_z^{'} = E_x^{*i'}/M_x^{'}. \tag{7.8}$$

Hence, whenever reciprocity is satisfied and world prices also change, we may represent the restriction of reciprocity as contained in (7.6) and (7.7) by the equivalent conditions (7.6) and (7.8).

Condition (7.8) is illuminating. It says that, if the home government and that of foreign country i succeed in altering world prices in a reciprocity-consistent fashion as a result of their bilateral negotiation, then their resulting trade patterns must satisfy a "proportionality" condition, so that the fraction of home-country exports of good y and of good z which foreign country i accepts is the same as the fraction of home-country imports of good x which foreign country i supplies. This condition would be satisfied automatically in equilibrium in a two-country world (where each fraction would be one).[35] But with three or more countries, condition (7.8) imposes an additional restriction (beyond (7.6)) on the local-price combinations that are attainable when bilateral negotiations alter world prices but still satisfy reciprocity.

Whether the feasible combinations of local prices consistent with (7.6) and (7.8) can provide mutual welfare improvements for the two governments will depend on circumstances. For example, if countries had negotiated to a point on the efficiency frontier at which the proportionality condition implied by (7.8) was initially satisfied, then the restriction that this condition must also be satisfied after bilateral negotiations which alter world prices might not be so severe, and a destabilizing bilateral negotiation might well be feasible under MFN and reciprocity. But if the point on the efficiency frontier to which countries had initially negotiated implied trading patterns that were sufficiently far away from satisfying the restriction in (7.8), then this requirement is likely to severely undermine the attractiveness of further bilateral negotiations. In such circumstances, there is unlikely to be a serious problem of bilateral opportunism if the rules of MFN and reciprocity are applied.

[35] As may be confirmed by inspection, in a two-country world (7.6) and (7.7) collapse to a single condition as well.

Hence, in providing a solution to the terms-of-trade-driven bilateral opportunism problem, the tandem rules of MFN and reciprocity can be viewed as solving the most pervasive problem associated with bilateral opportunism in a many-good environment. More speculatively, we return to our discussion at the end of Section 4 and note that, because the opportunities for bilateral opportunism that remain in the presence of MFN and reciprocity are fairly limited, they might be adequately handled by the ability of third-countries to file non-violation complaints of nullification and impairment under Article XXIII:1 (b).

8. 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 negotiations under different negotiation rules. Working with a three-country general-equilibrium model, we begin by showing that the opportunism problem is potentially severe: in the absence of rules that govern the nature of bilateral negotiations, *every* initial efficient agreement is vulnerable to a future bilateral negotiation that benefits the involved parties at the expense of the non-participant. We next identify a "reciprocal market access" rule, under which *no* initial efficient agreement is vulnerable to a future bilateral agreement. While this rule has desirable theoretical properties, it also has practical limitations. We thus consider next various negotiation rules that are prominent in GATT discussion and practice. Our main finding is that the tandem rules of reciprocity and non-discrimination (MFN) effectively mimic the reciprocal market access rule: if the future bilateral negotiation is constrained by the rules of reciprocity and MFN, then the bilateral negotiation cannot alter the welfare of the non-participating government. As a consequence, *no* initial agreement that is efficient within the MFN class is vulnerable to a future bilateral negotiation, when the bilateral negotiation is required to respect these rules.

Our results suggest that reciprocity, which is often maligned as a mercantilist distraction, may in fact serve a useful 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 likely route to opportunistic bilateral negotiations, especially when reciprocity and MFN would otherwise combine to prevent such opportunism. In this light, preferential tariff agreements may present a natural and appropriate target for "non-violation" nullification-and-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.

Finally, while we have emphasized the properties of reciprocity in an MFN environment with regard to the problem of bilateral opportunism, the fact that the welfare of non-participating governments is preserved under these rules has a flip side as well: when combined with reciprocity, the "free-rider" problem often associated with MFN does not arise. A formal analysis of the free-rider problem requires a model of the decision of whether or not to participate in negotiations. We leave these and other tasks for future work.

9. References

Bagwell, Kyle and Staiger, Robert W., "An Economic Theory of GATT," *American Economic Review*, forthcoming.

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.

Bernheim, B. D., B. Peleg and M. Whinston, "Coalition Proof Nash Equilibria, I: Concepts," *Journal of Economic Theory,* 42, 1987, pp. 1-12.

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.

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.

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.

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.

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.

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.

10. Appendix

Proof of Proposition 5 (MFN-Efficient Tariffs): To prove this proposition, we first identify some general relationships and then establish three lemmas. We observe that for every $i, j \in \{1, 2\}$ with $i \neq j$, we have:

(A1). $\widetilde{W}_{\tau} = [W_p \tau + W_{p^w}] \frac{\partial \widetilde{p}^w}{\partial \tau} + W_p \widetilde{p}^w > 0$

(A2). $\widetilde{W}_{\tau^{*i}} = [W_p \tau + W_{p^w}] \frac{\partial \widetilde{p}^w}{\partial \tau^{*i}} < 0$

(A3). $\widetilde{W}^{*i}_{\tau^{*i}} = [W^{*i}_{p^{*i}} \frac{1}{\tau^{*i}} + W^{*i}_{p^w}] \frac{\partial \widetilde{p}^w}{\partial \tau^{*i}} - W^{*i}_{p^{*i}} (\frac{1}{\tau^{*i}})^2 \widetilde{p}^w > 0$

(A4). $\widetilde{W}^{*i}_{\tau} = [W^{*i}_{p^{*i}} \frac{1}{\tau^{*i}} + W^{*i}_{p^w}] \frac{\partial \widetilde{p}^w}{\partial \tau} < 0$

(A5). $\widetilde{W}^{*i}_{\tau^{*j}} = [W^{*i}_{p^{*i}} \frac{1}{\tau^{*i}} + W^{*i}_{p^w}] \frac{\partial \widetilde{p}^w}{\partial \tau^{*j}} > 0,$

where the expressions are signed in accordance with Assumption 2'. Using these expressions, we next derive that:

(A6). $\frac{\widetilde{W}_{\tau^{*i}}}{\widetilde{W}_{\tau^{*j}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*j}}} > 0$

(A7). $\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*j}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*j}}} < 0$

(A8). $\frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}} - \frac{\widetilde{W}^{*j}_{\tau}}{\widetilde{W}^{*j}_{\tau^{*i}}} = \frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}} - \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}} = \frac{W_p \widetilde{p}^w}{\widetilde{W}_{\tau^{*i}}}$

(A9). $\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} - \frac{\widetilde{W}^{*j}_{\tau}}{\widetilde{W}^{*j}_{\tau^{*i}}} = \frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} - \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}} = \frac{W^{*i}_{p^{*i}} (\frac{1}{\tau^{*i}})^2 \widetilde{p}^w}{\widetilde{W}^{*i}_{\tau^{*i}}} \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}$

(A10). $\frac{\widetilde{W}_{\tau^{*i}}}{\widetilde{W}_{\tau^{*j}}} - \frac{\widetilde{W}^{*i}_{\tau^{*i}}}{\widetilde{W}^{*i}_{\tau^{*j}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*j}}} - \frac{\widetilde{W}^{*i}_{\tau^{*i}}}{\widetilde{W}^{*i}_{\tau^{*j}}} = \frac{W^{*i}_{p^{*i}} (\frac{1}{\tau^{*i}})^2 \widetilde{p}^w}{\widetilde{W}^{*i}_{\tau^{*j}}}.$

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:

(A11). $\widetilde{W}_{\tau} + \lambda_1 \widetilde{W}^{*1}_{\tau} + \lambda_2 \widetilde{W}^{*2}_{\tau} = 0,$

(A12). $\widetilde{W}_{\tau^{*1}} + \lambda_1 \widetilde{W}^{*1}_{\tau^{*1}} + \lambda_2 \widetilde{W}^{*2}_{\tau^{*1}} = 0$ and

(A13). $\widetilde{W}_{\tau^{*2}} + \lambda_1 \widetilde{W}^{*1}_{\tau^{*2}} + \lambda_2 \widetilde{W}^{*2}_{\tau^{*2}} = 0.$

To characterize the MFN-efficiency frontier, we proceed exhaustively through three cases: $W_p > 0$, $W_p < 0$ and $W_p = 0$. 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 $i \in \{1, 2\}$,*

$$\frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}} > \frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}} > \frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} \text{ and } W^{*i}_{p^{*i}} > 0.$$

Proof: Given $W_p > 0$, the first inequality follows directly from Assumption 2' and (A8). To establish the other inequalities, we use the first order conditions for τ (i.e., (A11)) and τ^{*i} (i.e., (A12) or (A13), as appropriate) to solve for λ_j and λ_i. Using (A7), these solutions may be written as:

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

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

As λ_i must be non-negative and finite, the first inequality established above together with Assumption 2' imply that

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

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

It remains to show that $\frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} > \frac{\widetilde{W}^{*i}_\tau}{\widetilde{W}^{*i}_{\tau^{*i}}}$. Using (A14), (A16) and Assumption 2', we see that $\lambda_i \geq 0$ requires $\frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} \geq \frac{\widetilde{W}^{*i}_\tau}{\widetilde{W}^{*i}_{\tau^{*i}}}$, and so we have only to eliminate the case of equality. To this end, we use the first order conditions for τ^{*j} and τ^{*i} to solve for λ_j and λ_i. Then using (A6), we calculate that λ_j may also be expressed as

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

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

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

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

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

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

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

$$\frac{\widetilde{W}^{*i}_\tau}{\widetilde{W}^{*i}_{\tau^{*i}}} > \frac{\widetilde{W}_\tau}{\widetilde{W}_{\tau^{*i}}} > \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}} \text{ and } W^{*i}_{p^{*i}} < 0.$$

Proof: Given $W_p < 0$, the second inequality follows directly from Assumption 2' and (A8). Using (A15), λ_i non-negative and finite then implies $\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} > \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}$, which with (A9) yields $W^{*i}_{p^{*i}} < 0$. Next, (A14) now implies that $\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} \geq \frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}}$. Finally, suppose $\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} = \frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}}$. Then, using (A18) we may again derive that (A19) must hold, whence under (A10) it follows that $W^{*i}_{p^{*i}} = 0$, a contradiction.

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

$$\frac{\widetilde{W}_{\tau}}{\widetilde{W}_{\tau^{*i}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}}$$

(ii). there exists $i \in \{1, 2\}$ such that

$$\frac{\widetilde{W}^{*i}_{\tau}}{\widetilde{W}^{*i}_{\tau^{*i}}} = \frac{\frac{\partial \widetilde{p}^w}{\partial \tau}}{\frac{\partial \widetilde{p}^w}{\partial \tau^{*i}}} \text{ and } W^{*i}_{p^{*i}} = 0.$$

Proof: Given $W_p = 0$, part (i) follows directly from (A8). Consider next part (ii). Using the finding from part (i), we the necessary MFN-efficiency condition (A18) may be rewritten as

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

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

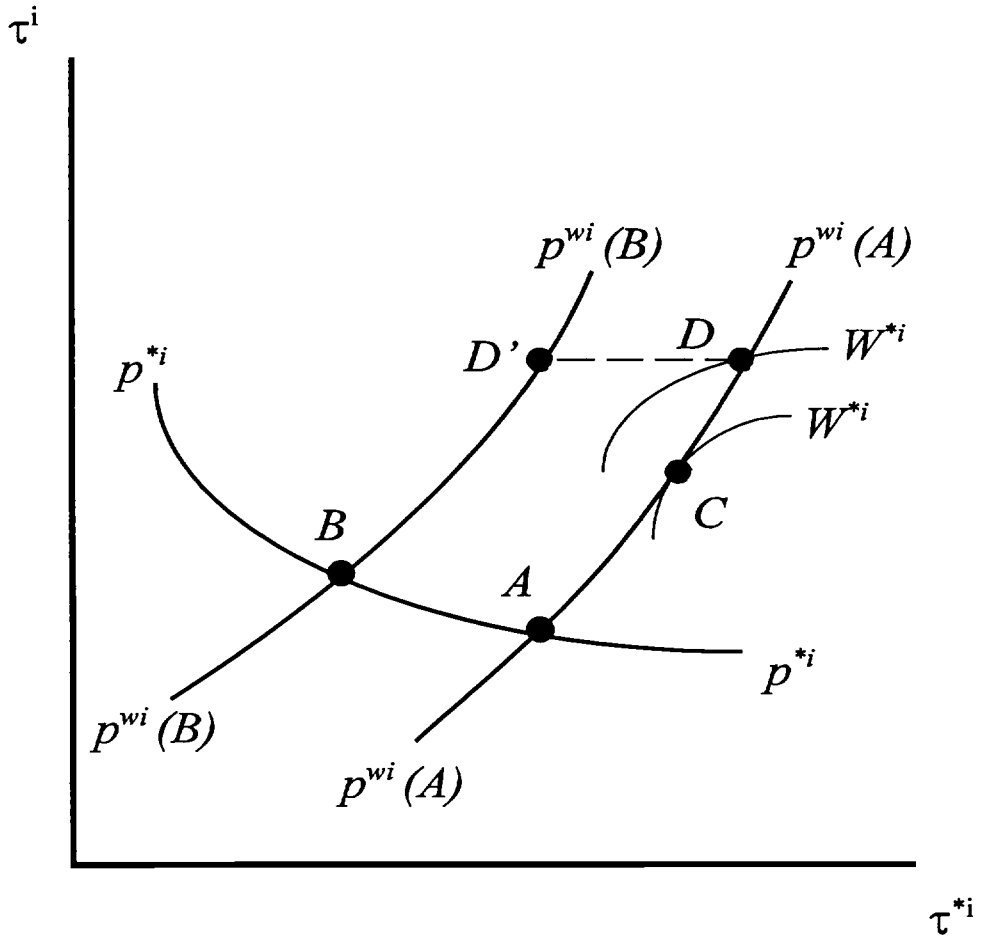

Figure 1

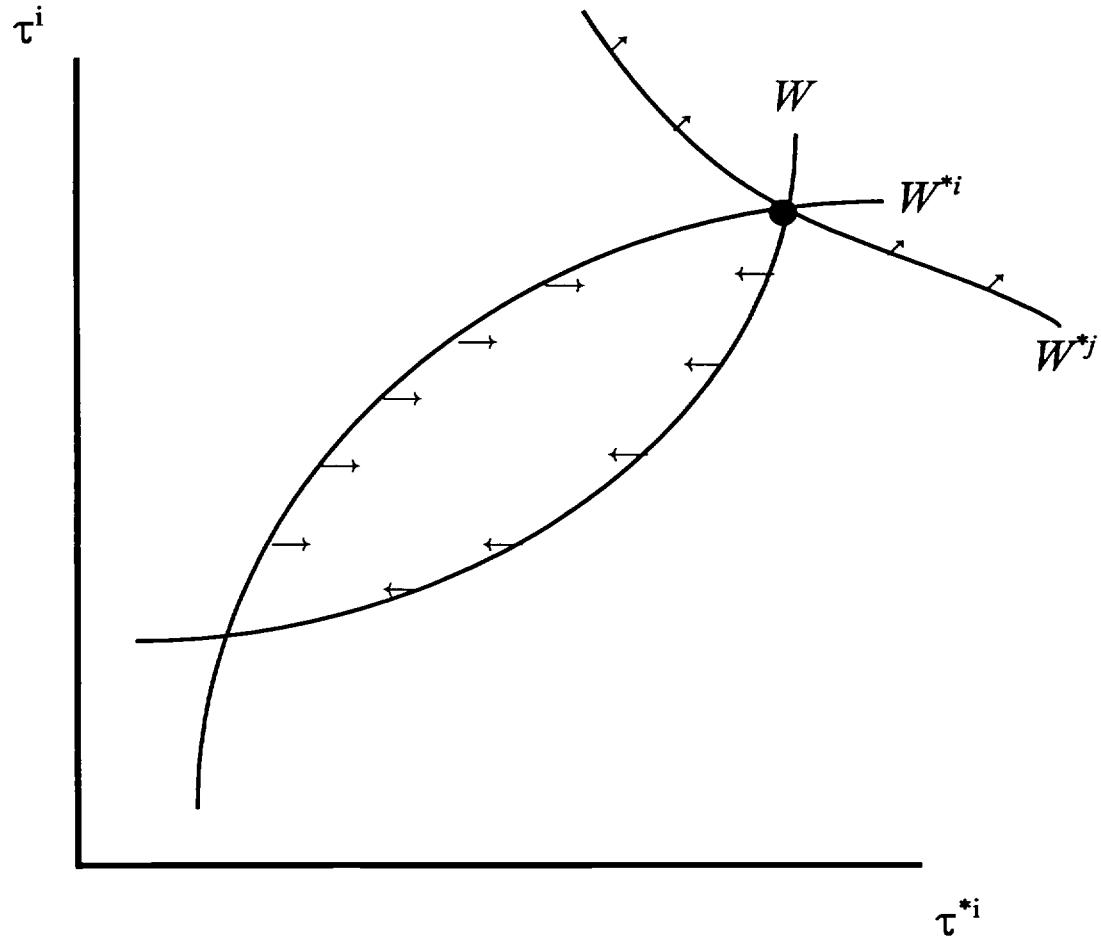

Figure 2

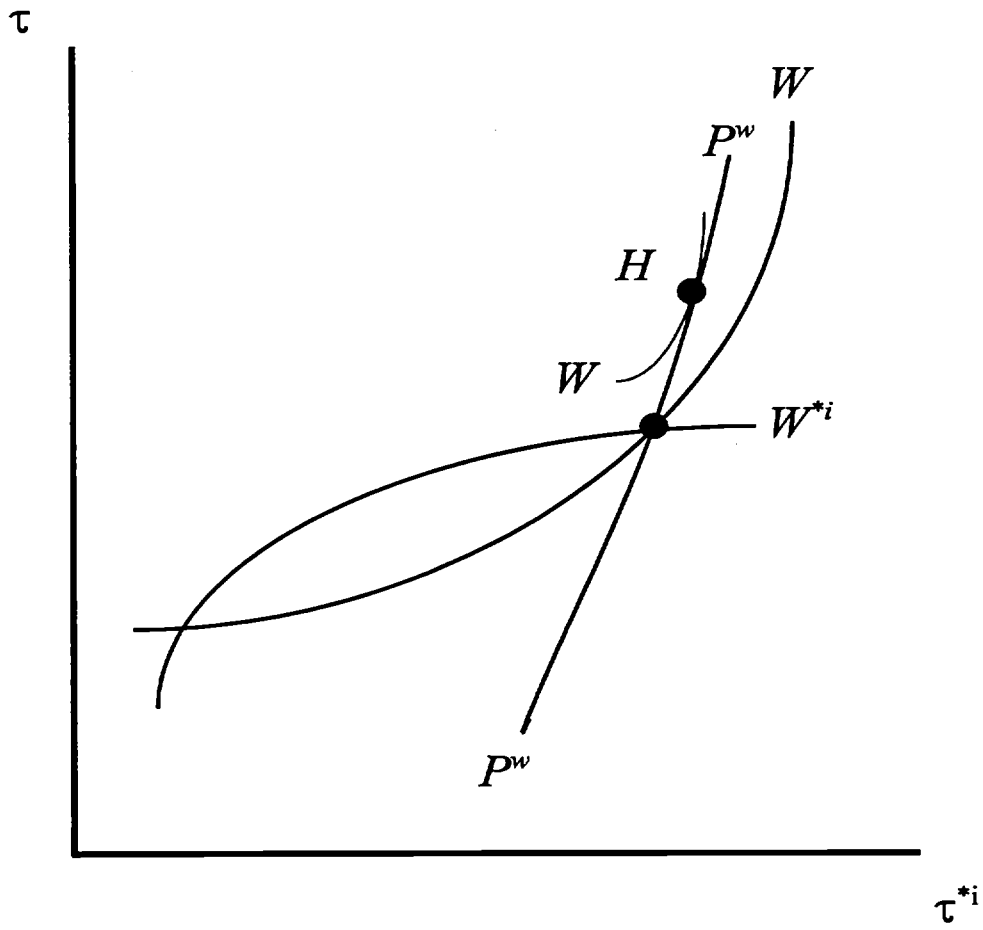

Figure 3A

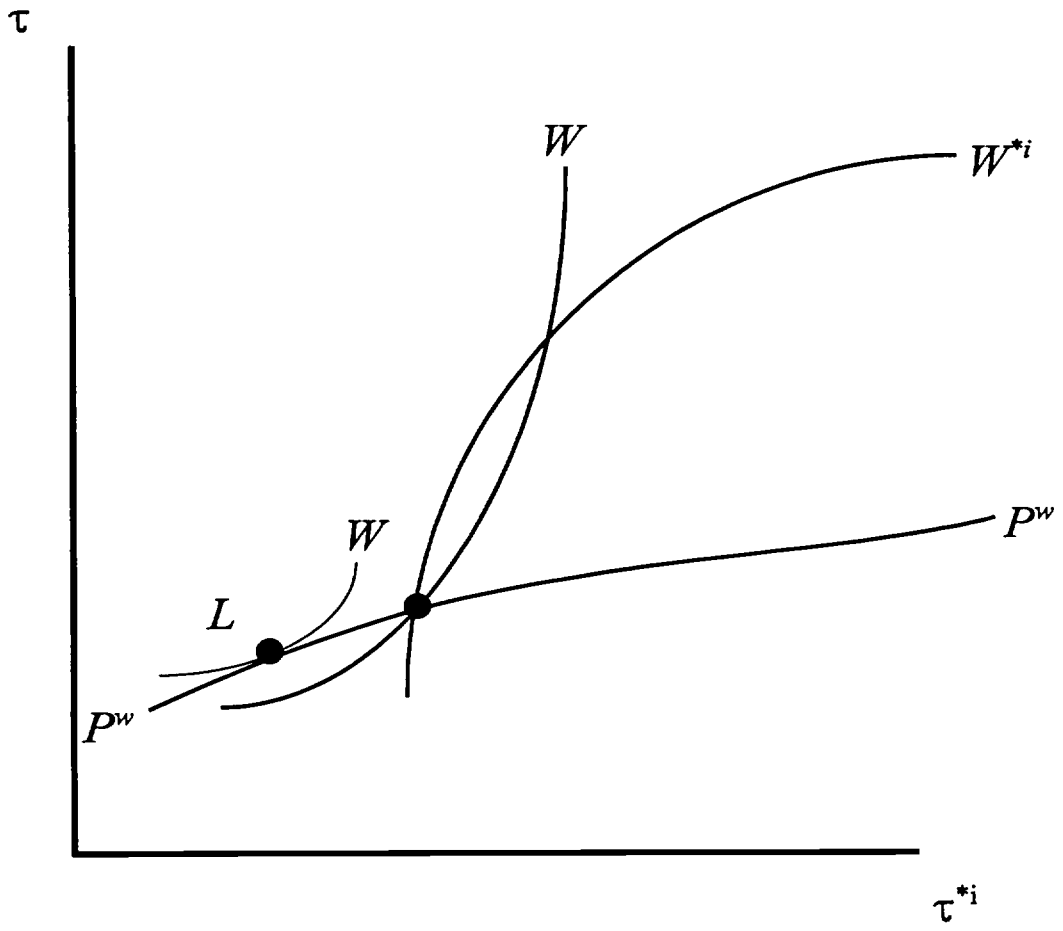

Figure 3B

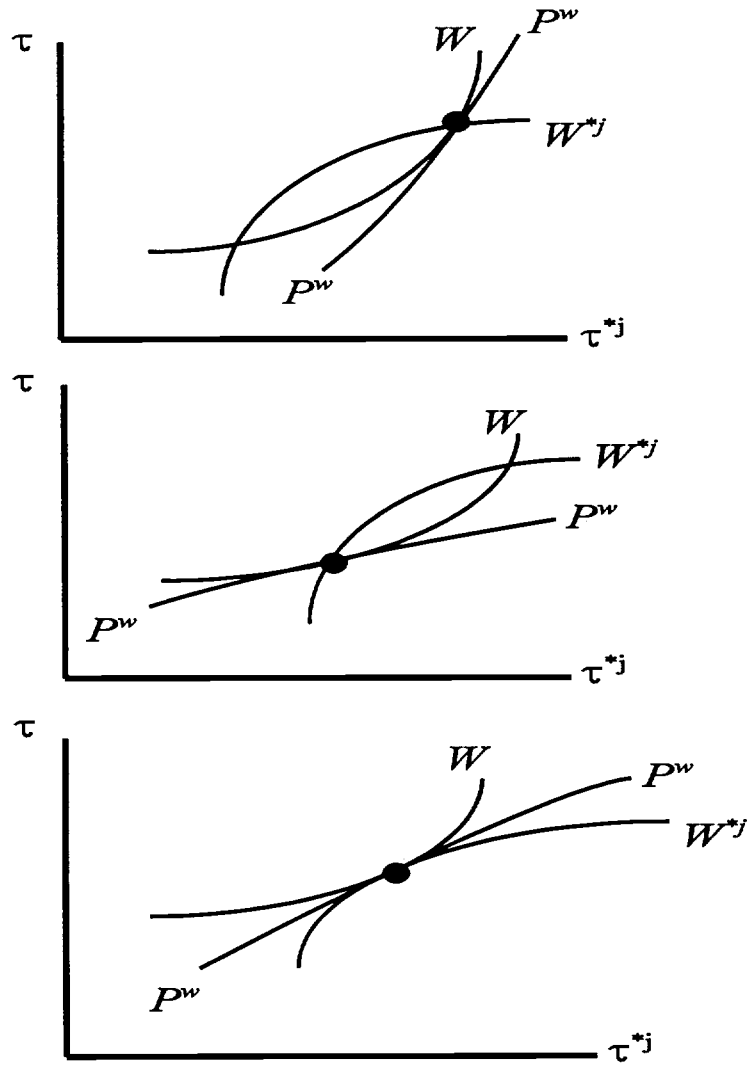

Figure 3C