

An Economic Theory of GATT

by

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Abstract

Despite the important role played by GATT in the world economy, economists have not developed a unified theoretical framework that interprets and evaluates the principles that form the foundation of GATT. Our purpose here is to propose such a framework. Working within a general equilibrium trade model, we represent government preferences with a very general formulation that includes the traditional case in which governments maximize national income as well as the possibility emphasized in leading political-economy models that governments are concerned with the distributional implications of their tariff choices. Using this general framework we establish that GATT's principles of *reciprocity* and *nondiscrimination* (MFN) can be viewed as simple rules that assist governments in their effort to implement efficient trade agreements. From this perspective, we argue that *preferential agreements* undermine GATT's ability to deliver efficient multilateral outcomes.

I. Introduction

The central role played by GATT in shaping post-war trade policy is widely accepted. Through the eight rounds of trade negotiations that have followed since the inception of GATT in 1947, average ad valorem tariffs on industrial goods have fallen significantly from over 40% to less than 4%. Over the same period of time, membership in GATT (and now its successor organization, the WTO) has risen from 23 countries to well above 100. Despite the important role played by GATT in the world economy, however, economists have not yet developed a unified theoretical framework that interprets and evaluates the principles that form the foundation of GATT. Our purpose here is to propose such a framework.

We begin with a first and most-basic question: What can governments gain from a trade agreement? We adopt the view that a trade agreement is appealing to governments if it offers them greater welfare than they would receive in the absence of the agreement. If in the absence of an agreement, governments set trade policies in a unilateral fashion, then a trade agreement is appealing provided that an inefficiency (relative to governments' preferences) exists under unilateral tariff setting. Viewed from this perspective, the role of a trade agreement is then to remove the inefficiency, so that member governments can enjoy higher welfare. The principles embodied in the trade agreement can then be interpreted and evaluated in this light.

What, then, is the inefficiency that trade agreements are designed to remedy? Working with models in which governments maximize national income, previous authors have established that the classic terms-of-trade externality creates an inefficiency in unilateral trade policies.¹ Intuitively, when a government imposes an import tariff, some of the cost of this policy is shifted to foreign exporters, whose products sell at a lower world price (i.e., at less favorable terms of trade). This temptation to shift costs naturally leads governments to set unilateral tariffs that are higher than would be efficient. A trade agreement can then promote a more efficient outcome for its member governments, if it serves as a means to eliminate the terms-of-trade-driven restrictions in trade that arise when policies are set unilaterally. The assumption that governments maximize national income, however, stands in contrast to the manifest political constraints under which real governments operate. It is thus

¹For an early formal analysis of the terms-of-trade externality, see Johnson (1953-54). More recent discussions include Bagwell and Staiger (1990), Dixit (1987) and McMillan (1986, 1989).

important to consider further the rationale for a trade agreement, within a richer model in which governments may have political concerns.

To this end, we construct a general model that allows for a wide class of government preferences. The economic environment is captured with a standard two-good general equilibrium model of trade between two countries, and we represent each government's welfare as a general function of the local and world prices that the tariff selections imply. This formulation allows us to associate a government's motivation to manipulate the terms of trade with the welfare gain that the government receives when its tariff choice changes the world price (holding fixed the local price). The government's preferences as to the local price are unconstrained and may reflect general economic and political (i.e., distributional) considerations. Our representation of government preferences thus includes the traditional case in which governments maximize national income as well as the possibility emphasized in leading political-economy models that governments are concerned with the distributional implications of their tariff choices.

Working with this general framework, we observe that political motivations influence the determination of the tariff policies to which governments aspire. For example, when governments have political motivations, free trade may not rest on the efficiency frontier. But it is the terms-of-trade externality -- and this externality alone -- that creates an inefficiency when governments set their trade policies unilaterally. For the class of government preferences that we entertain, we thus offer as our first broad conclusion that trade agreements are appealing to governments solely as a means to remedy the inefficient terms-of-trade-driven restrictions in trade that arise when trade policies are set unilaterally. To establish this conclusion, we demonstrate that unilateral trade policies would be efficient in a hypothetical world in which governments pursued political goals but were not motivated by the terms-of-trade implications of their trade policies. In other words, if governments were not motivated by the terms-of-trade implications of their trade policy selections, then there would be no reason for the creation of GATT.² This hypothetical experiment yields a set of *politically optimal* tariffs, which are efficient precisely because the motivation for such tariffs is separate from any cost-

²A political motivation for trade agreements might arise if governments seek such agreements to gain commitment relative to their private sectors. This possibility, which is not included in our modeling framework, is explored by Maggi and Rodriguez (1998), Staiger (1995) and Staiger and Tabellini (1987). However, whether this commitment theory of trade agreements offers an interpretation of the basic principles of GATT is still an open question.

shifting incentive.³

Armed with this basic conclusion as to the purpose of trade agreements, we next interpret and evaluate the key principles on which GATT is founded. Following the legal literature on GATT (see, e.g., Jackson, 1989, pp. 85-89), we interpret GATT as a "rules-based" institution whereby, prior to negotiating over trade policy, member governments agree to a set of rules or principles which describe the limits of acceptable behavior and thereby govern the "bargaining chips" that can be brought to the actual trade policy negotiations that follow.⁴ While GATT has a large number of specific articles, it is widely accepted that the two "pillars" of the GATT approach are the principles of reciprocity and non-discrimination (MFN). The principle of reciprocity is a GATT norm under which one country agrees to reduce its level of protection in return for a reciprocal "concession" from its trading partner. At the broadest level, this principle refers to the "ideal" of mutual changes in trade policy which bring about equal changes in import volumes across trading partners. The principle of non-discrimination is a separate norm, under which a member government agrees that any tariff on a given product applied to the imports of one trading partner applies equally to all other trading partners. This discussion motivates our second question: Do the principles of reciprocity and non-discrimination serve governments as simple rules of negotiation that promote efficiency, by "undoing" the terms-of-trade-driven inefficiency that arises in the absence of an agreement?

We begin with the principle of reciprocity. Our discussion here builds upon a key observation: mutual changes in trade policy that conform to the principle of reciprocity leave world prices unchanged. Recalling that trade-policy decisions are inefficient if and only if governments are motivated by their abilities to *change* the world price, we propose at a general level that the principle of reciprocity can be efficiency enhancing, since it neutralizes the terms-of-trade externality that underlies inefficient behavior. To develop this general proposal in a more concrete fashion, we then identify and consider the two specific applications of reciprocity that arise in GATT practice.

A first application arises when governments seek negotiated tariff reductions. While there is no formal requirement in GATT articles that governments exchange reciprocal tariff reductions in

³The politically optimal tariffs correspond to reciprocal free trade when governments maximize national income.

⁴A separate question is how these rules are to be enforced. We abstract from the issue of enforcement in the body of the paper, but return to it in the concluding section.

these negotiations, it has been observed that governments in fact seek a *balance of concessions* (i.e., tariff cuts). This emphasis on reciprocal tariff reductions contrasts sharply with the standard economic argument that unilateral free trade is the best policy for a (small) country, independent of the tariff selected by its trading partner, and this contrast has led many to conclude that governments approach trade negotiations from a mercantilist perspective that is driven by political forces and divorced from sound economic reasoning. We show instead that the principle of reciprocity as it arises in this application can be given a rather direct economic interpretation: whatever their underlying political motivations, governments are driven to choose overly protective trade policies because of the cost-shifting effects of the world-price movements associated with their unilateral tariff choices, and they would therefore seek lower tariffs if the world-price implications of their liberalization could be neutralized, a feat that reciprocity achieves.

A second application of reciprocity in GATT practice occurs when a government decides to increase a previously "bound" (i.e., negotiated) tariff and invokes GATT's procedures for renegotiation. Here, GATT's reciprocity rules explicitly require moderation on the part of trading partners, who are permitted to withdraw *substantially equivalent concessions* of their own. In this case, the principle of reciprocity governs the manner in which tariffs may be *increased* as part of a renegotiation. In light of this possibility for renegotiation, an important issue is whether *any* efficient set of tariffs that might be agreed to in an original negotiation is in fact "renegotiation proof" under the rules of GATT. We show that GATT's insistence on reciprocity in renegotiations is indeed compatible with an efficient set of tariffs, and we further find that the only efficient tariffs that are impervious to renegotiation of this nature are the politically optimal tariffs. If governments seek an efficient outcome that will not be renegotiated as allowed under the principle of reciprocity, they therefore will negotiate to the politically optimal tariffs.

We then turn to the principle of non-discrimination. Extending our framework to a multi-country setting, we begin by establishing an "affinity" between politically optimal tariffs and the principle of non-discrimination: while there will in general be many points on the efficiency frontier that entail discriminatory tariffs, we show that politically optimal tariffs are efficient if and only if they conform to the principle of non-discrimination. We next explore the implications of reciprocity in our multi-country setting, finding that an efficient multilateral trade agreement is impervious to

renegotiation as allowed under the principle of reciprocity if and only if it is characterized by politically optimal tariffs that satisfy the principle of non-discrimination. Thus, if a trade agreement permits renegotiation that conforms to the principle of reciprocity, then governments can achieve an efficient outcome only if the agreement also imposes the principle of non-discrimination.⁵

The complementary relationship between the principles of reciprocity and non-discrimination in generating efficient outcomes rests upon a simple intuition. As we have discussed above, the principle of reciprocity has the effect of neutralizing the world-price effects of a government's decision to raise tariffs, and so it can eliminate the externality that causes governments to make inefficient trade policy choices provided that trade policy externalities travel only through world prices. While externalities indeed travel only through world prices in the basic two-country model, when the modeling framework is extended to include multiple countries, there arises as well the possibility of a local-price externality. In particular, if a country discriminates when setting its trade policy, then, all else equal, it would prefer that a greater fraction of a given import volume be provided by the export source on whom it places the highest tariff. But the export volumes from trading partners are in turn determined in part by the local prices in these countries, and so a local-price externality is created. If the importing country adopts a policy of non-discrimination, however, the preference for one export source over another is removed, and the only remaining externality is again the world-price externality, which the principle of reciprocity is well-designed to neutralize.

Drawing on these findings, we offer as our second broad conclusion that the principles of reciprocity and non-discrimination may be interpreted as simple negotiation rules that work hand-in-hand to assist governments as they attempt to undo the terms-of-trade-driven inefficiency that characterizes unilateral trade policies. In fact, we offer the more specific finding that these principles direct negotiation outcomes toward the tariffs that are both politically optimal and non-discriminatory, and hence toward the tariffs that governments would have chosen had they not been motivated by cost-shifting incentives in the first place. We interpret these results as establishing an efficiency-enhancing role for the two principles that form the pillars of the GATT architecture.

Finally, we consider the implications of a major exception to the principle of non-

⁵The principle of non-discrimination is trivially satisfied in the basic two-country model described above.

discrimination that must be granted whenever GATT's member governments negotiate *preferential agreements*. This exception, embodied in Article XXIV of GATT, was controversial in its inception and has met with renewed controversy recently as many GATT members have increasingly exercised their rights under this article to negotiate preferential agreements. Against this backdrop, we use our modeling framework to address a third question: Will preferential agreements interfere with the efficiency properties of a multilateral trading system that is otherwise built upon the pillars of reciprocity and non-discrimination?

In accord with Article XXIV, we consider two forms of preferential agreements: *free trade areas*, in which member countries eliminate internal barriers to trade, and *customs unions*, in which members also adopt a common external tariff. Preferential agreements are inherently discriminatory, and so they revive the local-price externality described above. As a consequence, the principle of reciprocity typically does not deliver an efficient outcome when preferential agreements are in place. The only exception arises in the special case in which the preferential agreement takes the form of a customs union formed by members with sufficiently similar preferences. In this case, the customs union can be regarded as a "single" country with no internal tariff, and our previous results then imply that the principles of reciprocity and non-discrimination can serve to deliver an efficient outcome. More generally, we offer as our third broad conclusion that preferential agreements pose a threat to the efficiency properties of the existing multilateral system.

This paper builds on the approach from Bagwell and Staiger (1996), in which we study the purpose of reciprocal trade agreements but do not interpret and evaluate the principles of reciprocity and non-discrimination as embodied in GATT practice. A more closely related paper is Bagwell and Staiger (1997a), where we adopt a partial equilibrium framework, impose a particular representation of political economy, and explore similar themes.

The remainder of the paper proceeds as follows. Section II presents our basic framework in a two-country setting and examines the purpose of reciprocal trade agreements. Section III then turns to an interpretation and evaluation of the principle of reciprocity. A multi-country extension of the modeling framework is developed in Section IV, and the principle of non-discrimination is analyzed. Preferential agreements are examined in Section V. Next, in Section VI we consider why governments might choose to design an institutional arrangement such as GATT that adopts a rules-

based approach to trade negotiations. We argue that this approach can encourage participation of weaker countries in GATT, and we show that stronger countries might support the creation of such an institution for this reason. Finally, in Section VII, we conclude the paper with a discussion of evidence relating to our implicit hypothesis that governments have the ability and the desire to manipulate the terms of trade in a quantitatively significant fashion.

II. The Purpose of Reciprocal Trade Agreements

In this section, we develop a model of the economic environment for the case in which two countries trade two goods. Allowing for a wide range of government preferences, we then show that trade agreements are appealing to governments if and only if they serve as a means to remedy the inefficient terms-of-trade-driven restrictions in trade that arise under unilateral trade policies.

A. The Economic Environment

We begin with a description of the economic environment in which trade takes place. We work within a standard two-sector, two-country perfectly-competitive general equilibrium trade model. Two countries, home (no *) and foreign (*), trade two goods, x and y , taken to be 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. Let x (y) be the natural import good of the home (foreign) country, and define $p \equiv p_x/p_y$ ($p^* \equiv p_x^*/p_y^*$) to be the local relative price facing home (foreign) producers and consumers. With t (t^*) representing the home (foreign) ad valorem import tariff which we take to be non-prohibitive, and with $\tau = (1+t)$ and $\tau^* = (1+t^*)$, we have $p = \tau p^w \equiv p(\tau, p^w)$ and $p^* = p^w/\tau^* \equiv p^*(\tau^*, p^w)$, where $p^w \equiv p_x^*/p_y$ is the "world" (i.e., untaxed) relative price. The foreign (domestic) terms of trade are then measured by p^w ($1/p^w$). We interpret $\tau > 1$ ($\tau < 1$) to be an import tax (import subsidy) and similarly for τ^* .⁶

Production in each country is determined by selecting the point on its production possibilities frontier at which the marginal rate of transformation between x and y is equal to the local relative price: $Q_i = Q_i(p)$ and $Q_i^* = Q_i^*(p^*)$ for $i \in \{x, y\}$. Consumption is a function of the local relative price -

⁶The 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 defines the tradeoff faced by consumers and determines the level and distribution of factor income in the economy - and of tariff revenue R (R^*), which is distributed lump-sum to domestic (foreign) consumers and which we measure in units of the local export good at local prices. We represent domestic and foreign consumption, respectively, as $D_i = D_i(p, R)$ and $D_i^* = D_i^*(p^*, R^*)$ for $i \in \{x, y\}$. Tariff revenue is defined implicitly by $R = [D_x(p, R) - Q_x(p)][p - p^w]$ or $R = R(p, p^w)$ for the domestic country, and similarly by $R^* = [D_y^*(p^*, R^*) - Q_y^*(p^*)][1/p^* - 1/p^w]$ or $R^* = R^*(p^*, p^w)$ for the foreign country, with each country's tariff revenue an increasing function of its terms of trade under the assumption that goods are normal. National consumption in each country can thus be written as $C_i(p, p^w) \equiv D_i(p, R(p, p^w))$ and $C_i^*(p^*, p^w) \equiv D_i^*(p^*, R^*(p^*, p^w))$.

We next introduce notation for imports and exports, so that the trade balance and equilibrium conditions may be expressed. For the home country, imports of x are denoted as $M_x(p, p^w) \equiv C_x(p, p^w) - Q_x(p)$ and exports of y are represented as $E_y(p, p^w) \equiv Q_y(p) - C_y(p, p^w)$. Foreign country imports of y , M_y^* , and exports of x , E_x^* , are similarly defined. Home and foreign budget constraints imply that, for any world price, we have balanced trade:

$$(1). \quad p^w M_x(p(\tau, p^w), p^w) = E_y(p(\tau, p^w), p^w); \quad M_y^*(p^*(\tau^*, p^w), p^w) = p^w E_x^*(p^*(\tau^*, p^w), p^w),$$

where we now represent explicitly the functional forms of the local prices. Finally, the equilibrium world price $\tilde{p}^w(\tau, \tau^*)$ is determined by the y -market-clearing condition

$$(2). \quad E_y(p(\tau, \tilde{p}^w), \tilde{p}^w) = M_y^*(p^*(\tau^*, \tilde{p}^w), \tilde{p}^w),$$

with market clearing for good x then implied by (1) and (2).

In summary, given an initial pair of tariffs, the equilibrium world price is implied by (2), and the equilibrium world price and the given tariffs then together determine the local prices. In this way, the initial tariffs imply local and world prices and thereby the levels for production, consumption, imports, exports and tariff revenue. Finally, we add the standard restriction that $dp/d\tau > 0 > dp^*/d\tau^*$ and $\partial \tilde{p}^w / \partial \tau < 0 < \partial \tilde{p}^w / \partial \tau^*$, which ensures that the prices so determined do not succumb to the Lerner and Metzler paradoxes.

B. Government Objectives

We next offer a general representation of government preferences. While it is customary to

represent a government's payoff (i.e., welfare) in terms of the underlying choice variables (i.e., tariffs), we choose instead to represent each government's welfare as a function of the local and world prices that the tariffs imply, as this approach enables us to isolate the terms-of-trade externality that tariff selections generate. We thus represent the objectives of the home and foreign governments by the general functions $W(p(\tau, \tilde{p}^w), \tilde{p}^w)$ and $W^*(p^*(\tau^*, \tilde{p}^w), \tilde{p}^w)$, respectively.

The essential structure we place on W and W^* is that, holding its local price fixed, each government achieves higher welfare when its terms of trade improve:

$$(3). \quad \partial W(p, \tilde{p}^w) / \partial \tilde{p}^w < 0 \quad \text{and} \quad \partial W^*(p^*, \tilde{p}^w) / \partial \tilde{p}^w > 0.$$

Figure 1 illustrates. An initial tariff pair $A \equiv (\tau, \tau^*)$ is associated with a domestic iso-local-price locus, $p(A) \rightarrow p(A)$, and an iso-world-price locus, $p^w(A) \rightarrow p^w(A)$.⁷ Also depicted is a second iso-world-price locus, $p^w(C) \rightarrow p^w(C)$, along which the world price is lower than at point A , indicating an improved terms of trade for the domestic country. A reduction in the world price that maintains the domestic local price is thus achieved with the movement from point A to B , corresponding to a higher (lower) domestic (foreign) import tariff. We assume only that the implied income transfer from the foreign to the domestic country is valued by the domestic government.

This representation of government preferences is quite general, as it includes both the traditional possibility that governments maximize national income as well as the possibility that governments are also motivated by distributional concerns. With respect to the latter possibility, as Baldwin (1987) observes, 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) can all be represented in this way. Similarly, the median-voter model of Mayer (1984), the lobbying models of Grossman and Helpman (1994, 1995) and Dixit, Grossman and Helpman (1997), and the political-constraint model of Baldwin (1985) fit within this framework.⁸

⁷Given the assumptions that Metzler and Lerner paradoxes are absent, the iso-local-price locus exhibits negative slope and the iso-world-price locus is positively sloped.

⁸Baldwin (1985) proposes that a government has autonomous *ideological* concerns (e.g., it may be a "free trader") but faces a *political-support constraint* (e.g., export-sector support for proposed liberalization efforts must counterbalance import-competing-sector opposition) when pursuing these goals. To see that this case is included, let G be the objectives of the domestic government and let the political-support constraint be given by the inequality restriction $S(p(\tau, \tilde{p}^w), \tilde{p}^w) \geq \bar{S}$. Then W is the Lagrangian $W(p(\tau, \tilde{p}^w), \tilde{p}^w) = G(p(\tau, \tilde{p}^w), \tilde{p}^w) + \rho[S(p(\tau, \tilde{p}^w), \tilde{p}^w) - \bar{S}]$, where the multiplier ρ depends also on $p(\tau, \tilde{p}^w)$ and \tilde{p}^w .

C. The Purpose of Reciprocal Trade Agreements

We assume that governments seek reciprocal trade agreements to achieve mutually beneficial changes in trade policy; that is, through a reciprocal trade agreement governments seek tariff changes that result in Pareto improvements for member countries (as measured by W and W^*) over what could be achieved by unilateral tariff setting. Reciprocal trade liberalization then refers to mutual reductions in tariffs implemented through a reciprocal trade agreement. Finally, if the tariffs negotiated under a reciprocal trade agreement reach the efficiency locus, defined by

$$(4). \quad [d\tau/d\tau^*]|_{dW=0} = [d\tau/d\tau^*]|_{dW^*=0},$$

then the governments have formed an efficient reciprocal trade agreement.

We begin our exploration of reciprocal trade agreements by considering the trade policy inefficiencies that arise in their absence. To this end, we first suppose that each government sets its trade policy unilaterally, selecting a tariff to maximize its objective function taking the tariff choice of its trading partner as given. The resulting reaction functions are defined implicitly by

$$(5a). \quad \text{Home:} \quad W_p [dp/d\tau] + W_{p^w} [\partial \tilde{p}^w / \partial \tau] = 0$$

$$(5b). \quad \text{Foreign:} \quad W_{p^*} [dp^*/d\tau^*] + W_{p^{*w}} [\partial \tilde{p}^{*w} / \partial \tau^*] = 0,$$

where subscripts denote partial derivatives.⁹ Thus, with $\lambda \equiv [\partial \tilde{p}^w / \partial \tau] / [dp/d\tau] < 0$ and $\lambda^* \equiv [\partial \tilde{p}^{*w} / \partial \tau^*] / [dp^*/d\tau^*] < 0$, (5a) and (5b) can be rewritten as

$$(6a). \quad \text{Home:} \quad W_p + \lambda W_{p^w} = 0,$$

$$(6b). \quad \text{Foreign:} \quad W_{p^*} + \lambda^* W_{p^{*w}} = 0.$$

Each government's best-response tariff is therefore determined by the combined impact that the induced local and world price movements have on welfare.

The forces that determine best-response tariffs are illustrated in Figure 1. Consider an initial tariff pair represented by the point $A \equiv (\tau, \tau^*)$. Holding fixed τ^* , if the domestic government were to unilaterally increase its tariff from τ to τ^1 , a new tariff pair corresponding to the point $C \equiv (\tau^1, \tau^*)$ would be induced. This tariff pair lies on a new iso-local-price locus, given as $p(C) \rightarrow p(C)$, and also

⁹We also assume throughout that second-order conditions are globally satisfied.

on a new iso-world-price locus, represented as $p^w(C) \rightarrow p^w(C)$. By increasing its tariff, the domestic government thus induces a local price that is higher and a world price that is lower. As Figure 1 illustrates and (6a) suggests, the overall movement from A to C can be disentangled into separate movements in the local and world prices, respectively. The movement from A to B isolates the world price change. The welfare gain for the domestic government that is associated with this change is captured in (6a) with the term λW_p^w , which is strictly positive by (3). The movement from B to C then reflects the induced increase in the local price, and the effect of this change on the domestic government's welfare is represented in (6a) by the term W_p .

We now define Nash equilibrium tariffs as a pair of domestic and foreign tariffs (τ^N, τ^{*N}) which simultaneously satisfy (6a) and (6b).¹⁰ Our first pair of results establish that a Pareto improvement from the Nash equilibrium can be achieved through a reciprocal trade agreement, but only if the agreement is characterized by reciprocal trade liberalization.

Proposition 1: Nash equilibrium tariffs are inefficient.

Proposition 2: A reciprocal trade agreement must entail reciprocal trade liberalization.

Proofs of these propositions are found in the Appendix.

These results reflect a familiar intuition. When a government imposes an import tariff, its terms of trade improve, and part of the cost of this policy is borne by its trading partners, whose products sell at a lower world price. This terms-of-trade externality implies that the government faces less than the full costs of protecting its import-competing sectors. As a consequence, governments oversupply policies directed toward import protection relative to the efficient intervention levels given their preferences, and a reciprocal trade agreement can therefore benefit all governments if it serves as a mechanism through which the protection levels of each country can be reduced. An implication

¹⁰We postpone for now discussion regarding the existence and uniqueness of Nash equilibria, choosing instead to focus on statements that are true for any Nash equilibrium with positive trade that is not Pareto dominated by other Nash equilibria. An implication of this focus is that we ignore here and throughout the paper the possible gains from a reciprocal trade agreement that could come from coordinating across Pareto-ranked Nash equilibria. The emphasis placed on enforcement issues in actual trade agreements suggests that the achievement of coordination gains is not the primary purpose of such agreements. Similarly, we ignore for now issues associated with the existence and uniqueness of politically optimal tariffs, as defined below.

of our analysis is that the benefits of reciprocal trade liberalization are quite robust, as they arise for a very general class of government preferences.

More strikingly, for the class of government preferences entertained here, we find that the terms-of-trade externality is the *only* inefficiency that a reciprocal trade agreement can remedy. To establish this conclusion, we consider a hypothetical world in which governments are assumed not to value the terms-of-trade effects that their unilateral tariff choices imply.¹¹ If under this hypothesis unilateral tariff choices are efficient, then we may conclude that the terms-of-trade externality is the only rationale for a trade agreement. With this experiment in mind, we define politically optimal tariffs as any tariff pair (τ^{PO}, τ^{*PO}) that simultaneously satisfies:

$$(7a). \quad \text{Home:} \quad W_p = 0$$

$$(7b). \quad \text{Foreign:} \quad W_p^* = 0.$$

In the special case where the domestic and foreign governments seek to maximize national income, politically optimal tariffs correspond to reciprocal free trade.¹²

We now find that the terms-of-trade externality is indeed the only inefficiency that a trade agreement can remedy:

Proposition 3: Politically optimal tariffs are efficient.

This proposition is proved in the Appendix, but the intuition follows from Figure 1. When choosing its tariff, the domestic government considers the domestic costs and benefits that a tariff increase has through the corresponding increase in the domestic local price (the movement from *B* to *C*), and it also considers the extent to which the costs associated with a higher local price are shifted onto its

¹¹The assumption here is not that governments fail to understand that their tariff choices affect the terms of trade; rather, the hypothetical situation we consider is that governments are not motivated by the world price implications of their tariff choices. In terms of (6a), governments recognize that $\lambda < 0$, but we now consider the tariffs that they would select were their welfare functions such that $W_p = 0$. Our thought experiment identifies the tariffs that would be chosen by governments with these hypothetical preferences and evaluates the efficiency properties of these tariffs with respect to actual government preferences.

¹²When the domestic government maximizes the utility of a representative agent, its objective can be represented as $W(p, p^w) \equiv V(p, I(p, p^w))$, with V denoting the indirect utility of the representative domestic agent and with I denoting the domestic national income measured in units of y at local prices. With a similar expression for the foreign government, a direct application of Roy's identity indicates that $W_p = 0 = W_p^*$ implies $\tau = 1 = \tau^*$.

trading partner through the corresponding reduction in the world price (the movement from A to B). In the hypothetical case in which the domestic government does not value the world price change that a tariff increase implies, however, it is motivated only by the former consideration, and so the domestic government then internalizes all of the costs associated with an increase in its tariff. When both governments behave in this fashion, the resulting politically optimal tariffs are thus efficient.

Of course, the politically optimal tariffs are not the only efficient tariffs. To see this, we use (4) to recast the efficiency locus in the form

$$(8). \quad (1 - AW_p)(1 - A^*W_p^*) = 1,$$

where $A \equiv (1 - \tau\lambda)/(W_p + \lambda W_{pw})$ and $A^* \equiv (1 - \lambda^*/\tau^*)/(W_p^* + \lambda^*W_{pw}^*)$, with $A \neq 0$ and $A^* \neq 0$ under the further assumption that the partial derivatives of the welfare functions are always finite. Observe that (8) is satisfied when $W_p = 0 = W_p^*$, confirming that politically optimal tariffs are efficient; however, (8) can also be satisfied if $W_p \neq 0$ and $W_p^* \neq 0$, and politically optimal tariffs thus define only a particular point on the efficiency locus. Starting from the political optimum, other points on the efficiency locus can be reached by altering tariffs so as to generate local prices that are efficient given the new distribution of world income implied by the associated world price movements.¹³

We now add some additional structure to the model and assume that (i). a unique Nash equilibrium exists, (ii). a unique political optimum exists, and (iii). the political optimum lies on the contract curve (i.e., it corresponds to a point on the efficiency locus that yields mutual gains for each government relative to its Nash welfare).¹⁴ These assumptions are imposed in Figure 2, which illustrates the three propositions of the section. As Proposition 1 indicates, the Nash tariffs (point N) lie off of the efficiency locus as defined by (8) (the curve $E \rightarrow E$). The figure also depicts the Nash iso-welfare curves for the domestic and foreign governments, and these curves illustrate the message

¹³In the special case of national-income-maximizing governments, as Mayer (1981) shows, the efficiency locus is described by the set of tariffs that satisfy $\tau = 1/\tau^*$. In this case, along the efficiency locus, tariffs are adjusted so as to maintain equality in relative local prices across countries, with different efficient tariff pairs resulting in different world prices and thus different distributions of income across countries. In the more general formulation considered here, it remains true that the efficiency locus determines a relationship between domestic and foreign tariffs, but it need not be the case that this relationship equates relative local prices across trading partners.

¹⁴The political optimum lies on the contract curve if the countries are not too asymmetric. As Johnson (1953-54), Kennan and Reizman (1988) and Mayer (1981) show for the case in which governments maximize national income, when governments are sufficiently asymmetric, the political optimum (which is then free trade) need not offer Pareto gains relative to the Nash equilibrium for all governments.

of Proposition 2: relative to the Nash equilibrium, a trade agreement can increase the welfare of both governments only if the agreement calls for a reduction in both tariffs. Finally, as Proposition 3 requires, the politically optimal tariffs (point *PO*) lie on the efficiency locus. Notice that the iso-welfare curves are tangent at every point along this locus. A novel feature of the politically optimal point is that the iso-welfare curves are also tangent to the iso-world-price locus. The bold portion of the efficiency locus corresponds to the contract curve.

More broadly, Figure 2 illustrates the general purpose of a reciprocal trade agreement. When governments interact unilaterally, the associated Nash tariffs are inefficient as a consequence of the terms-of-trade externality. A reciprocal trade agreement is then attractive to governments if it enables them to cooperate and replace the high Nash tariffs with lower tariffs that rest on the contract curve. While the rationale for a reciprocal trade agreement may be understood in these general terms, there remains an important practical issue: How is the trade agreement to be designed?

There are two basic approaches. In a "rules-based" approach, governments agree to certain principles under which subsequent negotiations will be undertaken. Alternatively, governments might adopt a "power-based" approach in which they bargain in a direct fashion that is not constrained by agreed-upon principles of negotiation. With the creation of GATT, governments chose to adopt a rules-based approach, and two foundational rules of GATT are reciprocity and non-discrimination. We focus in the next two sections on the efficiency properties of these simple rules.

III. Reciprocity

In this section, we define and interpret GATT's principle of reciprocity. We then show that reciprocity can enhance efficiency, as it can guide governments toward the politically optimal tariffs.

A. The Principle of Reciprocity

We begin with a definition of reciprocity. At the broadest level, reciprocity refers to the "ideal" of mutual changes in trade policy that bring about equal changes in import volumes across trading partners.¹⁵ We thus propose the following definition: a set of tariff changes $\Delta\tau \equiv (\tau^1 - \tau^0)$ and

¹⁵See, for example, Dam (1970, pp. 58-61 and pp. 87-91) on the concept of reciprocity in GATT and the various ways in which reciprocity is measured in practice.

$\Delta\tau^* \equiv (\tau^{*1} - \tau^{*0})$ conforms to *the principle of reciprocity* provided that

$$\tilde{p}^{w0}[M_x(p(\tau^1, \tilde{p}^{w1}), \tilde{p}^{w1}) - M_x(p(\tau^0, \tilde{p}^{w0}), \tilde{p}^{w0})] = [M_y^*(p^*(\tau^{*1}, \tilde{p}^{w1}), \tilde{p}^{w1}) - M_y^*(p^*(\tau^{*0}, \tilde{p}^{w0}), \tilde{p}^{w0})]$$

where $\tilde{p}^{w0} \equiv \tilde{p}^w(\tau^0, \tau^{*0})$, $\tilde{p}^{w1} \equiv \tilde{p}^w(\tau^1, \tau^{*1})$ and changes in import volumes are measured at existing world prices. Using the trade balance condition (1) and the equilibrium condition (2), it is now direct to show that this expression reduces to

$$[\tilde{p}^{w1} - \tilde{p}^{w0}]M_x(p(\tau^1, \tilde{p}^{w1}), \tilde{p}^{w1}) = 0.$$

Hence, *mutual changes in trade policy that conform to reciprocity leave world prices unchanged.*

With this observation in hand, we may anticipate the general manner in which reciprocity can be efficiency-enhancing. Intuitively, as we argued above, unilateral tariff choices are inefficient if and only if governments are motivated by their abilities to *change* the world price. When governments negotiate tariffs under the rule of reciprocity, however, this terms-of-trade externality is neutralized, as the mutual tariff changes that occur under reciprocity leave the world price *fixed*. This feature of reciprocity, which can be seen transparently in our two-country two-good model but which also extends beyond the 2x2 case, will play a central role in our analysis.¹⁶

To explore this general proposal more fully, we identify the two specific applications of reciprocity that occur within GATT practice. First, the principle of reciprocity is often associated with the informal idea that governments seek a "balance of concessions" (i.e., reciprocal tariff cuts)

¹⁶To see that this property of reciprocity holds more generally, consider a two-country N -good world economy. Let (p^{w0}, p^0, E^0) denote an initial triple consisting of a $(1 \times N)$ vector of equilibrium world prices, a $(1 \times N)$ vector of equilibrium local home country prices, and an $(N \times 1)$ vector of equilibrium trades with the j th element of E positive (negative) if good j is imported by the foreign (home) country. Similarly, let (p^{w1}, p^1, E^1) denote a second set of equilibrium prices and quantities that arise under an alternative set of trade policies. In analogy with our approach above, the view that reciprocity reflects mutual changes in trade policy which bring about equal changes in import volumes across trading partners can be represented with the restriction that tariff changes conforming to reciprocity lead to changes in trade volumes which satisfy $p^{w0'}[E^1 - E^0] = 0$. Utilizing the balanced trade conditions $p^{w0'}E^0 = 0$ and $p^{w1'}E^1 = 0$ and proceeding as above, the restriction of reciprocity can be rewritten as $(p^{w1'} - p^{w0'})E^1 = 0$. Thus, mutual changes in trade policy continue to satisfy the restriction of reciprocity if world prices are unchanged. In the many-good case, however, it is also possible that reciprocity can be satisfied even when world prices change. To evaluate this possibility, we note that the restriction of reciprocity can be further rewritten as $(p^{w1'} - p^1)E^1 = (p^{w0'} - p^1)E^1$. This indicates that any trade policy adjustment giving rise to the price vectors p^{w1} and p^1 results in the same aggregate tariff revenue as would an alternative tariff policy adjustment that gave rise to the price vectors p^{w0} and p^1 , when each adjustment is consistent with the restriction of reciprocity. Since world prices affect welfare only through tariff revenue, we may therefore restrict attention to tariff policy adjustments that preserve the world prices. These properties of reciprocity also extend naturally to a many country setting.

when they enter into trade negotiations. The emphasis that governments place upon reciprocity in this sense has attracted the interest of many economists, and we therefore pause and offer an economic interpretation of this application in the next subsection. A second application of reciprocity can be found within the formal rules of GATT itself. We give this application primary emphasis, and it concerns the rules by which GATT members must abide when they renegotiate agreements. In the final subsection, we interpret and evaluate the agreements that governments can implement when they recognize that the principle of reciprocity governs any renegotiation process.

B. Reciprocity and the Balance of Concessions

When governments negotiate tariff reductions in a GATT round, they do so under GATT Article XXVIII bis. As the language therein makes clear, participation in negotiations is voluntary and suggests a desire to arrange "reciprocal and mutually advantageous" reductions in tariffs. At the same time, there is no formal requirement in GATT that negotiated tariff reductions conform to the principle of reciprocity as defined above. Rather, governments have developed an informal reliance upon this principle, as they typically seek a *balance of concessions* through a negotiated agreement.¹⁷

This informal principle of reciprocity appears to defy standard economic logic, which holds that unilateral free trade is the optimal policy for a country. Why should a government require a "concession" from its trading partner in order to do what is in any event best for its country? Indeed, the observation that governments seek reciprocity in negotiated agreements is sometimes interpreted as evidence that government negotiators adopt a mercantilist perspective that is inconsistent with economic reasoning and derives from political forces. For example, Krugman (1991) observes:

"To make sense of international trade negotiations, one needs to remember three simple rules about the objectives of the negotiating countries:

- 1) Exports are good.
- 2) Imports are bad.
- 3). Other things equal, an equal increase in imports and exports is good.

In other words, GATT-think is enlightened mercantilism." (Krugman, 1991, p. 25)

By contrast, we argue next that the informal principle of reciprocity that characterizes actual trade negotiations admits a direct and simple economic interpretation.¹⁸

¹⁷For a discussion of the informal application of reciprocity, see, e.g., Bhagwati (1991) and Dam (1970, p. 59).

¹⁸Krugman (1997) develops more fully the view that GATT negotiations are incompatible with economic reasoning and reflect mercantilist logic. Some of the advantages of reciprocity described by Bhagwati (1991, pp.

To develop this argument, we assume for the moment that governments begin at the Nash equilibrium point, and we show formally in the Appendix that reciprocal trade liberalization that satisfies the principle of reciprocity raises the welfare of each government in a monotonic fashion, at least if the liberalization effort does not proceed too far:

Proposition 4: Beginning at a Nash equilibrium, reciprocal trade liberalization that conforms to reciprocity will increase each government's welfare monotonically until this liberalization has proceeded to the point where $\min[-W_p, W_p^*]=0$. If countries are symmetric, this liberalization path leads to the politically optimal outcome.

Intuitively, at a Nash equilibrium, each government would prefer more trade, if only it could achieve this increase without experiencing a decline in its terms of trade. For example, it is direct from (3) and (6a) that $W_p < 0$ at a Nash equilibrium, which indicates that the domestic local price is higher than the domestic government prefers, taking as given the Nash world price. The domestic government would thus prefer to reduce its tariff, lower the local price and experience a corresponding increase in trade volume, if it could do so without reducing its terms of trade. While a unilateral liberalization effort is unappealing at the Nash equilibrium, as a consequence of the associated deterioration in the terms of trade, a negotiated *mutual* reduction in tariffs that conforms to the principle of reciprocity results in a higher trade volume without a terms-of-trade loss for either government. Both governments thus benefit from reciprocal tariff reductions of this form, provided that the reciprocal liberalization effort does not proceed past the point at which $\min[-W_p, W_p^*]=0$, where one government obtains its preferred local price given the initial Nash world price.

Figures 3a and 3b illustrate the liberalization paths described in Proposition 4. In Figure 3a, the countries are symmetric, and so the iso-world-price locus that runs through the Nash point N also intersects the politically optimal point PO . In this case, as governments liberalize according to the principle of reciprocity, each government benefits until they simultaneously achieve their preferred local prices at the politically optimal tariffs. The case in which countries are asymmetric is depicted in Figure 3b, and the Nash iso-world-price locus now need not intersect the politically optimal point.

50-51) and McMillan (1986, 1989) are more in line with the results we discuss here.

As Proposition 4 indicates, it remains true that liberalization from the Nash point under reciprocity initially raises the welfare of each government; but in the asymmetric case, the mutual benefits from further liberalization terminate before the efficiency locus is reached. For instance, in Figure 3b, it is the domestic government that first achieves its preferred local price at the given Nash world price, and so the mutual benefits from further liberalization terminate at point Z.

It is convenient now to consider further the relationship between reciprocity and the politically optimal tariffs. As discussed in the previous section, under the hypothetical experiment in which the domestic government does not value movements in the terms of trade, the domestic government sets its tariff to satisfy $W_p=0$. When both governments select tariffs in this fashion, the resulting tariffs are the politically optimal tariffs. Of course, there is no reason to expect that actual governments would be indifferent to terms-of-trade movements. The experiment is instructive, though. We may think of reciprocity as corresponding to a related experiment, in which governments ignore the terms-of-trade implications of their tariff selections, not because such a movement would be without value, but rather because the mutual adjustments in tariffs implied by reciprocity guarantee that the world price is, in fact, fixed. The domestic government's preferred tariff thus again satisfies $W_p=0$, which is to say that reciprocity induces governments to act *as if* they did not value the terms-of-trade movements associated with their unilateral tariff selections.¹⁹

Finally, we return to Krugman's (1991) three rules of "enlightened mercantilism" that characterize actual negotiations, and we note that Propositions 1 through 4 provide a formal economic interpretation of these rules. Specifically, we find that: (1). Governments enter into negotiations seeking more open export markets ("exports are good"), because a reduction in the import tariff levied by the trading partner serves to improve the terms of trade; (2). Import liberalization is viewed by governments as a concession ("imports are bad"), because it implies reducing the import tariff below the best-response value and suffering a terms-of-trade decline; and (3). Each government benefits from a concession at home that is balanced under reciprocity against an "equivalent" concession abroad ("other things equal, an equal increase in imports and exports is

¹⁹This discussion may be made more concrete with reference to (6a). As this equation makes clear, the domestic government's preferred tariff satisfies $W_p=0$ when the term λW_{pw} is zero. This would in fact be the case, either if the government were hypothesized not to value a change in the terms of trade (i.e., if $W_{pw}=0$) or if it were to expect a reciprocal tariff adjustment from its trading partner that would result in no change in the terms of trade (i.e., if $\lambda=0$).

good"), because the balance of concessions so achieved serves to neutralize the terms-of-trade decline that would have made unilateral liberalization undesirable.²⁰

C. Reciprocity and the Withdrawal of Substantially Equivalent Concessions

There is nothing in GATT which *requires* that the outcome of negotiations produce a balance of concessions; rather, reciprocity in this circumstance describes the broad manner in which governments seem to approach trade negotiations. Reciprocity also plays an important role in GATT in a second circumstance, however, and in this case GATT does require that countries comply with the rule of reciprocity. This second application of reciprocity concerns the manner in which countries may lawfully *renegotiate* a previous agreement. Under GATT Article XXVIII (Dam, 1970, pp. 79-99; Enders, 1997; Jackson, 1989, p. 119), a country may propose to modify or withdraw a tariff concession to which it had previously committed in a round of tariff negotiation. In the circumstance in which the country fails to reach agreement with its trading partners over a renegotiated tariff schedule, the country is free to carry out the proposed changes anyway, and the notion of reciprocity is used to moderate the responses of its trading partners, who are permitted to withdraw *substantially equivalent concessions* of their own.²¹

By requiring moderation on the part of trading partners, this second application of reciprocity ensures that the proposing country's unilateral decision to increase a previously bound tariff results in an offsetting tariff adjustment from its trading partner which preserves the original world price. Consequently, under GATT's rules, any agreement that leaves some government wanting less trade at the prevailing world price will be renegotiated. For the remainder of the paper, we will focus on

²⁰It is interesting to note that, according to a popular political argument, the appeal of reciprocity is that it mobilizes export-sector support for liberalization. In fact, however, this political argument can be captured by our model. The key point is that the proposed export-sector support for reciprocity is ultimately tied to the anticipated economic benefits of a lower foreign import tariff, and these benefits travel through the world price. See also note 8.

²¹In fact, it is in the context of Article XXVIII renegotiations that perhaps the clearest statement of the measurement of reciprocity in GATT practice has been given. In describing the "fairly well established criteria" that were considered in determining what would constitute the withdrawal of substantially equivalent concessions, the Legal Adviser to GATT's Director-General observed: "The first criterion was the development of the imports during, normally, the three years before the renegotiations started. What was taken into account was not just a statistical average, but also the trend in the development of trade during that period. Furthermore, account was taken of the size of the tariff increase being negotiated. Moreover, an estimate was made of the price elasticity of the product concerned." (WTO, 1995, p. 949)

reciprocity as it applies in this second circumstance, and we will consider the trade agreements that can be implemented when governments negotiate an initial set of tariff "bindings," where subsequently either government is free to increase its previously bound tariff with the understanding that the outcome of any renegotiation that follows will preserve the world price implied by the previous agreement. We wish to characterize the set of trade agreements that can be implemented as the end result of this process, i.e., once no further renegotiation is desired by either government.

Formally, we consider a negotiation process that entails three stages. In the initial negotiation stage (corresponding to Article XXVIII bis), governments agree to bind their tariffs at specified levels.²² The second stage is a renegotiation stage (corresponding to Article XXVIII), where any renegotiation satisfies the restriction of reciprocity as outlined above, and thus results in mutual changes in tariffs that preserve the world price from the first stage. Finally, to ensure that the renegotiation process achieves eventual resolution (and in line with Article XXVIII), we introduce a third stage that arises if governments fail to agree on a renegotiated set of tariffs. In this final stage, the tariffs that are implemented are those that achieve the greatest trade volume consistent with the restriction of reciprocity and the requirement that no country is asked to import a volume greater than is implied by its government's proposal in the renegotiation stage.

We begin our analysis with some definitions. Given a world price \bar{p}^w that is determined in the first stage of negotiations, we will say that a renegotiated tariff pair (τ, τ^*) satisfies the restriction of reciprocity if the tariff pair preserves the original world price: $\tilde{p}^w(\tau, \tau^*) = \bar{p}^w$. If in the renegotiation stage the domestic government proposes a domestic tariff $\hat{\tau}$ and the foreign government proposes a foreign tariff $\hat{\tau}^*$, then under the restriction of reciprocity the tariff proposed by one government will "imply" a world-price-preserving tariff for its trading partner. We thus define the domestic government's implied foreign tariff, $\tau^* = \tau^*(\hat{\tau}, \bar{p}^w)$, and the foreign government's implied domestic tariff, $\tau = \tau(\hat{\tau}^*, \bar{p}^w)$, by the requirements that $(\hat{\tau}, \tau^*(\hat{\tau}, \bar{p}^w))$ and $(\tau(\hat{\tau}^*, \bar{p}^w), \hat{\tau}^*)$ satisfy the restriction of

²²Our purpose here is to examine the tariffs that *can* be implemented in the presence of renegotiation as formally allowed by GATT rules. Consistent with this objective and the formal content of GATT rules, we thus allow that governments are unconstrained with respect to the tariff bindings to which they initially agree. In particular, we depart from the focus of the previous subsection, in which negotiated tariffs are constrained (at least informally) to lie on the Nash iso-world-price locus. This focus served well to illustrate the point that the informal pursuit of reciprocity in trade negotiations has a direct economic interpretation, but it is an unduly restrictive focus in light of our present objectives.

reciprocity. We may then say that the proposed tariffs, $\hat{\tau}$ and $\hat{\tau}^*$, agree if they imply the same tariff pair along the iso-world-price locus: $(\hat{\tau}, \tau^*(\hat{\tau}, \bar{p}^w)) = (\tau(\hat{\tau}^*, \bar{p}^w), \hat{\tau}^*)$. When the proposed tariffs do not agree, the tariff pair (τ, τ^*) that is implemented in the final stage satisfies the restriction of proposed import limits if the domestic import volume under (τ, τ^*) is no greater than the implied import volume $M_x(p(\hat{\tau}, \bar{p}^w), \bar{p}^w)$ and the foreign import volume under (τ, τ^*) is likewise no greater than the implied import volume $M_y^*(p^*(\hat{\tau}^*, \bar{p}^w), \bar{p}^w)$. This final restriction formalizes the idea that neither government can be forced to import a volume greater than implied by its own proposal in the renegotiation stage.

We are prepared now to formally define the *Bilateral Negotiation Game*:

- Stage 1: Governments bargain over tariffs and a world price, \bar{p}^w , is determined.*
- Stage 2: The domestic government proposes a domestic tariff, $\hat{\tau}$, at the same time that the foreign government proposes a foreign tariff, $\hat{\tau}^*$. If the tariff proposals agree, then they are implemented as the outcome of the negotiation.*
- Stage 3: If the tariff proposals do not agree, then the tariffs that are implemented are those which achieve the greatest trade volume while satisfying the restrictions of reciprocity and proposed import limits.*

Our approach is to first determine the tariffs that can be achieved under the representation of reciprocity given in stages 2 and 3, and then later provide a description of the stage-1 bargaining process that encompasses a range of possibilities.

While there are a variety of simple rules under which governments might negotiate, we will argue that an appealing feature of reciprocity is that this rule is compatible with an efficient outcome. In fact, renegotiation under reciprocity results in an efficient outcome if and only if tariffs are ultimately set at their politically optimal levels. The key intuition is again that the rule of reciprocity eliminates the ability of any government to shift costs onto its trading partner through a change in the world price. This rule therefore induces each government to behave as if it did not value world-price movements, a behavior which leads naturally toward the selection of politically optimal tariffs.

The main ideas can be developed more concretely with reference to Figure 4. There, we identify three pairs of efficient tariffs, labeled *A*, *B* and *PO*. We represent as well the iso-world-price loci that run through each of the three tariff pairs. Finally, we also illustrate the loci that represent

tariffs for which $W_p=0$ and $W_{p^*}=0$, respectively. For illustrative purposes only, these loci are assumed downward sloping. According to (8), each locus intersects the efficiency frontier at the politically optimal point PO and nowhere else.²³

Suppose now that the governments' initial agreement corresponds to point A . In this case, the foreign government would prefer to move up the associated iso-world-price locus to point A' , where it achieves its preferred local price. The foreign government thus has incentive to propose the tariff $\tau^*(A')$, with the corresponding implied domestic tariff $\tau(A')$; in fact, for the bilateral negotiation game represented above, this proposal is a dominant strategy for the foreign government.²⁴ The efficient tariff pair at A is thus not "renegotiation-proof" under GATT rules, since the foreign government would request a renegotiation to raise its tariff to $\tau^*(A')$, knowing that the domestic government would then withdraw a substantially equivalent concession that preserved the world price and delivered the point A' . Using a similar argument, it is apparent that the point B also fails the renegotiation test, although in this case it is the domestic government that withdraws its original concession in order to induce the point B' . It is now direct to see that there is exactly one efficient tariff pair which, if agreed to initially, would be impervious to the renegotiation process. This tariff pair is the politically optimal tariff pair, since this is the only point on the efficiency locus at which each government achieves its preferred local price for the given world price.²⁵

We now say that a tariff pair (τ, τ^*) can be *implemented under reciprocity* if there exists a world price \bar{p}^w such that the outcome of stages 2 and 3 of the Bilateral Negotiation Game is uniquely (τ, τ^*) , when governments make dominant proposals. Arguing in this general fashion described

²³Using (8), efficiency is possible if and only if both $W_p=0$ and $W_{p^*}=0$ (corresponding to the politically optimal point) or both $W_p \neq 0$ and $W_{p^*} \neq 0$.

²⁴The restriction of proposed import limits ensures that, if the proposals do not agree, the tariff pair that is implemented is the proposed tariff pair that is the "highest" (i.e., most-restrictive) pair. Thus, if the domestic government proposes a tariff pair that is lower than A' , then the foreign government's proposal is pivotal, and the foreign government achieves its preferred point on the given iso-world-price locus. On the other hand, if the domestic government proposes a tariff pair that is higher than A' , then the foreign proposal is non-pivotal, and the foreign government's proposal would matter only if it were higher yet, which would result in an even worse (i.e., further above A') outcome for the foreign government.

²⁵In the special case in which governments maximize national income, the political optimum corresponds to reciprocal free trade and the locus at which $W_p=0$ ($W_{p^*}=0$) is horizontal (vertical) out of this point. The efficiency locus passes through the reciprocal-free-trade point as well, but it otherwise lies below the loci at which $W_p=0$ and $W_{p^*}=0$. If governments maximize national income, therefore, the point of reciprocal free trade is the only point on the efficiency frontier that is impervious to renegotiation as allowed by GATT rules.

above, we show formally in the Appendix that the following proposition obtains:

Proposition 5: An efficient trade agreement can be implemented under reciprocity if and only if it is characterized by tariffs which are set at their politically optimal levels.

Thus, if governments recognize the potential for renegotiation as allowed by GATT rules, and if they seek an efficient outcome, then their negotiations will result in the politically optimal tariffs.

We turn now to Figure 5a and consider the stage-1 bargaining process in more detail. This figure illustrates the complete locus of reciprocal trade agreements that are implementable under reciprocity. With τ and τ^* on the vertical and horizontal axis, respectively, we depict there the efficiency locus (labeled $E \rightarrow E$), the contract curve (the bold portion of the efficiency locus), and the politically optimal point (labeled PO). The locus of tariff combinations implementable under reciprocity in a reciprocal trade agreement corresponds to the upper envelope of the portions of the $W_p = 0$ and $W_p^* = 0$ loci that lie on or above the efficiency locus and inside the Nash welfare contours of the two governments, and we label this locus $R \rightarrow PO \rightarrow R$. Figure 5b translates this information into welfare space, with the vertical (horizontal) axis measuring W (W^*) and the origin representing the Nash welfare levels of each government. In this figure, the dashed curve represents the efficiency frontier, while the bold curve indicates the combinations of welfare achievable under reciprocity in a reciprocal trade agreement, corresponding to the welfare levels along the locus $R \rightarrow PO \rightarrow R$ in the top panel. As depicted in Figure 5b, reciprocity has the effect of shrinking the feasible set of bargaining outcomes to lie within the efficiency frontier at all but the politically optimal point.

With reference to Figure 5b, we may now understand the constraint of reciprocity more broadly as a rule of negotiation that has the effect of steering the stage-1 bargaining outcome toward the political optimum. To make this point, we consider any stage-1 bargaining process that can be represented in terms of the maximization of a general function, whose iso-quantity contours are downward sloping and convex in the space of welfare. The objective function specified in the Nash Bargaining Solution is one example. The maximization is taken over a set of feasible tariff/welfare outcomes, and the feasible set is determined in turn by the bargaining format.

We compare two bargaining formats.²⁶ Suppose first that governments bargain directly in stage 1 over final tariff/welfare outcomes, without the possibility of subsequent renegotiation. The feasible set of welfare outcomes then corresponds in Figure 5b to those welfare levels that lie on or within the efficiency frontier. Assuming that the efficiency frontier is concave, the bargaining outcome is uniquely determined as a tangency between an iso-quantity contour and the efficiency frontier. We represent this solution as point *A*. The second format corresponds to the Bilateral Negotiation Game. In this case, the feasible set of welfare outcomes is represented in Figure 5b as those welfare levels that lie on or within the bold curve. If this curve is concave, the bargaining solution is uniquely determined as a tangency between the iso-quantity contour and the bold curve. This solution is depicted as point *B*, and we see that the stage-1 bargaining outcome is closer to the political optimum under the second format.²⁷

This discussion indicates that the restriction of reciprocity directs the bargaining outcome toward the political optimum. Intuitively, this restriction limits the extent to which one government can gain when the other government's welfare is diminished (relative to the political optimum), and this "efficiency penalty" ensures that governments will not venture too far from the political optimum in their stage-1 negotiations. Finally, we also observe that, as Proposition 5 states, the politically optimal outcome is itself necessary under any stage-1 bargaining process, if this process is to deliver an efficient outcome for the Bilateral Negotiation Game. Hence, the politically optimal tariffs will be the outcome of negotiations under a wide range of stage-1 bargaining procedures when, for example, the ability of governments to make side payments is allowed.²⁸

²⁶We explore the differences between these two formats at greater length in Section VI, where we refer to the first (second) format as a power- (rules-) based approach.

²⁷The details depicting the positions of points *A* and *B* in Figure 5b will depend on the specific stage-1 bargaining process adopted, but the general point illustrated by the figure -- that each government's payoff lies closer to its politically optimal payoff under the second bargaining format -- will hold in a variety of settings. For example, this will always be the case if countries are not too asymmetric, or with sufficient concavity of the reciprocity-constrained efficiency frontier relative to the unconstrained frontier. It will also hold if stage-1 bargaining is characterized by the generalized Nash Bargaining Solution with sufficiently large bargaining-power asymmetries, under the added regularity condition that the reciprocity-constrained frontier is globally more concave than the unconstrained frontier.

²⁸Government-to-government side payments are often considered in theoretical analyses of trade agreements (e.g., Bond and Syropoulos, 1996, Grossman and Helpman, 1995). The general relevance of such side payments in practice is less clear, though important cases are discussed in Kowalczyk and Sjoström (1994) and Whalley (1998).

IV. Non-discrimination

Along with reciprocity, the principle of non-discrimination (MFN) provides the second pillar of the foundation upon which GATT is built. We now extend our framework to a multi-country setting in order to assess the role of non-discrimination in multilateral trade agreements.

A. The Economic Environment

We assume that there is one home country (no $*$) and three foreign countries ($*$).²⁹ The home country is a natural importer of x , and the three foreign countries are natural importers of y . We assume that the three foreign countries have no basis for trade among themselves in the absence of discriminatory tariffs. Furthermore, if tariffs are discriminatory, we assume that the "natural" flow of trade is not altered: discriminatory tariffs do not induce trade among the foreign countries, and they also do not reverse the pattern of trade between the home country and any of its foreign trading partners.³⁰ As such, each foreign country trades only with the home country, and the home country is thus the only country that has the opportunity to set discriminatory tariffs.

We now introduce some notation. The set of foreign countries is denoted by $N^* \in \{1,2,3\}$, and we use $j \in N^*$ as an index for foreign country j . We continue to define $p \equiv p_x/p_y$ as the home local relative price, and we now denote the local relative price in foreign country j as $p^{*j} \equiv p_x^{*j}/p_y^{*j}$. The ad valorem tariff levied by the home country on imports from foreign country j is denoted as t^j , and similarly t^{*j} is the ad valorem tariff imposed by foreign country j on imports from the home country. We assume these tariffs are non-prohibitive. Next, we define the "world" (untaxed) relative price for trade between the home country and foreign country j as $p^{wj} \equiv p_x^{*j}/p_y$. Defining $\tau^j \equiv (1+t^j)$ and $\tau^{*j} \equiv (1+t^{*j})$, we then have that $p = \tau^j p^{wj} \equiv p(\tau^j, p^{wj})$ and $p^{*j} = p^{wj}/\tau^{*j} \equiv p^{*j}(\tau^{*j}, p^{wj})$. Finally, we note that bilateral trades link world prices according to:

$$(9). \quad p^{wj} = [\tau^k/\tau^j] \cdot p^{wk}, \text{ for } j, k \in N^*.$$

²⁹Three is the minimal number of foreign countries that will allow us to consider the role of non-discrimination in a multilateral agreement when the domestic country is also a member of a preferential agreement. This topic is the subject of Section V.

³⁰These assumptions will be met if, for example, transportation costs between foreign countries are large as compared to the extent of discriminatory home tariffs. Their only role in our analysis is to ensure that it is possible for the home country to select discriminatory tariffs without prohibiting trade between it and its less-favored trading partners.

Thus, a home-country policy of MFN (i.e., $\tau^1 = \tau^2 = \tau^3$) implies a single world price: $p^{wj} \equiv p^w$. By contrast, tariff discrimination across imports from foreign countries j and k (i.e., $\tau^j \neq \tau^k$) implies different world prices: $p^{wj} \neq p^{wk}$.

Foreign production and consumption decisions can be characterized exactly as in our two-country model, since each foreign country j has only one trading partner, and so its terms of trade are given simply by p^{wj} . Thus, production, consumption, exports and imports for foreign country $j \in N^*$ are denoted respectively by $Q_i^{*j} = Q_i^{*j}(p^{*j})$ for $i \in \{x, y\}$, $C_i^{*j}(p^{*j}, p^{wj})$ for $i \in \{x, y\}$, $E_x^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj})$ and $M_y^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj})$. The presence of multiple trading partners for the domestic country potentially complicates the expression of domestic quantities, as the home country may face different terms of trade with each of its trading partners. This complication does not affect the determination of domestic production, which is still represented as a function of local relative prices: $Q_i = Q_i(p)$ for $i \in \{x, y\}$. Likewise, domestic consumption of good i is still determined as a function of the local relative price and domestic tariff revenue: $D_i(p, R)$ for $i \in \{x, y\}$. But, in light of the possibility of discriminatory tariffs, domestic tariff revenue now depends both on 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 let $\{p^{*j}\}$ and $\{p^{wj}\}$ denote the set of foreign local and world prices, respectively, and we define bilateral trade shares by

$$s_x^{*j}(\{p^{*j}\}, \{p^{wj}\}) \equiv E_x^{*j}(p^{*j}, p^{wj}) / [\sum_{i \in N^*} E_x^{*i}(p^{*i}, p^{wi})].$$

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

$$T(\{p^{*j}\}, \{p^{wj}\}) \equiv \sum_{i \in N^*} s_x^{*i}(\{p^{*i}\}, \{p^{wi}\}) \cdot p^{wi}.$$

With this definition in place, domestic tariff revenue is given implicitly by

$$R = [D_x(p, R) - Q_x(p)] \cdot \sum_{i \in N^*} s_x^{*i}(\{p^{*i}\}, \{p^{wi}\}) \cdot [p - p^{wi}] = [D_x(p, R) - Q_x(p)] \cdot [p - T],$$

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

We may now represent the domestic country's consumption as $C_i(p, T) \equiv D_i(p, R(p, T))$. It follows that home country imports of x 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 $E_y(p,T) \equiv Q_y(p) - C_y(p,T)$. Henceforth, we will refer to T simply as the home country's terms of trade, and it will play a role analogous to p^w in the two-country model of the previous sections. In fact, as (9) indicates, if the home country adopts an MFN tariff policy, then $T = p^{wj} \equiv p^w$. However, a discriminatory tariff policy implies $T \neq p^{wj}$ for $j \in N^*$.

We turn finally to the trade balance and market-clearing conditions. Home and foreign budget constraints imply that, for any world prices, we have

$$(10). \quad T(\{p^{*j}\}, \{p^{wj}\}) \cdot M_x(p, T(\{p^{*j}\}, \{p^{wj}\})) = E_y(p, T(\{p^{*j}\}, \{p^{wj}\})); \\ M_y^{*j}(p^{*j}, p^{wj}) = p^{wj} \cdot E_x^{*j}(p^{*j}, p^{wj}), \text{ for } j \in N^*.$$

With $\{\tau^j\}$ and $\{\tau^{*j}\}$ representing the set of domestic and foreign tariffs, respectively, we denote the equilibrium world price for trade between the home and foreign country j by $\tilde{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\})$. Equilibrium world prices are then determined by (9) and the market-clearing condition for good x :

$$(11). \quad M_x(p, T(\{p^{*j}\}, \{\tilde{p}^{wj}\})) = \sum_{i \in N^*} E_x^{*i}(p^{*i}, \tilde{p}^{wi}).$$

The equilibrium in the y -market is then assured by (10).

B. Government Objectives

We again represent the objectives of each government as a general function of its local price and terms of trade. Thus, the home government maximizes $W(p, T)$ while foreign government j maximizes $W^{*j}(p^{*j}, \tilde{p}^{wj})$. We assume only that, with local prices held fixed, each government strictly prefers an improvement in its terms of trade: $W_T(p, T) < 0$ and $W_p^{*j}(p^{*j}, \tilde{p}^{wj}) > 0$.

The home government welfare function embodies a novel pattern of externalities. As in the two-country model, the tariff level selected by a foreign government alters world prices, and this in turn affects the home country's terms of trade T and imparts a home-government externality through the consequent change in tariff revenue. In the multi-country model, however, the tariff level selected by the foreign government may also exert a home-government externality through the effect that the tariff has on the foreign local price and thereby the home country's terms of trade and tariff revenue. Intuitively, for any given total import volume for the home country, if the home country sets tariffs in a discriminatory fashion, then the home government receives greater tariff revenue when a larger fraction of imports emanates from the foreign country on whom it places the highest import tariff.

The foreign export volumes, however, are determined in part by foreign local prices, and therefore foreign local prices impart a home-government externality when home tariffs are discriminatory. Importantly, this "local-price externality" disappears when the home government's tariffs satisfy MFN, since in that event the home country's terms of trade is independent of foreign local prices and is given simply by the (common) world price.

C. Tariff Policies

As in our analysis of the two-country model, we compare the Nash, politically optimal and efficient tariffs. We begin with the Nash tariffs. Let the domestic government select a tariff policy, (τ^1, τ^2, τ^3) , to maximize its welfare, W , at the same time that each foreign government j chooses its tariff policy, τ^{*j} , to maximize its welfare, W^{*j} . The resulting best-response conditions are

$$(12a). \text{ Home: } W_p + \tilde{\lambda}^j W_T = 0, \quad \text{for } j \in N^*$$

$$(12b). \text{ Foreign: } W_p^{*j} + \tilde{\lambda}^{*j} W_{p^{wj}}^{*j} = 0, \quad \text{for } j \in N^*,$$

with $\tilde{\lambda}^j \equiv [dT/d\tau^j]/[dp/d\tau^j]$ and $\tilde{\lambda}^{*j} \equiv [\partial \tilde{p}^{wj}/\partial \tau^{*j}]/[dp^{*j}/d\tau^{*j}]$. A set of tariffs $(\{\tau^j\}, \{\tau^{*j}\})$ for $j \in N^*$ forms a Nash equilibrium if each government's tariff policy satisfies its best-response condition(s).

We next extend to our multi-country setting the definition of politically optimal tariffs. In analogy with our two-country model, we define politically optimal tariffs as a set of tariffs $(\{\tau^{jPO}\}, \{\tau^{*jPO}\})$ for $j \in N^*$ that satisfies

$$(13a). \text{ Home: } W_p = 0,$$

$$(13b). \text{ Foreign: } W_p^{*j} = 0, \text{ for } j \in N^*.$$

Notice that (13a) and (13b) comprise a set of four equations that must be met by a set of six tariffs (three domestic, three foreign). As such, in the multi-country setting, there are in general many combinations of tariffs that are politically optimal. However, if the additional restriction of MFN is imposed, the number of tariffs drops to four (one domestic, three foreign), and so it may be expected that there is a unique set of politically optimal tariffs that conform to MFN.

We consider next the set of efficient tariffs. To characterize this set, we may fix the welfare levels of each foreign government and determine the set of tariffs that maximizes the welfare of the domestic government. This defines a point on the efficiency locus. By varying foreign welfare levels

over all feasible values, the entire efficiency locus can be described. We carry out this analysis in the Appendix, where we confirm that the Nash equilibrium tariffs are again inefficient. We establish as well the following proposition:

Proposition 6: Politically optimal tariffs are efficient if and only if they conform to MFN.

This proposition thus reports an "affinity" between politically optimal tariffs and the principle of non-discrimination. Intuitively, politically optimal tariffs are efficient provided that the externalities countries impose on one another in their tariff choices travel only through world prices. In a multi-country world, trade policy externalities indeed travel in this way if and only if tariffs conform to MFN. Tariff discrimination complicates the transmission of externalities across trading partners by allowing bilateral trade volumes, and hence local prices, to transmit externalities as well. Finally, we note that non-discrimination is not a general property of points on the efficiency frontier, but is rather a special property required only by political optimality.

D. Reciprocity and Non-discrimination

We now interpret and evaluate the role of non-discrimination in the presence of reciprocity. To this end, we first adapt our earlier definition of reciprocity to a multi-country setting. Maintaining our interpretation of reciprocity as calling for equal changes in exports and imports across trading partners, we say that a set of tariff changes $\Delta\tau^j \equiv (\tau^{jl} - \tau^{j0})$ and $\Delta\tau^{*j} \equiv (\tau^{*jl} - \tau^{*j0})$ conforms to reciprocity provided that, for $j \in N^*$,

$$\tilde{p}^{wj0} \cdot [E_x^{*j}(p^{*j}(\tau^{*jl}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) - E_x^{*j}(p^{*j}(\tau^{*j0}, \tilde{p}^{wj0}), \tilde{p}^{wj0})] = M_y^{*j}(p^{*j}(\tau^{*jl}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) - M_y^{*j}(p^{*j}(\tau^{*j0}, \tilde{p}^{wj0}), \tilde{p}^{wj0}),$$

where we now make explicit the dependence of local prices on tariffs and the market-clearing world prices. Trade balance (condition (10)) implies that this expression can be reduced to

$$[\tilde{p}^{wj1} - \tilde{p}^{wj0}] \cdot E_x^{*j}(p^{*j}(\tau^{*jl}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) = 0 \text{ for } j \in N^*.$$

Hence, as before, mutual tariff changes that conform to reciprocity leave world prices unchanged.

Our next task is to develop the appropriate extension of the Bilateral Negotiation Game for the multi-country model. As before, we posit a three-stage negotiation process that begins with an

initial stage in which tariffs are bound at specified levels, determining a set of bilateral world prices. In the second stage, governments make renegotiation proposals, where under the restriction of reciprocity the bilateral world prices must be preserved. If governments fail to reach an agreement in this renegotiation stage, a third stage is entered in which tariffs are implemented that achieve the greatest multilateral trade volume consistent with the constraints that the tariffs satisfy the restriction of reciprocity and require no government to import a bilateral volume in excess of that implied by its proposal in the renegotiation stage.

We now develop a formal representation of the trade negotiation process. Letting $\{\bar{p}^{wj}\}$ denote the set of bilateral world prices determined in the first stage, we say that a renegotiated set of tariffs $(\{\tau^j\}, \{\tau^{*j}\})$ satisfies the restriction of reciprocity if the tariff set preserves the bilateral world prices: $\bar{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\}) = \bar{p}^{wj}$ for each $j \in N^*$. We now consider the foreign tariffs and bilateral trade volumes that are "implied" by the domestic government's proposal in the renegotiation stage, where the domestic proposal is a set $\{\hat{\tau}^j\}$ of domestic tariffs that satisfy (9). In contrast to the two-country model, the proposed tariff set when combined with the fixed set of bilateral world prices $\{\bar{p}^{wj}\}$ does not uniquely imply domestic import volumes nor foreign tariffs.³¹ We therefore assume that the domestic government also proposes the shares $\{\hat{s}_x^{*j}\}$ of its total import volume that are to come from each foreign trading partner, where these proposed shares are non-negative and sum to one. When the domestic government proposes $\{\hat{\tau}^j\}$ and $\{\hat{s}_x^{*j}\}$, the implied foreign tariffs, $\tau^{*j} = \tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$, are defined by the requirements that the tariffs $(\{\hat{\tau}^j\}, \{\tau^{*j}\})$ satisfy the restriction of reciprocity and generate the proposed set of trade volume shares:

$$E_x^{*j}(p^{*j}(\tau^{*j}(\cdot), \bar{p}^{wj}), \bar{p}^{wj}) = \hat{s}_x^{*j} \cdot \sum_{i \in N^*} E_x^{*i}(p^{*i}(\tau^{*i}(\cdot), \bar{p}^{wi}), \bar{p}^{wi}) \text{ for } j \in N^*,$$

where $\tau^{*j}(\cdot)$ denotes the value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$.³²

We consider next the foreign trade volumes and domestic import tariffs that are implied by

³¹For a fixed set of domestic tariffs $\{\hat{\tau}^j\}$ and bilateral world prices $\{\bar{p}^{wj}\}$, the local domestic price $p(\hat{\tau}^j, \bar{p}^{wj})$ is implied. In the multi-country model, however, this price alone is insufficient to determine domestic import volume, as T is affected by the set of foreign tariffs, $\{\tau^{*j}\}$, when domestic tariffs are discriminatory. See equilibrium condition (11).

³²Given $\{\bar{p}^{wj}\}$, $\{\hat{\tau}^j\}$ and $\{\hat{s}_x^{*j}\}$, foreign tariffs and bilateral trade volumes are implied as follows. First, p is determined as $p = p(\hat{\tau}^j, \bar{p}^{wj})$ while T is determined as $T = \sum_{i \in N^*} \hat{s}_x^{*i} \cdot \bar{p}^{wi}$. Total import volume is then determined as $M_x = M_x(p, T)$, where under (11) we have $M_x = \sum_{i \in N^*} E_x^{*i}$ as well. E_x^{*j} is then implied as $E_x^{*j} = \hat{s}_x^{*j} \cdot \sum_{i \in N^*} E_x^{*i}$, and this in turn implies p^{*j} as $p^{*j} = p^{*j}(\tau^{*j}, \bar{p}^{wj})$, and hence a value for τ^{*j} , for each $j \in N^*$.

the proposals of the foreign governments in the renegotiation stage. We assume that, in this stage, each foreign government j proposes its tariff, $\hat{\tau}^{*j}$. Given the bilateral world price \bar{p}^{wj} , this proposal directly implies an import volume for foreign country j , which is given as $M_y^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$. In addition, the three foreign tariff proposals together imply a set of domestic tariffs, when the bilateral world prices are fixed.³³ Thus, if in the renegotiation stage each foreign government j proposes tariff $\hat{\tau}^{*j}$, then the set $\{\hat{\tau}^{*j}\}$ defines an implied set of domestic tariffs, $\tau^j = \tau^j(\{\hat{\tau}^{*j}\}, \{\bar{p}^{wj}\})$, by the requirement that the tariffs $(\{\tau^j\}, \{\hat{\tau}^{*j}\})$ satisfy the restriction of reciprocity.

We are now prepared to state two final definitions. First, we say that the proposals $(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\})$ and $\{\hat{\tau}^{*j}\}$ agree if $(\{\hat{\tau}^j\}, \{\tau^{*j}(\cdot)\}) = (\{\tau^j(\cdot)\}, \{\hat{\tau}^{*j}\})$, where as above $\tau^{*j}(\cdot)$ denotes the implied value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$ and where $\tau^j(\cdot)$ denotes the implied value $\tau^j(\{\hat{\tau}^{*j}\}, \{\bar{p}^{wj}\})$. Second, when the proposals do not agree, the tariff set $(\{\tau^j\}, \{\tau^{*j}\})$ that is implemented in the final stage is said to satisfy the restriction of proposed import limits if the domestic import volume from any foreign trading partner j under $(\{\tau^j\}, \{\tau^{*j}\})$ is no greater than the implied import volume from this partner $E_x^{*j}(p^{*j}(\tau^{*j}(\cdot), \bar{p}^{wj}), \bar{p}^{wj})$ and the import volume for any foreign country j under $(\{\tau^j\}, \{\tau^{*j}\})$ is no greater than the implied import volume $M_y^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$, for every $j \in N^*$.

We now define the *Multilateral Negotiation Game*:

- Stage 1:* Governments bargain over tariffs and a set of bilateral world prices, $\{\bar{p}^{wj}\}$, is determined.
- Stage 2:* The domestic government proposes a set of domestic tariffs, $\{\hat{\tau}^j\}$, and trade-volume shares, $\{\hat{s}_x^{*j}\}$, at the same time that each foreign government j proposes a foreign tariff, $\hat{\tau}^{*j}$. If the proposals agree, then the tariffs are implemented as the outcome of the negotiation.
- Stage 3:* If the proposals do not agree, then the tariffs that are implemented are those which achieve the greatest multilateral trade volume while satisfying the restrictions of reciprocity and proposed import limits.

³³Given $\{\bar{p}^{wj}\}$ and $\{\hat{\tau}^{*j}\}$, we have that $\{p^{*j}\}$ is determined, and so the right-hand side of (11) is also determined. Furthermore, with $\{p^{*j}\}$ determined, we see that T is determined as well. Thus, satisfaction of (11) determines p . But this means that τ^j is implied as $\tau^j = \bar{p}^{wj}/p$.

As before, we concentrate on stages 2 and 3, in order to determine the tariffs that can be implemented when reciprocity is represented in this way.

We say that a tariff set $(\{\tau^j\}, \{\tau^{*j}\})$ can be *implemented under reciprocity* if there exists a set of bilateral world prices $\{\bar{p}^{wj}\}$ such that the outcome of stages 2 and 3 of the Multilateral Negotiation Game is uniquely $(\{\tau^j\}, \{\tau^{*j}\})$, when foreign governments choose dominant proposals and the proposal of the domestic government is a best response to the foreign proposals.³⁴ We can now state our next proposition:

Proposition 7: An efficient multilateral trade agreement can be implemented under reciprocity if and only if it is characterized by tariffs which conform to the principle of MFN and are set at their politically optimal levels.

A proof of this proposition is provided in the Appendix.

Intuitively, non-discrimination ensures that all international externalities are channeled through world price movements, and the principle of reciprocity serves effectively to neutralize externalities of exactly this nature. Alternatively, if stage-1 bargaining results in discriminatory tariffs, then the tariff choices of each foreign country will impart externalities on the home country through both world price and foreign local price effects, and reciprocity is ill-suited to handle the latter. Reciprocity and non-discrimination are thus simple rules that, when used together, can deliver an efficient outcome. Furthermore, these rules direct attention to a particular set of tariffs - the politically optimal MFN tariffs - along the efficiency frontier.³⁵

V. Preferential Agreements

³⁴In the multi-country model, we no longer require that the domestic-government proposal is dominant. Intuitively, the domestic government will wish to choose its share proposal so as to trade as much as possible with the partners with whom it has the most favorable terms of trade. The optimal domestic share proposals are thus sensitive to the anticipated foreign proposals, as the latter bound the import volumes that the respective foreign partners will accept.

³⁵At this point it is useful to comment on the relation between the bilateral and multilateral negotiation games. In our analysis of the latter we have allowed for the possibility of discriminatory tariffs and have shown that MFN is required for efficiency. This possibility introduces some complications, as we then must consider share announcements and best-response choices by the domestic government. If we had instead imposed MFN from the outset, then the analysis would again be exactly analogous to the bilateral negotiation game.

While the principles of reciprocity and non-discrimination form the pillars of GATT, a major exception to the latter principle is allowed for the purpose of creating preferential agreements. As mentioned in the introduction, this exception, embodied in GATT Article XXIV, was controversial in its inception and has met with renewed controversy recently. In this section, we use our modeling framework to address a central question in this controversy: Will preferential agreements interfere with a multilateral trading system that is built upon the pillars of reciprocity and non-discrimination?

In accord with Article XXIV, we consider two forms of preferential agreements. First, the domestic country forms a free trade area with foreign country i if $\tau^i=0=\tau^{*i}$ and $\tau^j>0$ for some $j\neq i$. As free trade areas are inherently discriminatory, we have as a direct implication of Proposition 7:

Proposition 8: An efficient multilateral trade agreement can not be implemented under reciprocity in the presence of a free trade agreement.

Free trade agreements are thus fundamentally at odds with a multilateral trading system that is built on the pillars of reciprocity and non-discrimination. This is because, to deliver efficiency, reciprocity requires a world in which the transmission of externalities is contained within world price movements, but externalities travel through local prices as well when tariffs are discriminatory.

A second preferential agreement is a customs union, in which members eliminate all internal trade barriers and adopt a common external tariff as well. Proposition 7 no longer directly applies to this case, since the creation of a customs union reduces the number of external tariff authorities from four to three. But Proposition 7 is instructive, in that it suggests that reciprocity might continue to deliver efficiency, provided that the union can be viewed as a single country in the previous analysis that sets its external tariffs at the politically optimal MFN levels.

To explore this possibility, we must define the objectives of the tariff authorities in the customs union. If the domestic country forms a customs union with foreign country i , we assume that the customs union sets external tariffs to maximize a function $U(W, W^{*i})$, where U is increasing in each argument. The elimination of internal barriers implies that $p=p^{*i}=\tilde{p}^{wi}\equiv p^{cu}$ and that the two countries experience a common external terms of trade, $T\equiv T^{cu}$. The objectives of the customs union may thus be represented further as $U(W, W^{*i})=U(W(p^{cu}, T^{cu}), W^{*i}(p^{cu}, T^{cu}))\equiv W^{cu}(p^{cu}, T^{cu})$, with

$W_{T^{cu}}^{cu} < 0$. With $W^{*j}(p^{*j}, \tilde{p}^{wj})$ still representing the objectives of each foreign government $j \neq i$, it follows from Proposition 7 that an efficient multilateral trade agreement between the customs union and the remaining foreign countries can be achieved under reciprocity if and only if the external tariffs of the customs union and the tariffs of all other countries conform to the principle of MFN and are set at their politically optimal levels.

This conclusion is appropriate if we define efficiency in terms of the welfare of the customs union itself and the remaining foreign countries. When we define efficiency in terms of the welfare of individual countries, however, we must determine as well whether it is internally efficient (i.e., with respect to W and W^{*i}) for members of the customs union to share a common local-market price. If the tariff revenue collected by the customs union can be divided among members in a way that achieves internal efficiency at this common price, we will call the two countries *natural integration partners*. This possibility is ensured if the political preferences and income levels of the two countries are sufficiently similar. We can now state:

Proposition 9: An efficient multilateral trade agreement can be implemented under reciprocity in the presence of a customs union if and only if the members of the customs union are natural integration partners and the external tariffs of the customs union and the tariffs of all other countries conform to the principle of MFN and are set at their politically optimal levels.

Together, Propositions 8 and 9 identify a rather limited set of circumstances under which preferential agreements can exist without compromising the effectiveness of the principles of reciprocity and non-discrimination in delivering an efficient multilateral trading agreement.

VI. Participation

GATT is a "rules-based" approach to trade negotiations. While there are all manner of rules that might be contemplated when designing a rules-based institution, an important feature of the GATT rules of reciprocity and non-discrimination is that they steer negotiations toward a particular point on the efficiency frontier: the political optimum. As mentioned in Section II, an alternative negotiation approach is "power-based." Under this approach, governments negotiate directly over tariffs, without reference to any previously-agreed-upon rules, and the outcome of the negotiations

is thus especially sensitive to the "bargaining power" that the governments respectively possess. Natural formalizations of the power-based approach, such as the Nash Bargaining Solution, indicate that power-based negotiations may result in an agreement that rests on the efficiency frontier. Yet these negotiations, by favoring the more powerful country, would typically not deliver the political optimum. This raises a central question: How might governments choose between alternative institutional designs (e.g., rules-based versus power-based approaches)?

This is a fundamental question within the field of international relations, and we do not presume to provide a complete answer here. Some of the broader considerations involved are described below by Jackson (1989), who concludes that the history of international relations has witnessed a gradual evolution from a power-based to a rules-based approach:

In broad perspective one can roughly divide the various techniques for the peaceful settlement of international disputes into two types: settlement by negotiation and agreement with reference (explicitly or implicitly) to relative power status of the parties; or settlement by negotiation or decision with reference to norms or rules to which both parties have previously agreed.

For example, countries A and B have a trade dispute regarding B's treatment of imports from A to B of widgets. The first technique mentioned would involve a negotiation between A and B by which the most powerful of the two would have the advantage. Foreign aid, military maneuvers, or import restrictions on other key goods by way of retaliation would figure in the negotiation. A small country would hesitate to challenge a large one on whom its trade depends...

On the other hand, the second suggested technique – reference to agreed rules – would see the negotiators arguing about the application of the rule...During the process of negotiating a settlement it would be necessary for the parties to understand that an unsettled dispute would ultimately be resolved by impartial third-party judgements based on rules so that the negotiators would be negotiating with reference to their respective predictions as to the outcome of those judgments and not with reference to potential retaliation or actions exercising power of one or more of the parties of the dispute.

In both techniques negotiation and private settlement of disputes is the dominant mechanism for resolving differences; but the key is the perception of the participants as to what are the "bargaining chips."...

All diplomacy, and indeed all government, involves a mixture of these techniques. To a large degree, the history of civilization may be described as a gradual evolution from a power-oriented approach, in the state of nature, toward a rule-oriented approach.... (Jackson, 1989, pp. 85-86).³⁶

While our simple modeling framework can not capture the breadth of themes to which Jackson alludes, it can be used to explore a pair of important issues that are associated with the choice between rules-based and power-based approaches to trade-policy negotiations.

The first issue concerns the sense in which GATT is a rules-based institution. Up to this

³⁶As Jackson's discussion goes on to suggest, a separate issue is how agreements are to be enforced. Whether the agreement is over tariff levels directly or rather over rules within which governments agree to operate when determining their tariff policies, enforcement of the agreement is an issue which should not be ignored. We return to this important issue in our concluding section.

point, we have regarded any negotiating approach as "rules-based," if the approach involves agreed-upon rules under which subsequent negotiations are undertaken. Certainly, GATT satisfies this standard. As Jackson's discussion above suggests, however, there is also a second standard that might be put forth: a rules-based agreement is designed so that the outcome of negotiations is not influenced by the power positions of the parties involved. While it is inevitable that real-world negotiations are influenced to some degree by the power positions of the participants, we argue that GATT also satisfies this second standard, since it is designed in a manner that separates negotiation outcomes from bargaining power. In particular, the rule of reciprocity neutralizes power asymmetries and guides governments toward the political optimum, an outcome that is defined without reference to countries' relative power status. In this sense, our results confirm the widely-held view that reciprocity is one "pillar" of GATT's architecture, with non-discrimination then required as a second pillar that preserves the effectiveness of reciprocity in a multi-country world.

This discussion leads naturally to a second issue: Why would powerful countries agree to participate in GATT under the rule of reciprocity? In the remainder of the section, we offer one possible answer: by serving to moderate the lawful response of powerful countries in case of disagreement, GATT's rule of reciprocity may encourage weaker countries to participate in GATT negotiations without the fear of exploitation by their stronger trading partners.

To develop this point, we return to the Bilateral Negotiation Game described in Section III and consider the addition of a stage 0 in which each government decides whether or not to participate in negotiations in light of the bargaining format which follows. As with reference to Figure 5b, we may consider the possibility of two bargaining formats: a "power-based" format, in which governments bargain directly in stage 1 over final tariff/welfare outcomes without the possibility of subsequent renegotiation, and a "rules-based" format corresponding to the Bilateral Negotiation Game. As described in Section III, the power-based format gives rise to a negotiation outcome corresponding to the point labeled *A* in Figure 5b, while the rules-based format gives rise to the negotiation outcome labeled *B* in Figure 5b.

The question we now pose is whether the stage-0 participation decision might be influenced by the bargaining format. More specifically, we ask whether, in directing the bargaining outcome toward the political optimum, GATT's rule of reciprocity might encourage weaker countries to

participate in GATT negotiations without the fear of exploitation by their stronger trading partners. Essentially, the answer to this question is “yes,” provided that there exists a distinction between stage-0 and stage-1 government preferences which leads to a difference between the Nash (disagreement) welfare levels as viewed from stage-1 negotiations (labeled N in Figure 5b) and the Nash welfare levels as viewed from the stage-0 participation decision (which we depict for illustrative purposes by the point labeled N_0 in Figure 5b). Here we briefly consider one way in which such a difference could arise: from sunk costs associated with the actions of private agents.³⁷

If production requires irreversible investments, then private-sector decisions made in anticipation of negotiations to liberalize markets may alter the payoffs to governments should negotiations break down. McLaren (1997) has argued that this observation may be particularly relevant in describing the plight of a small country negotiating to gain access to the markets of a large trading partner, where “the rational investments undertaken by small-country citizens...in anticipation of future bargaining can rob the small country of its flexibility...” (p. 404) and make it worse off under the resulting bargain than if the opportunity to negotiate had never arisen. This point may be illustrated in the present context with the use of Figure 5b, if we think of the foreign government as representing the smaller country, and we think of the irreversible small-country investments in serving the large-country market as being determined between stages 0 and 1.

Consider first the possibility of a power-based bargaining format. The curves represented in Figure 5b will correspond to the situation as viewed in stage-1 (i.e., after the decision to negotiate has been made and the investment decisions of the small country have been sunk), with the welfare levels at point N depicting the respective payoffs for the two governments in the event that stage-1 negotiations break down, and the point A reflecting the bargaining outcome under a power-based format. The point labeled N_0 depicts the respective payoffs for the two governments if either government decides in stage 0 not to participate in negotiations, and the payoff to the foreign government is larger at N_0 than at N as a result of the sunk investments associated with the latter. If, as depicted in Figure 5b, N_0 lies to the right of the outcome under the power-based bargain A ,

³⁷An alternative way to generate a difference between ex-ante (prior to initiating negotiations) and ex-post government preferences would be to focus on changing political constraints associated with the resolution of uncertainty over the effects of liberalization, along the lines of Fernandez and Rodrik (1991). See also note 8.

then the foreign country would do better to pass up the opportunity to negotiate a trade agreement with its large trading partner, much as McLaren's (1997) remarks suggest. As a result, negotiations do not occur, and governments receive the Nash payoffs associated with N_0 in this case.

Now consider the possibility of a rules-based bargaining format. In particular, suppose that the stage-0 participation decision is made with reference to the Bilateral Negotiation Game, whose outcome is depicted in Figure 5b by the point B . It is here that, by guiding countries toward the political optimum in their tariff negotiations, the introduction of a rule such as reciprocity can diminish power asymmetries, thereby relaxing the participation constraint for the weaker country and facilitating its entry into tariff negotiations. In terms of Figure 5b, the foreign government will agree to participate in negotiations under the rule of reciprocity provided that, as depicted, the point N_0 lies to the left of the rules-based negotiating outcome depicted at B . It is now apparent that, as long as B lies to the northeast of N_0 , it will also be in the interest of the more-powerful country to agree to a rule of reciprocity, so as to encourage the widest participation of its trading partners.

VII. Conclusion

Working within a general equilibrium model and adopting a representation of government trade policy objectives that accommodates the major formulations of political economy motives, we have shown that governments can shift the cost of their intervention onto trading partners by altering world prices with their unilateral tariff choices, and that this is the source of the inefficiency which a reciprocal trade agreement must address. From this perspective, we have offered an interpretation of GATT's principles of reciprocity and non-discrimination as rules that work in concert to guide governments toward efficient multilateral trade agreements. While we establish circumstances under which customs unions are compatible with an efficient multilateral trading system built on these principles, we have shown that these circumstances are quite narrow, and that in addition free trade agreements are fundamentally incompatible with such a system. As such, we offer support for the view that preferential agreements pose a threat to the multilateral trading system.

Our basic argument is developed in four main steps. First, we establish that governments' unilateral tariffs are higher than is efficient, because of the temptation to shift costs onto trading partners via the world-price externality. Second, utilizing the requirement of balanced trade, we find

that the principle of reciprocity as practiced in GATT serves to neutralize the world-price implications of tariff negotiations. Reciprocity can thus assist governments in achieving efficient trade policy outcomes. Third, we construct a multi-country model and observe that externalities then may travel to the home government both through world and foreign local prices. When the home government sets MFN tariffs, however, the only externality is the world-price externality, and so the principle of reciprocity is again well-suited to address the inefficiencies with which a trade agreement must contend. Finally, we observe that exceptions to MFN for the purpose of creating preferential agreements revive the local-price externality, thus frustrating the ability of a multilateral system governed by the principle of reciprocity to deliver an efficient outcome.

The empirical relevance of our theory requires that governments are able to shift the costs of their intervention onto trading partners and that the implications of such cost-shifting activities are quantitatively significant. The first requirement is met if governments are able to improve their terms of trade with their trade policy choices, which is the case when foreign exporters incur some of the incidence of an import tariff (i.e., when the full tariff is not passed through to domestic consumers). Equivalently, the hypothesis that governments can improve their terms of trade with their tariff choices is supported if a reduction in the domestic import tariff is not fully passed through as a reduced price for domestic consumers. It is therefore relevant to refer to the study of GATT negotiations by Kreinin (1961, p. 314), who suggests that “less than a third...of the tariff concessions granted by the United States were passed on to the U.S. consumer in the form of reduced import prices, while more than two-thirds...accrued to the foreign suppliers and improved the terms of trade of the exporting nations.”³⁸ It is also relevant to note that a large empirical literature exists that documents imperfect pass-through of exchange-rate shocks. Presumably, if the cost increase to foreign exporters takes the form of a tariff increase as opposed to an exchange rate shock, imperfect pass through would once again occur, confirming that some of the incidence of the import tariff is borne by foreign exporters. Empirical support for this presumption is offered by Feenstra (1995).³⁹

³⁸A recent study which finds large terms-of-trade effects from regional liberalization is Winters and Chang (1997).

³⁹In this context, it is instructive also to mention the theoretical analysis of Gros (1987). He finds that even apparently small countries have some power over the terms of trade, provided that the industry is monopolistically competitive. We also stress that our theory does not require that all countries are able to alter the terms of trade. Our theory suggests that truly "small" countries should be extended MFN treatment under GATT without a requirement that they offer reciprocal liberalization of their own. (This is because the unilateral tariff policies of small countries

Evidence also exists that supports the requirement that the terms-of-trade effects of trade policy choices influence the national cost of intervention in quantitatively important ways. In particular, this requirement is strongly supported in the empirical studies by Goldberg (1996) and Berry, Levinsohn and Pakes (1994). In both studies, it is found that the terms-of-trade implications of the U.S. decision in the 1980's to restrict automobile imports from Japan with VER's (rather than tariffs) increased substantially the cost to the U.S. of achieving the reduced import volumes. Berry, Levinsohn and Pakes report a particularly striking experiment. They compare the actual VER policy with a hypothetical equivalent-tariff policy and calculate that the equivalent-tariff policy would have yielded revenue sufficient to turn what was a losing trade policy in terms of U.S. national income into a policy that would have generated a net gain to U.S. national income of \$12.5 billion. The study is relevant for our arguments, since the only difference between the two policies is that they generate distinct world prices. It is precisely this role of world prices to affect the incidence of the cost of intervention across trading partners that is the starting point of our theory.⁴⁰

Finally, we note that relevance of cost-shifting motives for the purpose and design of trade agreements has been suggested as well by GATT legal scholars. For example, in discussing rationales for departing from a goal of free trade, Jackson (1989) observes:

More subtle is the possibility that a national consensus could explicitly opt for a choice of policies that would not maximize wealth (in the traditionally measurable sense, at least), but would give preference to other non-economic goals...It can be argued that when a nation makes an "uneconomic" choice, it should be prepared to pay the whole cost, and not pursue policies which have the effect of unloading some of the burdens of that choice on to other nations. In an interdependent world, paying the whole cost is not often easy to accomplish. (Jackson, 1989, p. 19).

We conclude by mentioning two caveats that apply to our analysis. First, we have interpreted reciprocity and non-discrimination as principles that can help guide governments from inefficient unilateral outcomes to the efficiency frontier. In practice, however, enforcement difficulties at the international level (see, e.g., Dam, 1970) may preclude governments from eliminating fully the

impart no externality; see Bagwell and Staiger, 1996.) To some extent, this treatment is represented in GATT through MFN combined with the "principle supplier" rule (see Dam, 1970, p. 61) as it applies to reciprocal tariff negotiations.

⁴⁰At the same time, the decision of the U.S. to "give away" such an amount might be taken as evidence that governments in fact do not care about the terms of trade, even when the associated implications for income are large. This inference, however, does not follow from the U.S. VER experience. The relevant policy alternative for the U.S. was not a set of unilateral tariff increases (corresponding to the equivalent-tariff policy above), which surely would have incited a retaliatory "trade war" with Japan, but rather a set of tariff changes from the U.S. and Japan that were consistent with GATT rules.

terms-of-trade driven restrictions in trade volume and arriving at the efficiency frontier. When this is the case, the efficiency properties of reciprocity and non-discrimination may be weakened. For example, it then becomes possible that the formation of preferential agreements may enhance the efficiency of the multilateral trading system, by providing additional enforcement ability that results in multilateral tariffs that are closer to the efficiency frontier.⁴¹

Second, while the government welfare function that we have employed in our analysis is quite general, it does not capture all of the reasons that governments might pursue trade agreements in practice. For example, regional integration initiatives may reflect broader objectives, such as military security and political stability, which are not captured by local and world prices. This suggests that GATT's willingness to allow Article XXIV exceptions to MFN might be understood in terms of the broader benefits that regional integration may confer. Our framework also excludes the possibility that governments seek trade agreements as a commitment device in a game with domestic agents. These and other possibilities are important topics for future research.

⁴¹As we show in other work (Bagwell and Staiger, forthcoming), however, the enforcement implications of preferential agreements for multilateral tariff cooperation are complex, and there is as yet no basis from which to conclude that such agreements are necessarily efficiency enhancing. See also Bagwell and Staiger (1997 c,d), Bond and Syropoulos (1996) and Bond, Syropoulos and Winters (1996). Maggi (1996) offers a broader perspective as to the role of enforcement in the multilateral trading system.

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Appendix

Proposition 1: Nash equilibrium tariffs are inefficient.

Proof: We begin by noting that

$$(A1). \quad \frac{d\tau}{d\tau^*} \Big|_{dW=0} = -\frac{\partial \tilde{p}^w / \partial \tau^*}{dp/d\tau} \left[\frac{\tau W_p + W_{p^w}}{W_p + \lambda W_{p^w}} \right]; \quad \frac{d\tau}{d\tau^*} \Big|_{dW^*=0} = -\frac{dp^*/d\tau^*}{\partial \tilde{p}^w / \partial \tau} \left[\frac{W_{p^*} + \lambda^* W_{p^w}^*}{W_{p^*} / \tau^* + W_{p^w}^*} \right].$$

At a pair of Nash equilibrium tariffs (τ^N, τ^{*N}) , $[d\tau/d\tau^*] \Big|_{dW=0} = \infty > 0 = [d\tau/d\tau^*] \Big|_{dW^*=0}$ by (6a), (6b), and (A1). Thus, by (4), the tariff pair (τ^N, τ^{*N}) is inefficient. **QED**

Proposition 2: A reciprocal trade agreement must entail reciprocal trade liberalization.

Proof: We establish that a necessary condition for a tariff pair (τ^0, τ^{*0}) to yield welfare improvements for both the domestic and foreign government relative to the Nash tariffs (τ^N, τ^{*N}) is that $\tau^0 < \tau^N$ and $\tau^{*0} < \tau^{*N}$. To establish this we suppose that $\tau^0 > \tau^N$ and show that the foreign government must lose. The other case in which $\tau^{*0} > \tau^{*N}$ can be handled in an analogous way. First consider the impact of each country's tariff change on the welfare of its trading partner, given by $dW/d\tau^* = [\tau W_p + W_{p^w}][\partial \tilde{p}^w / \partial \tau^*]$ and $dW^*/d\tau = [W_{p^*} / \tau^* + W_{p^w}^*][\partial \tilde{p}^w / \partial \tau]$, respectively. Recalling that (6a) and (6b) define, respectively, the domestic and foreign reaction functions $\tau^R(\tau^*)$ and $\tau^{*R}(\tau)$, we note that when the domestic or foreign government, respectively, is on its reaction function, the impact on its welfare of a rise in its trading partner's tariff is

$$dW/d\tau^* = [1 - \tau^R(\tau^*)\lambda]W_{p^w}[\partial \tilde{p}^w / \partial \tau^*] < 0; \quad dW^*/d\tau = [1 - \lambda^*/\tau^{*R}(\tau)]W_{p^w}^*[\partial \tilde{p}^w / \partial \tau] < 0.$$

These inequalities imply that, along each government's reaction function, its welfare is strictly declining in the tariff of its trading partner. With this we now have that $\tau^0 > \tau^N$ implies

$$\begin{aligned} W^*(p^*(\tau^{*0}, \tilde{p}^w(\tau^0, \tau^{*0})), \tilde{p}^w(\tau^0, \tau^{*0})) &\leq W^*(p^*(\tau^{*R}(\tau^0), \tilde{p}^w(\tau^0, \tau^{*R}(\tau^0))), \tilde{p}^w(\tau^0, \tau^{*R}(\tau^0))) \\ &< W^*(p^*(\tau^{*R}(\tau^N), \tilde{p}^w(\tau^N, \tau^{*R}(\tau^N))), \tilde{p}^w(\tau^N, \tau^{*R}(\tau^N))) = W^*(p^*(\tau^{*N}, \tilde{p}^w(\tau^N, \tau^{*N})), \tilde{p}^w(\tau^N, \tau^{*N})). \end{aligned}$$

Thus, the foreign government must be hurt by any change in tariffs that involves increasing the domestic tariff from its Nash level. **QED**

Proposition 3: Politically optimal tariffs are efficient.

Proof: Using (A1), we have $[d\tau/d\tau^*] \Big|_{dW=0} = -[\partial \tilde{p}^w / \partial \tau^*] / [\partial \tilde{p}^w / \partial \tau] = [d\tau/d\tau^*] \Big|_{dW^*=0}$ at politically optimal tariffs defined by (7a) and (7b), which therefore by (4) are efficient. **QED**

Proposition 4: Beginning at a Nash tariff equilibrium, reciprocal trade liberalization that leaves world prices unchanged will increase each government's welfare monotonically until this liberalization has proceeded to the point where $\min[-W_p, W_{p^*}] = 0$. If countries are symmetric, this liberalization

path leads to the efficient politically optimal outcome.

Proof: Consider reciprocal reductions in τ and τ^* beginning from the Nash equilibrium and moving along the positively-sloped iso-world-price locus that passes through (τ^N, τ^{*N}) . With $dp^w=0$, the impact of a small amount of reciprocal liberalization along this path on domestic government welfare W is just $-W_p(\partial p/\partial \tau)d\tau$ while the impact on foreign government welfare W^* is $-W_p^*(\partial p^*/\partial \tau^*)d\tau^*$. Both are strictly positive around the Nash equilibrium, and both continue to be strictly positive until liberalization has proceeded down this path to the point where $\min[-W_p, W_p^*]=0$. If countries are symmetric, then both W_p and W_p^* will reach zero at the same point on the iso-world-price locus through (τ^N, τ^{*N}) , defining a pair of politically optimal tariffs by (7a) and (7b). **QED**

Proposition 5: An efficient trade agreement can be implemented under reciprocity if and only if it is characterized by tariffs which are set at their politically optimal levels.

Proof: A tariff pair (τ, τ^*) can be implemented under reciprocity if there exists a world price \bar{p}^w such that the outcome of stages 2 and 3 of the Bilateral Negotiation Game is uniquely (τ, τ^*) , when governments make dominant proposals. Therefore, to prove the proposition, we must establish that politically optimal tariffs are the only tariffs on the efficiency frontier that can be implemented under reciprocity. Expression (8) characterizes the efficiency frontier, and along this frontier it is necessary that $W_p=0=W_p^*$ or $W_p \neq 0 \neq W_p^*$. Observe as well that the restriction of proposed import limits will bind in stage 3 at the highest proposed tariff from stage 2, and therefore that the mapping from tariff proposals to the tariffs $(\tilde{\tau}(\bar{p}^w), \tilde{\tau}^*(\bar{p}^w))$ that are actually implemented as the outcome of the Bilateral Negotiation Game is given by $\tilde{\tau}(\bar{p}^w)=\max\{\hat{\tau}, \tau(\hat{\tau}^*, \bar{p}^w)\}$ and $\tilde{\tau}^*(\bar{p}^w)=\tau^*(\tilde{\tau}(\bar{p}^w), \bar{p}^w)$. The proposition now follows once it is observed that, for any world price \bar{p}^w determined in stage 1 of the Bilateral Negotiation Game, it is a dominant strategy in the subgame corresponding to stages 2 and 3 for the domestic government to propose $\hat{\tau}=\tau^0(\bar{p}^w)$ and for the foreign government to propose $\hat{\tau}^*=\tau^{*0}(\bar{p}^w)$ where $\hat{\tau}=\tau^0(\bar{p}^w)$ satisfies $W_p(p(\tau, \bar{p}^w), \bar{p}^w)=0$ and $\hat{\tau}^*=\tau^{*0}(\bar{p}^w)$ satisfies $W_p^*(p^*(\tau^*, \bar{p}^w), \bar{p}^w)=0$. **QED**

Proposition 6: Politically optimal tariffs are efficient if and only if they conform to MFN.

Proof: We first characterize the efficiency locus. Define $\tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j})$ as the equilibrium world price for trade between the domestic country and foreign country j that would provide the government of country j with the welfare level \bar{W}^{*j} when its tariff is set at τ^{*j} . This magnitude is defined implicitly by $W^{*j}(p^{*j}(\tau^{*j}, \tilde{p}^{wj}), \tilde{p}^{wj})=\bar{W}^{*j}$. For simplicity we treat $\tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j})$ as a well-defined function of τ^{*j} ,

which it must be provided that W^{*j} is sufficiently close to a representation of national income. Cases where \tilde{p}^{wj} is not uniquely defined can be handled with appropriate modifications without changing our results. For future reference we note that

$$(A2). \quad \partial \tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = [p^{*j} \cdot W_p^{*j}] / [W_p^{*j} + \tau^{*j} W_{p^{wj}}^{*j}] \text{ for } j \in N^*.$$

Since the three foreign tariff and welfare levels, $\{\tau^{*j}\}$ and $\{\bar{W}^{*j}\}$, determine a complete set of both world and foreign local prices, they also imply a value for the domestic terms of trade:

$$\bar{T}(\{\tau^{*j}\}, \{\bar{W}^{*j}\}) \equiv T(\{p^{*j}(\tau^{*j}, \tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j}))\}, \{\tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j})\}).$$

Finally, by equilibrium condition (11), a value for the domestic local price is implied as well, and we denote it by $\bar{p}(\{\tau^{*j}\}, \{\bar{W}^{*j}\})$. Domestic government welfare can now be written as a function of the three foreign tariffs and foreign welfare levels, or $W(\bar{p}(\{\tau^{*j}\}, \{\bar{W}^{*j}\}), \bar{T}(\{\tau^{*j}\}, \{\bar{W}^{*j}\}))$. Fixing foreign welfare levels and choosing foreign tariffs to maximize the domestic welfare level then defines a point on the efficiency frontier. The first-order conditions are

$$(A3). \quad W_p + \bar{\lambda}^{*j} W_T = 0 \text{ for } j \in N^*,$$

where $\bar{\lambda}^{*j} \equiv [\partial \bar{T} / \partial \tau^{*j}] / [\partial \bar{p} / \partial \tau^{*j}]$ and where $\partial \bar{p} / \partial \tau^{*j}$ is non-zero and finite. An implication of (A3) is that Nash tariffs are inefficient. This can be seen by fixing foreign welfare levels at their Nash values and observing that efficient tariffs satisfy (A3), while Nash tariffs satisfy (12a).

Now suppose that a set of tariffs are politically optimal. Then by (A3) and (13a), they will be efficient if and only if $\partial \bar{T} / \partial \tau^{*j} = 0$ for $j \in N^*$. From the definition of \bar{T} , we have

$$(A4). \quad \frac{\partial \bar{T}}{\partial \tau^{*j}} = \frac{1}{M_x} \cdot \left[\left(\frac{\partial E_x^{*j}}{\partial p^{*j}} \frac{dp^{*j}}{d\tau^{*j}} + \frac{\partial E_x^{*j}}{\partial p^{wj}} \frac{\partial \tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j})}{\partial \tau^{*j}} \right) \cdot (\tilde{p}^{wj} - \bar{T}) + E_x^{*j} \cdot \frac{\partial \tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j})}{\partial \tau^{*j}} \right].$$

But political optimality implies, by (A2) and (13b), that $\partial \tilde{p}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = 0$, and hence

$$(A5). \quad \frac{\partial \bar{T}}{\partial \tau^{*j}} = \frac{1}{M_x} \cdot \left[\frac{\partial E_x^{*j}}{\partial p^{*j}} \frac{dp^{*j}}{d\tau^{*j}} \right] \cdot (\tilde{p}^{wj} - \bar{T}),$$

which will be zero if and only if tariffs also conform to MFN. **QED**

Proposition 7: An efficient multilateral trade agreement can be implemented under reciprocity if and only if it is characterized by tariffs which conform to the principle of MFN and are set at their politically optimal levels.

Proof: To prove this result we add an additional regularity condition that $\partial E_x^{*j} / \partial p^{*j} > 0$ for $j \in N^*$, which will be met as long as substitution effects dominate income effects. We must establish that the only set of world prices for which the outcome of stages 2 and 3 of the Multilateral Negotiation Game rests on the efficiency frontier, when foreign governments make dominant proposals and the

proposal of the domestic government is a best response to the foreign proposals, is the politically optimal MFN world price (i.e., the world price associated with politically optimal MFN tariffs). We outline the general argument here; a more detailed argument is found in our discussion paper (Bagwell and Staiger, 1997b).

We begin with the possibility of MFN tariffs. Arguments analogous to the proof of Proposition 5 establish that politically optimal MFN tariffs can be implemented under reciprocity given the politically optimal MFN world price, and by Proposition 6 these tariffs are efficient. Moreover, arguments analogous to those in Proposition 5 establish that efficient tariffs cannot be implemented under reciprocity given any other MFN world price.

We next consider the possibility of discriminatory tariffs. We establish that efficient tariffs cannot be implemented under reciprocity given any set of discriminatory world prices that such tariffs might imply. Again, as each foreign country faces a single world price, arguments analogous to those in the proof of Proposition 5 establish that for any world price \bar{p}^{wj} determined in stage 1 of the Multilateral Negotiation Game, it is a dominant strategy in the subgame corresponding to stages 2 and 3 for foreign government j to propose $\hat{\tau}^{*j} = \tau^{*j0}(\bar{p}^{wj})$ where $\hat{\tau}^{*j} = \tau^{*j0}(\bar{p}^{wj})$ satisfies $W_p^{*j}(\tau^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj}) = 0$. The best-response of the domestic government to these foreign proposals is to propose tariffs and bilateral trade shares such that either (i) its proposal is non-pivotal with each foreign trading partner, in which case it (weakly) desires more multilateral trade volume (at the fixed terms of trade defined by the given set of world prices and the bilateral trade volumes implied by the proposals of its trading partners) than its trading partners are willing at those world prices to accommodate, so that $\{W_p \leq 0, W_p^{*j} = 0 \text{ for } j \in N^*\}$, or (ii) its proposal is pivotal with at least one foreign trading partner, in which case the foreign trading partner H with which it shares the least favorable (highest) world price among all foreign countries with which it trades will obtain (weakly) less trade than it desires at the given bilateral world price, while the domestic government achieves its desired multilateral trade volume (at the fixed terms of trade defined by the given set of world prices and the bilateral trade volumes implied by the pivotal foreign proposals and its proposed bilateral trade volume with H), so that $\{W_p = 0, W_p^{*j} \geq 0 \text{ for } j \in N^*\}$. If the conditions in (i) or (ii) hold with strict equality, then the implemented tariffs will be discriminatory politically optimal tariffs, which by Proposition 6 are inefficient. Hence, there are two cases left to consider (we now maintain the assumption that all bilateral trade flows are strictly positive, though this is inessential for the

proof):

(i) $\{W_p < 0, W_p^{*j} = 0 \text{ for } j \in N^*\}$: In this case, (A2) implies that $\partial \bar{p}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = 0$ for $j \in N^*$, and thus that $\partial \bar{T} / \partial \tau^{*j}$ is given by (A5) for $j \in N^*$. Then by (A3) and (A5), tariffs must be discriminatory if they are to be efficient, and noting that $\partial \bar{p}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = 0$ also implies $\partial \bar{p} / \partial \tau^{*j} > 0$ for $j \in N^*$, it follows from (A3) that $\partial \bar{T} / \partial \tau^{*j}$ must then be strictly negative for each j if efficiency is to be achieved. But then let k solve $\min_j \{\bar{p}^{wj}\}$ and observe that $\partial \bar{T} / \partial \tau^{*k} > 0$ by (A5).

(ii) $\{W_p = 0, W_p^{*j} \geq 0 \text{ for } j \in N^*, \text{ with a strict inequality for at least one } \tilde{j}\}$: In this case, (A3) implies that we have efficiency if and only if $\partial \bar{T} / \partial \tau^{*j} = 0$ for $j \in N^*$. By (A2), we must have $\partial \bar{p}^{w\tilde{j}}(\tau^{*\tilde{j}}, \bar{W}^{*\tilde{j}}) / \partial \tau^{*\tilde{j}} > 0$ and thus, by (A4), efficiency requires discriminatory tariffs. But then let k solve $\min_j \{\bar{p}^{wj}\}$ and observe that $\partial \bar{T} / \partial \tau^{*k} > 0$, provided that $\partial E_x^{*j} / \partial p^{*j} > 0$ and $\partial E_x^{*j} / \partial p^{wj} < 0$. The latter condition is ensured by our assumption that all goods are normal in consumption, while the former condition is posited above and will be met as long as substitution effects dominate income effects.

QED

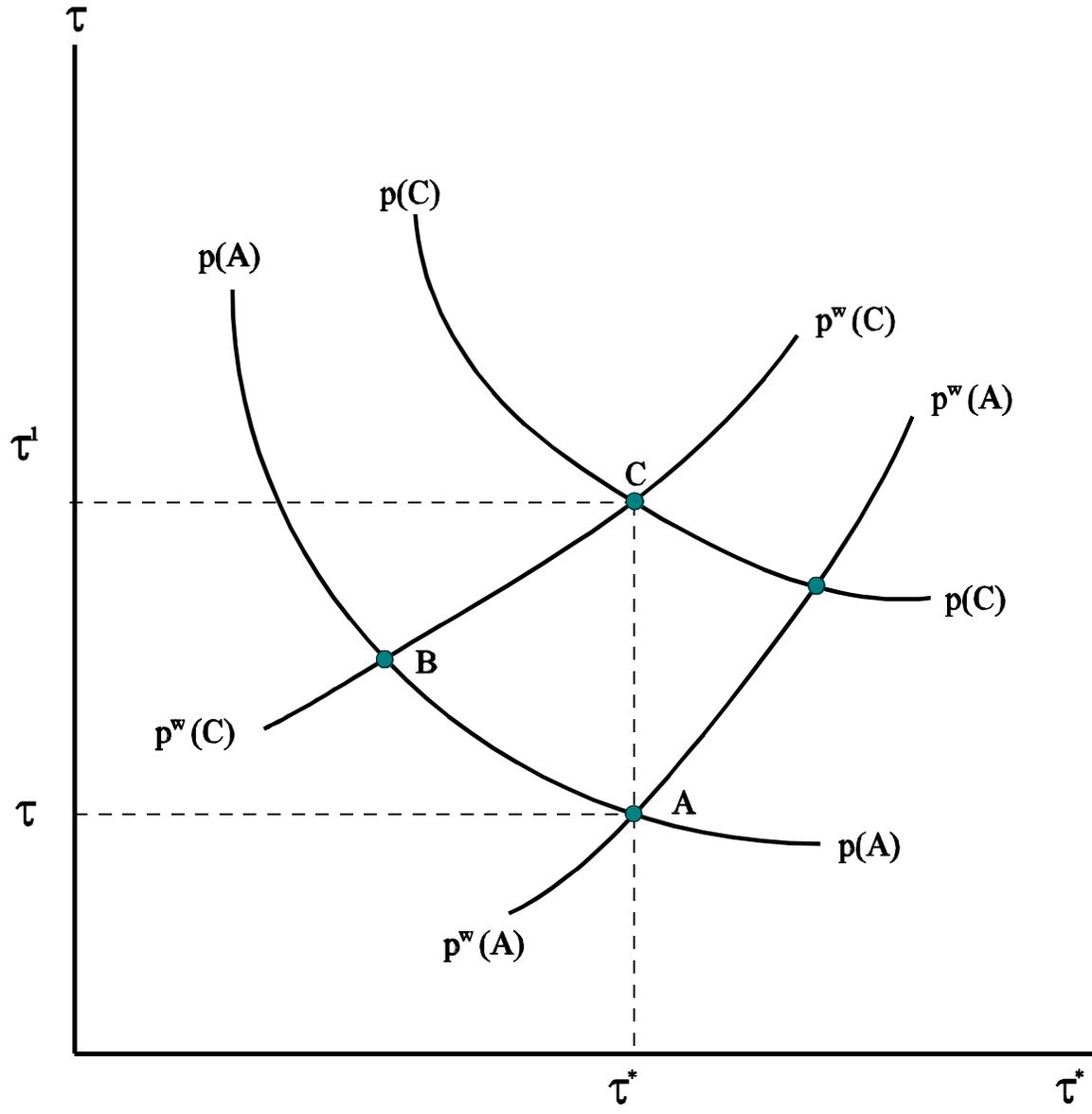


Figure 1

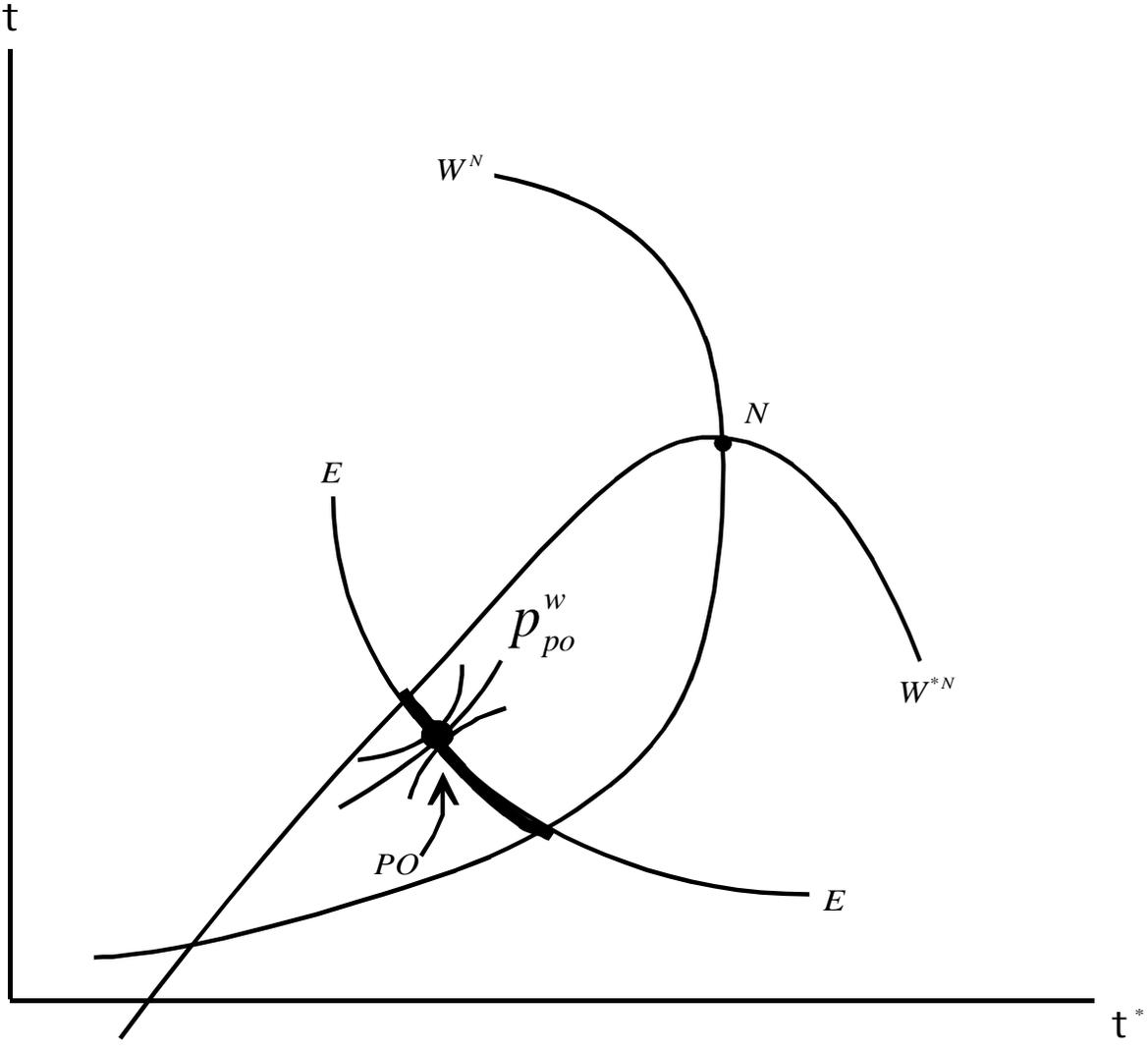


Figure 2

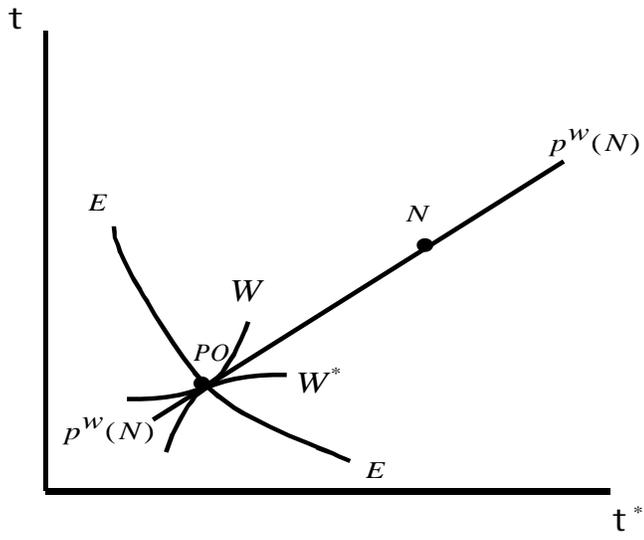


Figure 3a

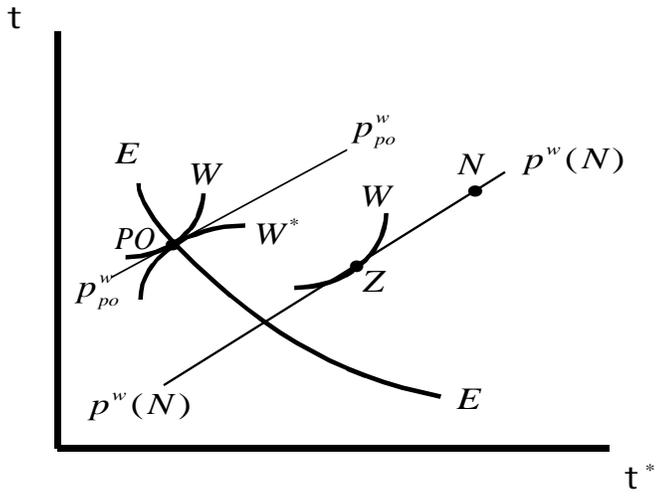


Figure 3b

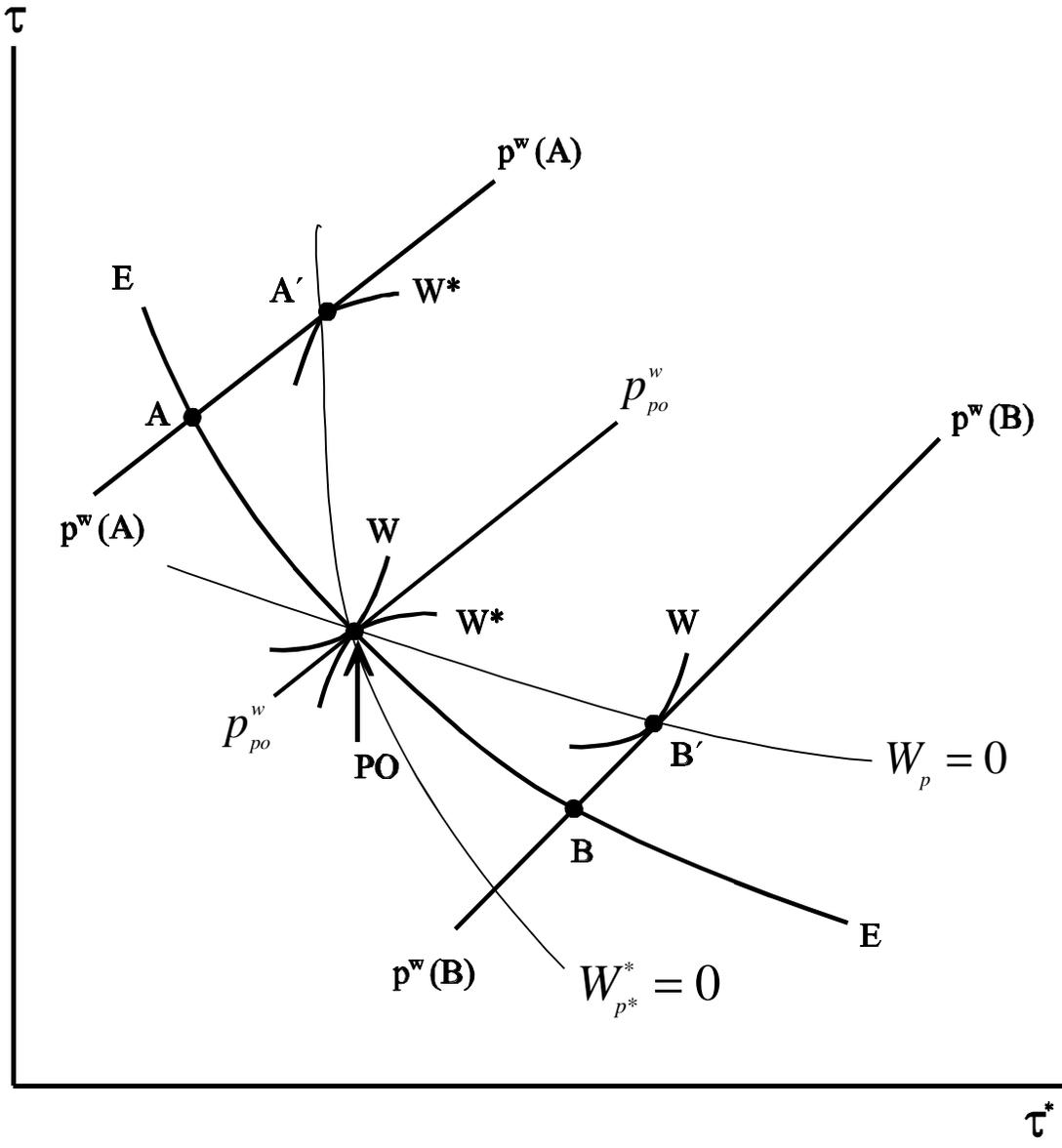


Figure 4

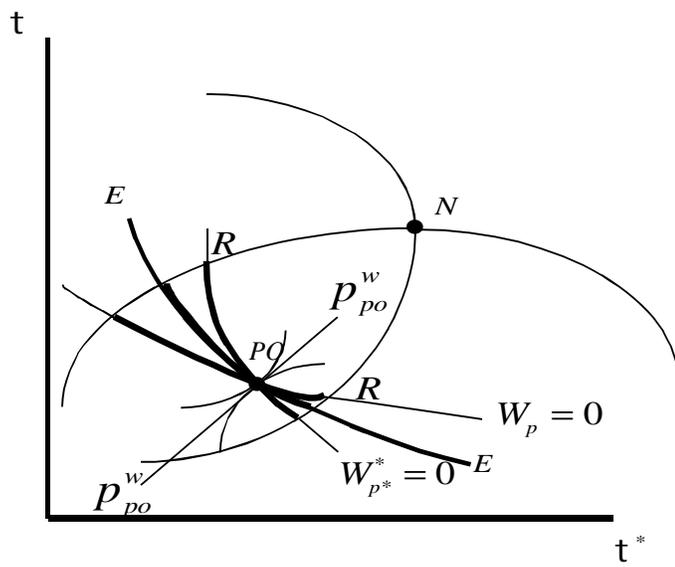


Figure 5a

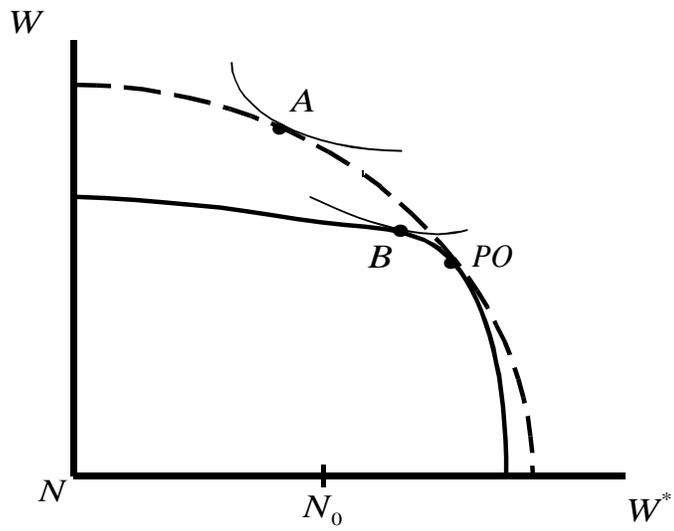


Figure 5b