

An Economic Theory of GATT

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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 all the major political-economy models of trade policy as special cases. Using this general framework we establish three key results. First, GATT's principle of *reciprocity* can be viewed as a mechanism for implementing efficient trade agreements. Second, through the principle of reciprocity countries can implement efficient trade agreements if and only if they also abide by the principle of *nondiscrimination*. And third, *preferential agreements* undermine GATT's ability to deliver efficient multilateral outcomes through the principle of reciprocity, unless these agreements take the form of customs unions among partners that are sufficiently similar.

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 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 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.

To develop this framework, we must first confront a basic question: What can governments gain from reciprocal trade agreements such as those negotiated under GATT? 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 reciprocal trade agreements are designed to remedy? We argue that the inefficiency of unilateral trade policies derives from the classic terms-of-trade externality.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. This temptation to shift costs naturally leads governments to set unilateral tariffs that are higher than would be efficient. A reciprocal 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 volume that arise when policies are set unilaterally.

We develop this conclusion in a very general model. The economic environment is

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

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 enables 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 model thus includes all of the major political-economy models of trade policy as special cases.

Working with this general framework, we demonstrate 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 that creates an inefficiency when governments set their trade policies unilaterally and that therefore explains the appeal of a reciprocal trade agreement.² To establish this point conclusively, we demonstrate that unilateral trade policies would be efficient in a hypothetical world in which governments were not motivated by the terms-of-trade implications of their trade policies. The associated *politically optimal tariffs* are efficient, precisely because the motivation for such tariffs is separate from any cost-shifting incentive.

Armed with this basic conclusion as to the purpose of reciprocal trade agreements, we turn next to interpret and evaluate the basic principles on which GATT is founded, and we ask whether GATT's principles can be seen as contributing to this purpose. A first principle is *reciprocity*, which is widely recognized as one of the most vital concepts in GATT practice. At the broadest level, reciprocity refers to the "ideal" of mutual changes in trade policy which bring about equal changes in import volumes across trading partners. We begin by establishing that mutual changes in trade policy which conform to reciprocity leave world prices unchanged. We then look to the specific applications of reciprocity within GATT.

We identify two distinct circumstances under which reciprocity is found in GATT practice.

² A political motivation for reciprocal trade agreements might arise if governments seek such agreements to gain commitment relative to their private sectors. This possibility is explored by Maggi and Rodriguez (1996), Staiger (1995) and Staiger and Tabellini (1987). However, whether this purpose would be served by the basic principles that form the foundation of GATT is still an open question.

First, reciprocity refers to the *balance of concessions* (i.e., tariff cuts) that governments seek through negotiated tariff reductions. While this has been interpreted by many as evidence of a mercantilist perspective that derives from political forces, we show that it can be given a rather direct economic interpretation within our framework: 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 would therefore seek lower tariffs if the world-price implications of their liberalization could be neutralized, a feat that reciprocity achieves. A second circumstance under which reciprocity is found in GATT practice occurs when a government decides to increase a previously "bound" (i.e., negotiated) tariff, in which case GATT's reciprocity rules require moderation on the part of its trading partners, who are permitted to withdraw *substantially equivalent concessions* of their own. We show that GATT's insistence on reciprocity in this circumstance can guide governments to efficient politically optimal outcomes, since by neutralizing the world-price effects of a government's decision to raise tariffs, reciprocity eliminates the externality that causes governments to make inefficient trade policy choices.

We then turn to the principle of *non-discrimination* (MFN) which, along with reciprocity, provides the second pillar of the foundation upon which GATT is built. We extend our framework to a multi-country setting within which we can interpret and evaluate the principle of non-discrimination. We first establish an "affinity" between politically optimal tariffs and the principle of non-discrimination: we show that politically optimal tariffs are efficient if and only if they conform to MFN. Intuitively, we have argued above that politically optimal tariffs are efficient provided that the externalities imposed by each country's tariff choices travel through world prices. In a multi-country world, externalities indeed travel in this way when tariffs conform to MFN, and hence politically optimal tariffs that conform to MFN are efficient. On the other hand, tariff discrimination complicates the transmission of externalities across trading partners, by allowing bilateral trade volumes (and hence the local prices in each country) to transmit externalities as well, and as a consequence, politically optimal tariffs are no longer efficient when tariff discrimination is present.

When we explore the implications of reciprocity in our multi-country setting, we find that an efficient multilateral trade agreement can be implemented under reciprocity if and only if it

is characterized by politically optimal tariffs which conform to the principle of MFN. Intuitively, in a multi-country world, the principle of reciprocity still 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 again that trade policy externalities travel only through world prices. When governments abide by the principle of MFN, externalities indeed travel in this way, and so reciprocity and non-discrimination work in complementary fashion as principles that guide governments to efficient multilateral trade agreements.

Finally, with the principles of reciprocity and non-discrimination interpreted and evaluated, we consider the implications of a major exception to the principle of non-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. We use our 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: *free trade agreements*, in which the member countries eliminate barriers to trade, and *customs unions*, in which the members adopt a common external tariff policy as well. We find that free trade agreements are fundamentally at odds with a multilateral trading system that is built on the pillars of reciprocity and non-discrimination. This is simply because, to deliver efficiency, reciprocity requires a world in which the transmission of trade policy externalities is contained within world price movements, but externalities travel through local prices as well when tariffs are discriminatory (as when some countries form a free trade area). Consequently, reciprocity can not deliver an efficient multilateral agreement in the presence of free trade areas. On the other hand, we find that reciprocity can continue to deliver efficient outcomes in the presence of a customs union, provided that the members of the union have sufficiently similar political objectives and that all external tariffs continue to be set in conformity with MFN. Our results therefore suggest rather narrow circumstances under which reciprocity can deliver an efficient multilateral trade agreement in the presence of preferential agreements. As such, we offer support

for the view that preferential agreements pose a threat to 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 (1997), 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 explores 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 our framework is developed in Section IV, and the principle of non-discrimination is examined. Preferential agreements are considered in Section V, while Section VI concludes and offers a discussion of empirical evidence related to the central tenets of our approach.

II. The Purpose of Reciprocal Trade Agreements

In this section we develop our basic framework in a two-country setting. We use this framework to derive and interpret the source of the inefficiency associated with unilateral tariff choices, and we show that a trade agreement will exhaust the possibilities of further mutual gains for its member-governments if it succeeds in eliminating the terms-of-trade motivations from their trade policy choices. These results will provide the starting point for our analysis of reciprocity in Section III, and their multi-country analogue will provide the basis of our exploration of non-discrimination and preferential agreements contained in sections IV and V, respectively.

A. The Economic Environment

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 $p \equiv p_x/p_y$ to be the local relative price facing home producers and consumers, with $p^* \equiv p_x^*/p_y^*$ the local relative

price facing foreign producers and consumers. With t (t^*) representing the home (foreign) ad valorem import tariff which we take to be non-prohibitive, and with $\tau \equiv (1+t)$ and $\tau^* \equiv (1+t^*)$, 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" (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^* .³

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 $i = \{x, y\}$. Consumption will be a function of the local relative price -- 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 $i = \{x, y\}$. Tariff revenue is defined implicitly by $R = [D_x(p, R) - Q_x(p)] \times [p - p^w]$ or $R = R(p, p^w)$ for the domestic country, and similarly by $R^* = [D_y^*(p^*, R^*) - Q_y^*(p^*)] \times [1/p^* - 1/p^w]$ 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 $C_i^*(p^*, p^w) \equiv D_i^*(p^*, R^*(p^*, p^w))$.

Home-country imports of x , $M_x(p(\tau, p^w), p^w)$, are then given by the difference between home-country consumption and production of x , while home-country exports of y , $E_y(p(\tau, p^w), p^w)$, are given by the difference between home-country production and consumption of y . Foreign country imports of y , $M_y^*(p^*(\tau^*, p^w), p^w)$, and exports of x , $E_x^*(p^*(\tau^*, p^w), p^w)$, are similarly defined. Home and foreign budget constraints imply that, for any world price, we have

³ The Lerner symmetry theorem ensures that trade taxes or subsidies can be equivalently depicted as applying to exports or to imports in this two-sector general equilibrium setting.

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

Finally, the equilibrium world price $\tilde{p}^w(\tau, \tau^*)$ is determined by the y-market-clearing condition

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

with equilibrium in the x-market then assured by (1).

B. Government Objectives

In order to keep our results general, we place a minimal amount of structure on the representation of government preferences. We assume that each government has the sovereign right to define its own domestic objectives and to utilize trade policy in pursuit of those objectives. We allow that a government might be interested in the pursuit of national income goals, but we allow as well that it might be concerned with the distribution of national income across the population. Such distributional considerations could reflect a broad societal desire to help certain segments of the population, or they may arise from a political desire to help special interests. In either case, distributional concerns generate government preferences over local prices which reflect more than simply the implications of these prices for national income.

Accordingly, we represent the objectives of the home and foreign governments by the general functions $W(p(\tau, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*))$ and $W^*(p^*(\tau^*, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*))$, respectively. The primary structure we place on W and W^* is that, holding local prices fixed, each government is assumed to achieve higher welfare with a terms-of-trade improvement:

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

With local prices held fixed, an improvement in a country's terms-of-trade amounts to a direct income transfer from its trading partner. We also assume that the second-order conditions associated with the maximization problems developed below are globally satisfied.

We note that our representation of government objectives is indeed quite general, as in each of the leading models of political economy and trade policy governments set trade policy as if they were maximizing a function of this form. For example, in a representative democracy,

the government may set trade policy to serve the interests of the median voter (Mayer, 1984), whose utility can be represented by a function of this form. Alternatively, as Baldwin (1987) observes, the major approaches to political economy of trade policy represented 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. Finally, the recent lobbying models of Grossman and Helpman (1994, 1995) also fit within our framework.

We also note that this representation of government preferences can be modified to allow for the possibility, as discussed by Baldwin (1985), that a government is motivated by autonomous *ideological* concerns that shape its goals but faces a *political-support constraint* in setting trade policy to pursue these goals. For example, the home government might be a "free-trader," but its ability to implement free trade policies may be hindered by the need to mobilize export support to offset political opposition to its liberalization efforts from import-competing sectors. Letting G represent the objectives of the domestic government, we can represent the government's domestic political-support constraint by the inequality restriction $S(p(\tau, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*)) \geq \bar{S}$. Forming the Lagrangian, W , would then define the domestic government's constrained maximization problem, with ρ the Lagrange multiplier:⁴

$$W(p(\tau, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*)) \equiv G(p(\tau, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*)) - \rho [S(p(\tau, \tilde{p}^w(\tau, \tau^*)), \tilde{p}^w(\tau, \tau^*)) - \bar{S}].$$

Hence, the problem faced by a liberalizing government that must mobilize export support for its liberalization efforts can be represented as the problem of choosing tariffs to maximize a function of the general form that we consider.

C. The Purpose of Reciprocal Trade Agreements

We assume that governments seek reciprocal trade agreements to achieve mutually beneficial changes in trade policy while respecting the sovereign right of each government to define its national goals. 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^*)

⁴While ρ is a choice variable, its optimal value will be a function of p and \tilde{p}^w as well.

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. An efficient reciprocal trade agreement will reach the efficiency locus, defined by

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

Observe that the efficiency locus is defined with reference to the governments' welfare functions, W and W^* , which may embody both national income and political considerations.

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 home and foreign reaction functions, respectively, are defined implicitly by

$$\text{Home: } W_p [dp/d\tau] + W_{p^w} [\partial \bar{p}^w / \partial \tau] = 0; \quad \text{Foreign: } W_p^* [dp^*/d\tau^*] + W_{p^w}^* [\partial \bar{p}^w / \partial \tau^*] = 0 \quad (5)$$

where subscripts denote partial derivatives. Under standard conditions ruling out the Metzler and Lerner paradoxes, we have $dp/d\tau > 0$, $dp^*/d\tau^* < 0$, $\partial \bar{p}^w / \partial \tau < 0$ and $\partial \bar{p}^w / \partial \tau^* > 0$. Thus, with $\lambda \equiv [\partial \bar{p}^w / \partial \tau] / [dp/d\tau] < 0$ and $\lambda^* \equiv [\partial \bar{p}^w / \partial \tau^*] / [dp^*/d\tau^*] < 0$, (5) can be rewritten as

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

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

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

Figure 1 offers a general interpretation of the two forces that combine to determine trade policy when governments set tariffs non-cooperatively in a Nash equilibrium: the impact of trade intervention on *local prices* and the impact of trade intervention on the *terms of trade*. Consider an initial tariff pair represented by the point $A \equiv (\tau, \tau^*)$ in Figure 1. Corresponding to this tariff pair will be a domestic iso-local-price locus, denoted as $p(A) \rightarrow p(A)$, and an iso-world-price

locus, given as $p^w(A) \rightarrow p^w(A)$.⁵ Now consider a unilateral tariff increase by the domestic government. For a fixed τ^* , an increase in τ to τ^1 will induce a new point $C \equiv (\tau^1, \tau^*)$. This point lies on new iso-price loci, depicted in Figure 1 as $p(C) \rightarrow p(C)$ and $p^w(C) \rightarrow p^w(C)$, and the domestic government experiences a local price that is now higher and a world price that is now lower than those at the original point A.

As (6a) suggests, the overall movement from A to C induced by a unilateral tariff increase by the domestic government can be disentangled into separate movements in the local and world prices, respectively. The movement from A to B isolates the world price change, and the corresponding welfare effect for the domestic government is associated in (6a) with the term λW_{p^w} which, by (3), is strictly positive. Similarly, the movement from B to C reflects the induced increase in the local price, holding fixed the world price, and the welfare implications of this change for the domestic government are associated in (6a) with the term W_p . The world-price movement from A to B illustrates the cost-shifting that arises when trade policies are set unilaterally. If the domestic government seeks to implement a local price corresponding to the iso-local-price locus $p(C) \rightarrow p(C)$, then a unilateral increase in the domestic import tariff passes some of the costs of this outcome to the foreign government, whose exports are sold at a lower world price. A similar decomposition holds for (6b). Hence, as (6a) and (6b) indicate, the terms-of-trade effects of intervention ensure that neither government will face the full cost of catering to its import-competing interests. Finally, Nash equilibrium tariffs are a pair of domestic and foreign tariffs (τ^N, τ^{*N}) which simultaneously satisfy (6a) and (6b).⁶

The inefficiency of the Nash equilibrium is now immediate, and we record it in:

⁵The iso-local-price locus (iso-terms-of-trade locus) will have negative (positive) slope in the absence of the Metzler and Lerner paradoxes.

⁶We postpone for now the issues of existence and uniqueness of Nash equilibria, returning to these issues later in the section. We focus for now on statements that will be true of 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 lack of enforcement issues associated with pure coordination gains and the prominence of enforcement issues in actual trade agreements suggests that pure coordination is not the primary objective of reciprocal trade agreements in practice. Similarly, we ignore for now the issue of existence and uniqueness of politically optimal and efficient tariffs, as defined below; these issues are also addressed later in the section.

Proposition 1: Nash equilibrium tariffs are inefficient.

Proof: We begin by noting that

$$\frac{d\tau}{d\tau^*} \Big|_{dW=0} = -\frac{\partial \tilde{p}^w / \partial \tau^*}{dp/d\tau} \left[\frac{\tau W_p + W_{p^w}}{W_p + \lambda W_{p^w}} \right]; \quad \frac{d\tau}{d\tau^*} \Big|_{dW^*=0} = -\frac{dp^*/d\tau^*}{\partial \tilde{p}^w / \partial \tau} \left[\frac{W_{p^*} + \lambda^* W_{p^w}}{W_{p^*} / \tau^* + W_{p^w}} \right]. \quad (7)$$

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 (7). Thus, by (4), the tariff pair (τ^N, τ^{*N}) is inefficient. **QED**

Proposition 1 implies that Pareto improvements from the Nash equilibrium could be achieved through an appropriate reciprocal trade agreement. Next we characterize the nature of reciprocal trade agreements.

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

Proof: We wish to establish that a necessary condition for a tariff pair (τ^o, τ^{*o}) to yield welfare improvements for both the domestic and foreign government relative to the Nash tariffs (τ^N, τ^{*N}) is that $\tau^o < \tau^N$ and $\tau^{*o} < \tau^{*N}$. To establish this we suppose that $\tau^o > \tau^N$ and show that the foreign government must loose. The other case in which $\tau^{*o} > \tau^{*N}$ 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 $\tau^o > \tau^N$ implies

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

Thus, the foreign government must be hurt by any change in tariffs that involves increasing the domestic tariff from its Nash level. Exactly analogous arguments establish that the domestic government must be hurt by any change in tariffs that involves increasing the foreign tariff from its Nash level. Hence, a necessary condition for tariff changes from the Nash equilibrium to improve a government's welfare is that its trading partner liberalize, and consequently a reciprocal trade agreement must entail reciprocal trade liberalization. **QED**

We have shown that the Nash equilibrium is inefficient and that a reciprocal trade agreement must lead to reciprocal trade liberalization. Reciprocal trade liberalization is therefore attractive to governments regardless of their political inclination, and indeed, whether governments act as national income maximizers, as maximizers of a broader notion of social welfare which includes distributional concerns, or as agents for politically powerful interest groups. This result reflects a simple and general intuition. When a government imposes an import tariff, its terms of trade improve, and part of the cost of this distortionary policy is borne by its trading partners, whose producers sell at a lower price. This terms-of-trade externality implies that the government faces less than the full cost of protecting its import-competing sectors. As a consequence, governments tend to oversupply policies directed toward import protection relative to the efficient intervention levels given their objectives.⁷ A reciprocal trade agreement can therefore benefit all governments, if it serves as a mechanism through which the associated terms-of-trade driven restrictions can be reduced.

We next show that the efficiency locus can be reached by eliminating the terms-of-trade motivations from each government's Nash trade policy decisions and implementing tariffs which jointly satisfy

⁷Similarly, when a government stimulates its export sector with an export subsidy, its terms of trade deteriorate, and so consumers abroad receive some of the benefit of the subsidy. The government thus faces exaggerated costs of stimulating the export sectors, and governments thus tend to undersupply policies directed toward export promotions relative to the efficient level.

$$\text{Home: } W_p = 0, \quad (8a)$$

$$\text{Foreign: } W_{p^*}^* = 0. \quad (8b)$$

We define politically optimal tariffs as any tariff pair (τ^{PO}, τ^{*PO}) satisfying (8a) and (8b). In the special case where the domestic and foreign governments seek to maximize national income, politically optimal tariffs will correspond with reciprocal free trade.⁸ More generally, however, if governments care as well for the distribution of national income when making trade policy decisions, politically optimal tariffs will diverge from reciprocal free trade.

The efficiency properties of politically optimal tariffs are now immediate:

Proposition 3: Politically optimal tariffs are efficient.

Proof: Using (7), 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 (8a) and (8b), which therefore by (4) are efficient. **QED**

Hence, if governments can negotiate a trade agreement that eliminates the terms-of-trade motivations from their trade-policy decisions, no further adjustments in trade policy can yield mutual gains. To understand this conclusion, suppose that all terms-of-trade considerations have been eliminated from the tariff choices of each government. Then each government has set its trade policy to achieve its preferred local prices without concern for the terms-of-trade implications of its intervention. Now consider a small change in the level of a country's intervention. Such a change will have three effects: (i) It will induce a small change in the country's local prices; (ii) it will induce a small change in the terms of trade; and (iii) through movement in the terms of trade, it will induce a small change in the local prices of its trading partners. But effects (i) and (iii) can not offer gains to governments, as they have already set

⁸In particular, when both the domestic and foreign governments maximize the utility of a representative agent, their objectives can be represented as $W(p, p^w) \equiv V(p, I(p, p^w))$ and $W^*(p^*, p^w) \equiv V^*(p^*, I^*(p^*, p^w))$, respectively, with V (V^*) representing the indirect utility function of the representative domestic (foreign) agent, and with I (I^*) denoting domestic (foreign) national income measured in units of good y at local prices. Using Roy's Identity, it is then direct to compute that $W_p=0=W_{p^*}^*$ implies $\tau=0=\tau^*$.

their policies to achieve preferred local prices, while the terms-of-trade movement in (ii) represents a pure international transfer. Thus, once terms-of-trade considerations have been eliminated from the tariff choices of member governments, no further Pareto gains are possible.

More generally, Figure 1 can be used to illustrate the essential inefficiency associated with non-cooperative tariffs and why politically optimal tariffs will be efficient. If the domestic government wishes to implement a local price that corresponds to the iso-local-price locus $p(C) \rightarrow p(C)$, then attaining this price imposes no world-price externality when the higher import tariff of the domestic government is balanced against a higher import tariff by its trading partner, so that the world price is not altered. This corresponds in Figure 1 with the movement from A to D. If the domestic government were not motivated by the terms-of-trade implications of its tariff policy, it would prefer choosing a higher tariff and inducing point C instead of selecting a lower tariff and inducing point A if and only if it also prefers point D to point A. If both governments were to choose tariffs in this fashion, then a resulting consistent set of tariffs is politically optimal. In this case, the tariffs that governments select are not influenced by cost-shifting motives, and so politically optimal tariffs are efficient.⁹

On the other hand, when the domestic government chooses its tariff policy mindful of the terms-of-trade externality associated with movements in the world price (i.e., the movement from D to C), it is aware that some of the costs of achieving the higher domestic local price will be transferred abroad through the resulting reduction in the world price. For this reason, the domestic government will choose a higher tariff (i.e., restrict trade more) than is jointly efficient. This explains why Nash trade policies are inefficient, with trade volumes that are too low.

Of course, implementing politically optimal tariffs is only one way to achieve an efficient trade agreement. To see this, we use (4) and (7) to recast the efficiency locus in the form

$$(1 - AW_p)(1 - A^*W_p^*) = 1, \tag{9}$$

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

⁹A willingness to move from point A to D in Figure 1 induces no externality through the terms of trade, but it will cause a change in the foreign local price. However, if the foreign government also selects tariffs that are politically optimal, then a small change in the foreign local price will have no first-order effect on foreign welfare.

the further assumption that the partial derivatives for the welfare functions are always finite. As (9) can be satisfied even if $W_p \neq 0$ and $W_p^* \neq 0$, efficiency need not imply that tariffs are politically optimal. Rather, political optimality defines a point on the efficiency locus where each government achieves the welfare level it would receive in a hypothetical world in which neither government distorts its tariff choices in light of its ability to shift the costs of its intervention onto its trading partner. Reaching other points on the efficiency locus will require altering tariffs from their politically optimal levels in such a way as to change the international distribution of income through world price movements while generating a set of local prices that is efficient in light of the new distribution of national income across countries.¹⁰

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).¹¹ 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 (9) (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 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, including the politically optimal point. A novel feature of the politically optimal point is that the iso-welfare curves are also tangent to the iso-world-price line. The bold portion of the efficiency

¹⁰For example, in the special case of national-income-maximizing governments, we have seen that the political optimum will be reciprocal free trade, but it is well known (see, for example, Mayer, 1981) that an entire locus of efficient tariffs can be obtained by choosing an import tax for one country and a symmetric import subsidy for the other so as to keep local prices in each country equalized while generating different international income distributions through the associated changes in world prices.

¹¹Existence and uniqueness of Nash and politically optimal tariffs follow from standard stability conditions on the relevant functions. The location of the political optimum on the portion of the efficiency locus corresponding to the contract curve follows from sufficient symmetry across countries. As Kennan and Riezman (1988) show for the case in which welfare is given by 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.

locus corresponds to the contract curve.

More broadly, Figure 2 clarifies the basic task facing governments that seek to design a reciprocal trade agreement. In the absence of any attempt at cooperation, governments would set trade policies unilaterally, leading to the Nash outcome N. This outcome is inefficient from the governments' perspectives, however, because of the cost-shifting aspect of trade policy that is associated with the terms-of-trade externality. A reciprocal trade agreement is then appealing to governments as a means to cooperate and move tariffs from the inefficient Nash point to some alternative tariff pair on the contract curve. A focal tariff pair on the contract curve corresponds to the politically optimal tariffs. These tariffs remedy the Nash inefficiency in a very direct way, as they are the tariffs that governments would choose in a unilateral setting if they were not motivated by terms-of-trade implications of their trade policies. As Figure 2 illustrates, when governments have both political and economic objectives, the efficiency locus need not pass through the reciprocal free trade point. With regard to the role of "politics" and "economics" in reciprocal trade agreements, we may thus offer the following distinction: while governments' political concerns will affect their preferences over tariffs (e.g., the location of the efficiency locus), it is the terms-of-trade externality that creates an inefficiency when governments set their trade policies unilaterally and that therefore explains the appeal of a reciprocal trade agreement.

When seeking a reciprocal trade agreement, governments therefore require a negotiation approach that serves to move tariffs from the inefficient Nash point to the contract curve. There are two basic approaches that might be considered. In a "rules-based" approach, governments identify and agree upon certain principles under which subsequent negotiations will be undertaken to eliminate the terms-of-trade driven restrictions in trade and promote an efficient outcome on the contract curve. On the other hand, governments might also consider a "power-based" approach in which they bargain in a direct fashion that is not constrained by agreed-upon principles of negotiation. The rules-based approach may lead to a point on the contract curve which differs from that implemented under a power-based approach, as in the latter the relative "bargaining power" of the negotiating governments then comes into play. As our focus is on the negotiation rules that are embodied in GATT, we examine here the extent to which the rules of reciprocity and non-discrimination assist governments as they navigate their way from the Nash point to the contract curve.

III. Reciprocity

The principle of *reciprocity* is widely recognized as one of the most vital concepts in GATT practice. In this section, we define and interpret this principle. We find that GATT's principle of reciprocity can guide governments to the contract curve, and in particular that reciprocity can deliver the political optimum.

A. The Principle of Reciprocity

We begin with the obvious first question: What is reciprocity? At the broadest level, reciprocity refers to the "ideal" of mutual changes in trade policy which bring about equal changes in import volumes across trading partners.¹² More formally, and in the context of the two-country model developed in the previous section, we will say that a set of tariff changes $\Delta \tau \equiv (\tau^1 - \tau^0)$ and $\Delta \tau^* \equiv (\tau^{*1} - \tau^{*0})$ conforms to reciprocity provided that

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

where $\bar{p}^{w0} \equiv \bar{p}^w(\tau^0, \tau^{*0})$, $\bar{p}^{w1} \equiv \bar{p}^w(\tau^1, \tau^{*1})$, and where we have without loss of generality measured changes in import volumes at existing world prices. Using the trade balance condition (1) and the equilibrium condition (2), it is direct to show that this expression reduces to

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

Hence, *mutual changes in trade policy that conform to reciprocity will leave world prices unchanged*. This is a promising beginning, since as demonstrated in the last section a government sets its tariffs in an inefficient manner if and only if its tariff choice imparts an externality to the welfare of trading partners through a change in the world price.

With the general principle of reciprocity now defined, we consider next the application of this principle within GATT practice. We distinguish between two applications. First, the principle of reciprocity is often interpreted in terms of the informal idea that governments seek a "balance of concessions" (i.e., reciprocal tariff cuts) when they enter into trade negotiations.

¹²See, for example, Dam (1970, pp. 58-61 and pp. 87-91) on the concept of reciprocity in GATT and for a discussion of the various ways in which reciprocity is actually measured in practice.

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 of reciprocity in the next subsection. A second application of the principle 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

As mentioned above, a first application of the concept of reciprocity in GATT practice reflects the *balance of concessions* that governments seek through a negotiated agreement. As Dam (1970, p. 59) explains, the language of Article XXVIII bis, under which the rounds of GATT tariff negotiations occur, makes it clear that participation in these negotiations is to be voluntary, and that negotiations are to be carried out "on a reciprocal and mutually advantageous basis." Dam continues:

"This permissive approach to the content of tariff agreements is often referred to under the heading of *reciprocity*. From the formal legal principle that a country need make concessions only when other contracting parties offer reciprocal concessions considered to be "mutually advantageous" has been derived the informal principle that exchanges of concessions must entail reciprocity." (Dam, 1970, p. 59)

This informal principle of reciprocity, which Bhagwati (1991) calls "first-difference" 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, p. 25) 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)

The question we now address is, can the mercantilist approach to reciprocal trade liberalization that seems to drive actual negotiations be explained within our framework?¹³

In fact, this informal principle of reciprocity admits a rather direct interpretation within our framework. To develop this argument, we assume for the moment that governments begin at the Nash equilibrium point, and we show that reciprocal trade liberalization that satisfies the principle of reciprocity increases 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 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 (8a) and (8b). **QED**

Propositions 1 through 4 provide a formal economic interpretation of the apparent "mercantilist" behavior that seems to characterize actual trade negotiations, and of the emphasis on a "balance of concessions" that arises therein. Consistent with Krugman's (1991) three rules of "enlightened mercantilism," 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

¹³Krugman (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. 50-51) are more in line with the results we establish here.

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

It is interesting to contrast this explanation of why governments seek reciprocity with a specific political-economy argument that is often expressed. In particular, it is frequently argued that the appeal of reciprocity is that the reduction in the foreign import tariff mobilizes political support among domestic exporters that serves as a counterweight against the objections to liberalization voiced by the domestic import-competing sector. While we are unaware of any formal treatment of this argument, it is clear that the proposed export-sector support for reciprocity must spring from the anticipated economic consequence of the reduced foreign import tariff for this sector. The economic consequence of this tariff reduction for the export sector, however, travels through the world price. As such, this political perspective of reciprocity also can be captured within our modeling framework.

C. Reciprocity and the Withdrawal of Substantially Equivalent Concessions

As is evident from Dam's discussion, there is nothing in GATT which *requires* that the outcome of negotiations produce a balance of concessions. Instead, reciprocity in this circumstance describes the broad manner in which governments seem to approach trade negotiations. As mentioned, however, there is also a second circumstance under which the concept of reciprocity plays an important role in GATT, and here GATT does require that countries comply with the rule of reciprocity. This second circumstance applies to *renegotiation*, and occurs when (i). a country proposes to modify or withdraw a tariff concession to which it had previously committed in a round of tariff negotiation, which it is essentially free to do at any time (GATT Article XXVIII; Dam, 1970, pp. 79-99; Jackson, 1989, p. 119), and (ii). it fails to reach agreement with its trading partners over a renegotiated tariff schedule. In this circumstance, 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.

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 must result in an outcome 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 reciprocity as it applies in this second circumstance, and we will consider the kinds of trade agreements that can be implemented in its presence. In particular, we explore the nature of trade agreements that can be implemented when governments negotiate an initial set of tariff "bindings" from an initial disagreement point corresponding to Nash welfare levels, where subsequently either government is free at any time 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.

We thus focus our attention on a negotiation structure that entails an initial negotiation stage (corresponding to Article XXVIII bis), in which governments agree to bind their tariffs at specified levels, followed by a second stage (corresponding to Article XXVIII) in which a round of renegotiation is possible subject to the restriction of reciprocity as outlined above. In light of the ability to renegotiate, it is apparent that, when governments negotiate the initial tariff bindings, they are really negotiating a world price upon which, in the event that either government wishes subsequently to raise its tariff and reduce the volume of its imports at this world price, the reciprocal tariff increase by its trading partner will be gauged. Finally, to ensure that the renegotiation process achieves eventual resolution, we introduce a third stage (corresponding to GATT dispute settlement panels) that arises if governments fail to agree on a renegotiated set of tariffs. In this final stage, the tariffs that are implemented maximize trade volume, subject to the constraints that the tariffs satisfy the restriction of reciprocity and require no country to import a volume greater than is implied by its government's proposal in the renegotiation stage.

We now offer a formal description of this three-stage negotiation process. We begin with some definitions. Given a world price \bar{p}^w that is determined in the first stage of negotiations, we

will say that a tariff pair (τ, τ^*) satisfies the restriction of reciprocity if $\tilde{p}^w(\tau, \tau^*) = \bar{p}^w$. If in the renegotiation stage the domestic government announces a domestic tariff $\hat{\tau}$ and the foreign government announces a foreign tariff $\hat{\tau}^*$, then we may define the "implied" tariffs, $\tau^* = \tau^*(\hat{\tau}, \bar{p}^w)$ and $\tau = \tau(\hat{\tau}^*, \bar{p}^w)$, 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 reciprocity. We may then say that the announced tariffs, $\hat{\tau}$ and $\hat{\tau}^*$, agree if $(\hat{\tau}, \tau^*(\hat{\tau}, \bar{p}^w)) = (\tau(\hat{\tau}^*, \bar{p}^w), \hat{\tau}^*)$. When the announced tariffs do not agree, the tariff pair (τ, τ^*) that is implemented in the final stage is said to satisfy the restriction of announced 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 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 and a world price, \bar{p}^w , is determined.
- Stage 2:* The domestic government announces a domestic tariff, $\hat{\tau}$, at the same time that the foreign government announces a foreign tariff, $\hat{\tau}^*$. If the tariff announcements agree, then they are implemented as the outcome of the negotiation.
- Stage 3:* If the tariff announcements do not agree, then the tariffs that are implemented are those which maximize trade volume, subject to the constraints that the tariffs satisfy the restrictions of reciprocity and announced import limits.

We first determine the tariffs that *can* be achieved under the representation of reciprocity given in stages 2 and 3, and later provide a formal description of the stage-1 bargaining process.¹⁴

¹⁴Observe that nothing "happens" between stages one and two (i.e., no "shock," no new information). This is consistent with the fact that no justification need be given for renegotiation under Article XXVIII. GATT's Article XIX also provides for the (in this case temporary) suspension of tariff commitments, and authorizes trading partners to temporarily suspend "substantially equivalent concessions" of their own. However, in contrast to Article XXVIII, recourse to Article XIX requires that a country establish injury as a result of "unforeseen developments" in the presence of the concession it seeks to suspend (Dam, 1970, p. 101).

To begin, we take the world price \bar{p}^w and the announced tariffs $\hat{\tau}$ and $\hat{\tau}^*$ as given, and we characterize the tariffs that are actually implemented. There are two cases. If the governments agree in stage 2, with $(\hat{\tau}, \tau^*(\hat{\tau}, \bar{p}^w)) = (\tau(\hat{\tau}^*, \bar{p}^w), \hat{\tau}^*)$, then these tariffs are implemented. If instead the governments do not agree in stage 2, then the implemented tariffs are those which solve the following program:

$$\text{Max}_{(\tau, \tau^*)} M_x(p(\tau, \bar{p}^w(\tau, \tau^*)), \bar{p}^w(\tau, \tau^*))$$

subject to

$$(A). \quad \bar{p}^w(\tau, \tau^*) = \bar{p}^w$$

$$(B). \quad M_x(p(\tau, \bar{p}^w(\tau, \tau^*)), \bar{p}^w(\tau, \tau^*)) \leq M_x(p(\hat{\tau}, \bar{p}^w), \bar{p}^w)$$

$$(C). \quad M_y^*(p^*(\tau^*, \bar{p}^w(\tau, \tau^*)), \bar{p}^w(\tau, \tau^*)) \leq M_y^*(p^*(\hat{\tau}^*, \bar{p}^w), \bar{p}^w)$$

This program captures the role of the dispute resolution panel as we have described it above: maximize trade volume, subject to the restrictions of reciprocity (given in constraint (A)) and announced import limits (given in constraints (B) and (C)).¹⁵

To solve this program, we substitute constraint (A) into the objective and constraints (B) and (C), and we then use (1) and (2) to represent constraint (C) in terms of domestic import volume. These steps deliver the simplified and equivalent program:

$$\text{Max}_{\tau} M_x(p(\tau, \bar{p}^w), \bar{p}^w)$$

subject to

$$M_x(p(\tau, \bar{p}^w), \bar{p}^w) \leq \text{Min}\{M_x(p(\hat{\tau}, \bar{p}^w), \bar{p}^w), M_x(p(\tau(\hat{\tau}^*, \bar{p}^w), \bar{p}^w), \bar{p}^w)\}$$

where the choice of τ then implies a choice for τ^* under the restriction of reciprocity. It is now apparent that the constraint must bind; therefore, in the two-country model, the dispute settlement panel simply chooses the announced tariff which is most restrictive, in the sense of implying the

¹⁵With the world price fixed, maximizing import volume maximizes export volume as well.

least trade volume under the restriction of reciprocity.¹⁶

The tariffs that are implemented in stage 3, which are denoted as $(\tilde{\tau}(\bar{p}^w), \tilde{\tau}^*(\bar{p}^w))$, are now straightforward to characterize. Since the volume constraint is sure to bind at the highest announced tariff, we have that:

$$\tilde{\tau}(\bar{p}^w) = \max\{\hat{\tau}, \tau(\hat{\tau}, \bar{p}^w)\}; \quad \tilde{\tau}^*(\bar{p}^w) = \tau^*(\tilde{\tau}(\bar{p}^w), \bar{p}^w).$$

It may now be observed that the pair $(\tilde{\tau}(\bar{p}^w), \tilde{\tau}^*(\bar{p}^w))$ generates the stage-2 announcements, in the case that governments agree in stage 2. As a general matter, therefore, tariff announcements by the domestic and foreign governments in stage 2 lead to an implemented tariff pair, $(\tilde{\tau}(\bar{p}^w), \tilde{\tau}^*(\bar{p}^w))$, where this pair in turn determines local prices and thus domestic- and foreign-government welfare, W and W^* .

With the mapping from stage-2 announcements to welfare levels now characterized, we consider the stage-2 announcements themselves and determine the tariffs that can be implemented through the Bilateral Negotiation Game. To this end, we define the following tariffs:

$$\tau^0(\bar{p}^w) \text{ satisfies } W_p(p(\tau, \bar{p}^w), \bar{p}^w) = 0$$

$$\tau^{*0}(\bar{p}^w) \text{ satisfies } W_p^*(p^*(\tau^*, \bar{p}^w), \bar{p}^w) = 0.$$

These tariffs identify the respective preferred tariffs of the domestic and foreign governments, under the restriction of reciprocity. Figure 3 illustrates. The preferred tariffs $\tau^0(\bar{p}^w)$ and $\tau^{*0}(\bar{p}^w)$ are determined in Figure 3 by the tangency of the respective government's iso-welfare contour with the iso-world-price locus defined by the restriction of reciprocity. It is now direct to verify that, given \bar{p}^w , it is a dominant strategy in the subgame corresponding to stages 2 and 3 for the domestic government to announce $\hat{\tau} = \tau^0(\bar{p}^w)$ and for the foreign government to

¹⁶Thus, our results for the two-country model would continue to hold if we replaced stage 3 in the Bilateral Negotiation Game with a direct requirement that the most-restrictive announced tariff pair is imposed. Other dispute settlement approaches can also be considered that preserve our findings. We adopt the specific representation of the dispute settlement process embodied in stage 3 for two reasons. First, it seems to correspond reasonably with the actual manner in which disputes are resolved. Second, it leads naturally to the definition of the Multilateral Negotiation Game offered in the next section for our multi-country model.

announce $\hat{\tau}^* = \tau^{*0}(\bar{p}^w)$.¹⁷ With this we say that a tariff pair (τ, τ^*) can be *implemented under reciprocity* if there exists a \bar{p}^w such that

$$\tau = \max\{\tau^0(\bar{p}^w), \tau(\tau^{*0}(\bar{p}^w), \bar{p}^w)\}, \quad (10)$$

$$\tau^* = \tau^*(\tau, \bar{p}^w). \quad (11)$$

Using the positive slope of the iso-world-price locus, we see that if $\tau = \tau^0(\bar{p}^w)$, then $\tau^*(\tau, \bar{p}^w) \geq \tau^{*0}(\bar{p}^w)$. Similarly, if $\tau = \tau(\tau^{*0}(\bar{p}^w), \bar{p}^w)$, then $\tau^{*0}(\bar{p}^w) \geq \tau^*(\tau^0(\bar{p}^w), \bar{p}^w)$.

We may now state a property of any tariff pair that can be implemented under reciprocity:

Lemma 1: A tariff pair (τ, τ^*) can be implemented under reciprocity only if there exists \bar{p}^w such that at (τ, τ^*) we have $\tilde{p}^w(\tau, \tau^*) = \bar{p}^w$ and either $\{W_p = 0, W_p^* \geq 0\}$ or $\{W_p \leq 0, W_p^* = 0\}$.

Proof: Suppose (τ, τ^*) can be implemented under reciprocity. Then there exists \bar{p}^w such that (τ, τ^*) satisfy (10) and (11) and thus $\tilde{p}^w(\tau, \tau^*) = \bar{p}^w$. If $\tau = \tau^0(\bar{p}^w)$, then the implemented tariff pair $(\tau^0(\bar{p}^w), \tau^*(\tau^0(\bar{p}^w), \bar{p}^w))$ satisfies $\tau^*(\tau^0(\bar{p}^w), \bar{p}^w) \geq \tau^{*0}(\bar{p}^w)$, and so $W_p = 0$ and, using the second order condition that $W_{pp}^* < 0$, we have also that $W_p^* \geq 0$. If instead $\tau = \tau(\tau^{*0}(\bar{p}^w), \bar{p}^w)$, then the implemented tariff pair $(\tau(\tau^{*0}(\bar{p}^w), \bar{p}^w), \tau^{*0}(\bar{p}^w))$ satisfies $\tau(\tau^{*0}(\bar{p}^w), \bar{p}^w) \geq \tau^0(\bar{p}^w)$, and so $W_p^* = 0$ and, using the second order condition that $W_{pp} < 0$, we have also that $W_p \leq 0$. **QED**

¹⁷Consider the domestic government. Suppose that its announcement is implemented (i.e., $\hat{\tau} \geq \tau(\hat{\tau}, \bar{p}^w)$) and that its announcement is more restrictive than is $\tau^0(\bar{p}^w)$ (i.e., $\hat{\tau} > \tau^0(\bar{p}^w)$). If it were instead to announce $\tau^0(\bar{p}^w)$, then the implemented tariff pair would be: $(\tilde{\tau}(\bar{p}^w) = \max\{\tau^0(\bar{p}^w), \tau(\hat{\tau}, \bar{p}^w)\}; \tilde{\tau}^*(\bar{p}^w) = \tau^*(\tilde{\tau}(\bar{p}^w), \bar{p}^w))$. The implemented tariff pair is unaffected if $\hat{\tau} = \tau(\hat{\tau}, \bar{p}^w)$; on the other hand, if $\hat{\tau} > \tau(\hat{\tau}, \bar{p}^w)$, then the implemented tariff pair when the domestic government announces $\tau^0(\bar{p}^w)$ is no less restrictive than the pair $(\tau^0(\bar{p}^w), \tau^*(\tau^0(\bar{p}^w), \bar{p}^w))$ and is strictly closer to this pair than was the original implemented tariff pair $(\hat{\tau}, \tau^*(\hat{\tau}, \bar{p}^w))$. Assuming that the second order condition $W_{pp} < 0$ is met, the domestic government does no less well and sometimes strictly better with the announcement $\tau^0(\bar{p}^w)$ than with the proposed announcement $\hat{\tau}$. The other possibilities can be handled similarly.

Lemma 1 says that a pair of tariffs can be implemented under reciprocity only if, when faced with the fixed world prices required under reciprocity by that tariff pair, at least one government is content with the volume of trade and no government wants to reduce trade volume. In the case illustrated in Figure 3, for example, the domestic tariff $\tau^0(\bar{p}^w)$ and the implied foreign tariff can be implemented under reciprocity, and at this tariff pair the domestic (foreign) government is content with (desires more than) the prevailing trade volume under reciprocity. By contrast, the foreign tariff $\tau^{*0}(\bar{p}^w)$ pictured in Figure 3 and the implied domestic tariff can not be implemented under reciprocity, as at this tariff pair the foreign (domestic) government is content with (desires less than) the prevailing trade volume under reciprocity.

We are now in a position to determine whether efficient trade agreements can be implemented under reciprocity and, if so, the form that these agreements take. Our results are contained in the next proposition:

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: Recall from Proposition 3 that politically optimal tariffs are efficient. Furthermore, by (8), (10) and (11), politically optimal tariffs can be implemented under reciprocity: given the politically optimal world price, it is a dominant strategy for each government to announce its politically optimal tariff, and a stage-2 agreement is thus achieved. Expression (9) characterizes the efficiency frontier, and along this frontier it is necessary that $W_p=0=W_p^*$ or $W_p \neq 0 \neq W_p^*$. Since Lemma 1 indicates that a tariff pair can be implemented under reciprocity only if $W_p=0$ or $W_p^*=0$, the only efficient tariff pair that can be implemented under reciprocity is the politically optimal tariff pair. **QED**

Intuitively, reciprocity gives each government the power to renegotiate along the existing iso-world-price locus to a position of reduced trade volume. If the existing agreement is efficient and achieves the political optimum, then no government will wish to renegotiate to seek reduced trade volume along the prevailing iso-world-price line. If the existing agreement is efficient but does not achieve the political optimum, then some government will wish to renegotiate along the

prevailing iso-world-price locus to a position of reduced trade volume, rendering the renegotiated agreement inefficient.

Finally, in the top panel of Figure 4 we characterize the complete locus of reciprocal trade agreements implementable under reciprocity. With τ and τ^* on the vertical and horizontal axis, respectively, the efficiency locus is labelled $E \rightarrow E$, with its bold portion corresponding to the contract curve, and with the politically optimal point labelled PO. Also depicted are the loci corresponding to $W_p = 0$ and $W_p^* = 0$.¹⁸ These loci intersect at the political optimum point PO, and at this point of intersection the $W_p = 0$ ($W_p^* = 0$) locus is flatter (steeper) than the efficiency locus. 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 $R \rightarrow PO \rightarrow R$. As the figure illustrates, only one efficient trade agreement can be implemented under reciprocity, and this occurs when there is agreement at the politically optimal tariffs.

The lower panel of Figure 4 translates the information from the top panel into welfare space. The vertical axis measures W , while the horizontal axis measures W^* , with the Nash welfare levels of each government marked at the origin. The dashed curve represents the efficiency frontier, with welfare levels corresponding to those achieved on the efficiency locus in the top panel. The solid curve in the lower panel represents the combinations of welfare achievable under reciprocity in a reciprocal trade agreement, corresponding to welfare levels along $R \rightarrow PO \rightarrow R$ in the top panel. As depicted in the lower panel, 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.

We have been purposely vague as to the manner in which governments interact in the first stage. As Figure 4 illustrates, the frontier of combinations of welfare achievable under the constraint of reciprocity (i.e., stages 2 and 3) is "kinked" at the political optimum. If we think

¹⁸In Figure 4 we depict the loci corresponding to $W_p = 0$ and $W_p^* = 0$ as negatively sloped, though this is not needed for our results and need not be the case.

of the stage-1 bargaining process as corresponding to the maximization of a general function that is increasing in the welfare of each government, then it is natural to expect that the iso-quantity contours of this function are downward sloping in the space of tariffs. With the constraint of reciprocity providing a kink at the political optimum over the set of implementable tariff pairs, it is clear that the politically optimal tariffs will be selected under a wide range of bargaining procedures that might characterize stage 1. Further, as Proposition 5 states, the politically optimal tariffs must be selected, if the stage-1 bargaining process is to deliver an efficient outcome, given the constraint that the outcome can be implemented under reciprocity.¹⁹

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 *) who is a natural importer of x but that there are now three foreign countries (*), indexed by $j=\{1,2,3\}$, who are natural importers of y .²⁰ The three foreign countries are assumed to have no basis for trade between them in the absence of discriminatory tariffs. Moreover, we do not allow discriminatory tariffs to induce "unnatural" trade between the three foreign countries, nor do we allow such tariffs to reverse the natural pattern of trade between the home country and any of its foreign trading partners. As such, each foreign country trades only with the home country, who imports x from each of its foreign trading partners in exchange for exports of y , and who is therefore the only country that has the opportunity to set discriminatory tariffs across its trading partners.

¹⁹For example, if countries are sufficiently symmetric and bargaining in stage 1 of the Bilateral Negotiation Game is governed by the Nash Bargaining Solution, then the equilibrium outcome of this Bilateral Negotiation Game is the politically optimal trade policy.

²⁰Three 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 question is the subject of Section V.

Denoting the set of foreign countries by $N^*=\{1,2,3\}$, we continue to define $p \equiv p_x/p_y$ as the national relative price facing producers and consumers in the home country, with $p^{*j} \equiv p_x^{*j}/p_y^{*j}$ for $j \in N^*$ the national relative price facing producers and consumers in foreign country j . With t^j (t^{*j}) representing the non-prohibitive home country (foreign country j) ad valorem tariff on imports from foreign country j (the home country), and with $\tau^j \equiv (1+t^j)$ and $\tau^{*j} \equiv (1+t^{*j})$, we have $p = \tau^j p^{wj} \equiv p(\tau^j, p^{wj})$ and $p^{*j} = p^{wj}/\tau^{*j} \equiv p^{*j}(\tau^{*j}, p^{wj})$ for $j \in N^*$, where $p^{wj} \equiv p_x^{*j}/p_y$ is the "world" (untaxed) relative price for trade between the home country and foreign country j . Finally, we note that bilateral trades link world prices according to

$$p^{wj} = [\tau^k/\tau^j] \times p^{wk}, \quad j \in N^*, k \in N^*. \quad (12)$$

Thus, a home-country policy of MFN implies $\tau^1 = \tau^2 = \tau^3$ and hence $p^{w1} = p^{w2} = p^{w3} \equiv p^w$, while tariff discrimination across imports from foreign countries j and k implies $\tau^j \neq \tau^k$ and hence $p^{wj} \neq p^{wk}$.

As each foreign country has only one trading partner (the home country), its terms of trade are given simply by p^{wj} . Consequently, foreign production and consumption decisions can be characterized as in our two-country model. Specifically, production in a foreign 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 local relative prices: $Q_i^{*j} = Q_i^{*j}(p^{*j})$ for $i=\{x,y\}$ and $j \in N^*$. Consumption of good i by foreign country j can be represented as $D_i^{*j} = D_i^{*j}(p^{*j}, R^{*j})$, with R^{*j} , the tariff revenue of foreign country j , defined implicitly by $R^{*j} = [D_y^{*j}(p^{*j}, R^{*j}) - Q_y^{*j}(p^{*j})] \times [1/p^{*j} - 1/p^{wj}]$ or $R^{*j} = R^{*j}(p^{*j}, p^{wj})$. As before, each foreign country's tariff revenue will be an increasing function of its terms of trade under the assumption that goods are normal, and national consumption in each foreign country can thus be written as $C_i^{*j}(p^{*j}, p^{wj}) \equiv D_i^{*j}(p^{*j}, R^{*j}(p^{*j}, p^{wj}))$. Finally, foreign country j 's exports of x , $E_x^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj})$, are defined as the difference between its production and consumption of x , while foreign country j 's imports of y , $M_y^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj})$, are given by the difference between its consumption and production of y .

The presence of multiple trading partners for the domestic country potentially complicates matters, as the home country may face different terms of trade with each of its trading partners. This will not affect the determination of domestic production, which is still found at the point on the domestic production possibilities frontier where the marginal rate of transformation between x and y is equal to local relative prices: $Q_i = Q_i(p)$ for $i = \{x, y\}$. And domestic consumption of good i will still be determined as a function of the local relative price and domestic tariff revenue: $D_i(p, R)$ for $i = \{x, y\}$. But owing to the possibility of discriminatory tariffs, domestic tariff revenue will now depend not only on the total volume of x imported by the domestic country, but also on the shares of the total imported from each trading partner.

To derive an expression for domestic tariff revenue, we let $\{p^{*j}\}$ and $\{p^{wj}\}$ denote, respectively, the set of local and world prices for $j \in N^*$, 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:

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

With this, domestic tariff revenue is defined implicitly by

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

or $R = R(p, T)$. The domestic country's consumption can now be represented as $C_i(p, T) \equiv D_i(p, R(p, T))$. Henceforth, we will refer to T as the home country's terms of trade, and it will play a role analogous to that of p^w in the two-country model of the previous sections. In fact, as (12) indicates, if the home country adopts an MFN tariff policy, then $T = p^{w1} = p^{w2} = p^{w3} \equiv p^w$. However, a discriminatory tariff policy implies $T \neq p^{wj}$ for $j \in N^*$.

Total domestic imports of x, $M_x(p(\tau^j, p^{wj}), T(\{p^{*j}(\tau^{*j}, p^{wj})\}, \{p^{wj}\}))$, are then given by the difference between home-country consumption and production of x, while home-country exports of y, $E_y(p(\tau^j, p^{wj}), T(\{p^{*j}(\tau^{*j}, p^{wj})\}, \{p^{wj}\}))$, are given by the difference between home-country production and consumption of y. Home and foreign budget

constraints imply that, for any world prices, we have

$$T(\{p^{*j}(\tau^{*j}, p^{wj})\}, \{p^{wj}\}) \times M_x(p(\tau^j, p^{wj}), T(\{p^{*j}(\tau^{*j}, p^{wj})\}, \{p^{wj}\})) = E_y(p(\tau^j, p^{wj}), T(\{p^{*j}(\tau^{*j}, p^{wj})\}, \{p^{wj}\})) ; \quad (13)$$

$$M_y^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj}) = p^{wj} \times E_x^{*j}(p^{*j}(\tau^{*j}, p^{wj}), p^{wj}), \quad j \in N^*.$$

With $\{\tau^j\}$ ($\{\tau^{*j}\}$) representing the set of domestic (foreign) tariffs for $j \in N^*$, we denote the equilibrium world price for trade between the home and foreign country j by $\tilde{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\})$. The set of equilibrium world prices for $j \in N^*$ is then determined by (12) and the market-clearing condition for good x :

$$M_x(p(\tau^j, \tilde{p}^{wj}), T(\{p^{*j}(\tau^{*j}, \tilde{p}^{wj})\}, \{\tilde{p}^{wj}\})) = \sum_{i \in N^*} E_x^{*i}(p^{*i}(\tau^{*i}, \tilde{p}^{wi}), \tilde{p}^{wi}), \quad (14)$$

with equilibrium in the y -market then assured by (13).

Finally, as before, we represent the objectives of each government as a general function of its national prices and its terms of trade, and assume that, with national prices held fixed, each government strictly prefers improvements in its terms of trade. Thus we have the objectives of the home government given by

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

with $W_T(p, T) < 0$. Similarly, the objectives of foreign government j are given by $W^{*j}(p^{*j}(\tau^{*j}, \tilde{p}^{wj}), \tilde{p}^{wj})$, with $W_{p^{wj}}^{*j}(p^{*j}, \tilde{p}^{wj}) > 0$.

The home government welfare function embodies a novel pattern of externalities. As before, the tariff level selected by a foreign country alters world prices, and this in turn affects the home country's (multilateral) terms of trade and imparts a home-government externality through the consequent change in tariff revenue. In the multi-country model, however, the tariff level selected by a foreign country 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 (multilateral) 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 that faces the highest import tariff. The foreign export volumes, however, are determined 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 multilateral terms of trade is independent of foreign local prices and given simply by the (common) world price.

B. Non-discrimination and the Efficiency Frontier

As in our analysis of the two-country model, we begin by considering the trade policies that would be chosen in the absence of a trade agreement. To this end, we suppose that the domestic government selects 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 functions must satisfy

$$\text{Home: } W_p + \tilde{\lambda}^j W_T = 0, \quad \text{for } j=1,2,3 \quad (15a)$$

$$\text{Foreign: } W_{p^{*j}} + \tilde{\lambda}^{*j} W_{p^{*wj}} = 0, \quad \text{for } j=1,2,3, \quad (15b)$$

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 Nash equilibrium tariffs will place each government on its best-response function(s). Notice that (15a) implies the condition that the three domestic tariffs (τ^1, τ^2, τ^3) should be set so as to equate on the margin the relative impact of each tariff on domestic local prices and the domestic terms of trade (i.e., $\tilde{\lambda}^1 = \tilde{\lambda}^2 = \tilde{\lambda}^3$). This condition will in general require tariff discrimination on the part of the domestic government in the Nash equilibrium. In particular, were the domestic tariffs set in accordance with MFN, this condition would in general be violated, and a small adjustment in domestic tariff levels could be found which, taking foreign tariffs as fixed, would leave the domestic local price unaltered and lead to an improvement in the domestic country's terms of trade. As such, tariff discrimination will in general be required in the Nash equilibrium to ensure that the domestic tariffs are set to achieve the most-favorable terms of trade for the domestic country consistent with the desired domestic local price.

We next characterize the efficiency locus. To do this, we fix the welfare levels of each foreign government and characterize 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 first 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 $w^{*j}(p^{*j}(\tau^{*j}, \tilde{p}^{wj}), \tilde{p}^{wj}) = \bar{w}^{*j}$, and we note that²¹

$$\partial \tilde{p}^{wj}(\tau^{*j}, \bar{w}^{*j}) / \partial \tau^{*j} = [p^{*j} \times W_{p^{*j}}^{*j}] / [W_{p^{*j}}^{*j} + \tau^{*j} W_{p^{*j}}^{*j}]. \quad (16)$$

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 (14), a value for the domestic local price is implied as well, and we denote it by $\bar{p}(\{\tau^{*j}\}, \{\bar{w}^{*j}\})$.

We can now write the welfare of the domestic government as a function of the three foreign tariffs and foreign welfare levels, or $w(\bar{p}(\{\tau^{*j}\}, \{\bar{w}^{*j}\}), \bar{T}(\{\tau^{*j}\}, \{\bar{w}^{*j}\}))$. Choosing foreign tariffs to maximize the domestic welfare level then defines a point on the efficiency frontier. The first-order conditions are

$$W_p + \bar{\lambda}^{*j} W_T = 0, \quad \text{for } j=1,2,3, \quad (17)$$

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 (17) is that Nash tariffs are inefficient. This can be seen by fixing foreign welfare levels at

²¹For 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 there exists more than one \tilde{p}^{wj} that solves $w^{*j}(p^{*j}(\tau^{*j}, \tilde{p}^{wj}), \tilde{p}^{wj}) = \bar{w}^{*j}$ can be handled with appropriate modifications without changing our results.

their Nash values, and observing that efficient tariffs satisfy (17) while Nash tariffs satisfy (15a).

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

$$W_p = 0, \quad (18a)$$

$$W_{p^{*j}} = 0, \text{ for } j=1,2,3. \quad (18b)$$

Notice that (18a) and (18b) comprise a set of four equations that must be met by a set of six tariffs (three domestic, three foreign) to conform to political optimality. As such, there will in general be 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 in general a unique set of politically optimal tariffs conforming to MFN may be expected.

We can now state conditions under which politically optimal tariffs will be efficient in our multi-country setting:

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

Proof: Suppose that a set of tariffs are politically optimal. Then by (17) and (18a), 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

$$\frac{\partial \bar{T}}{\partial \tau^{*j}} = \frac{1}{M_x} \times \left[\left(\frac{\partial E_x^{*j}}{\partial p^{*j}} \frac{dp^{*j}}{d\tau^{*j}} + \frac{\partial E_x^{*j}}{\partial p^{wj}} \frac{\partial \bar{p}^{wj}(\tau^{*j}, \bar{W}^{*j})}{\partial \tau^{*j}} \right) \times (\bar{p}^{wj} - \bar{T}) + E_x^{*j} \times \frac{\partial \bar{p}^{wj}(\tau^{*j}, \bar{W}^{*j})}{\partial \tau^{*j}} \right]. \quad (19)$$

But political optimality implies, by (16) and (18b), that $\partial \bar{p}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = 0$, and hence under political optimality we have

$$\frac{\partial \bar{T}}{\partial \tau^{*j}} = \frac{1}{M_x} \times \left[\frac{\partial E_x^{*j}}{\partial p^{*j}} \frac{dp^{*j}}{d\tau^{*j}} \right] \times (\bar{p}^{wj} - \bar{T}), \quad (20)$$

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

QED

Proposition 6 establishes 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 through world prices. In a multi-country world, trade policy externalities will 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 a rather special property required only by political optimality. To see that there are many points on the efficiency frontier which require tariff discrimination to reach, note that in general the foreign tariff choices $\{\hat{\tau}^{*j}\}$ that solve (17) will imply bilateral world prices $\tilde{p}^{wj}(\hat{\tau}^{*j}, \bar{w}^{*j})$ that differ across $j \in N^*$, and hence require tariff discrimination on the part of the domestic country.

C. Reciprocity and Non-discrimination

We now extend our earlier exploration of reciprocity to the many-country setting developed above, and 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. Keeping with our interpretation of reciprocity as calling for equal changes in exports and imports across trading partners, and in analogy with our two-country treatment, we will say that a set of tariff changes $\Delta \tau^j \equiv (\tau^{j1} - \tau^{j0})$ and $\Delta \tau^{*j} \equiv (\tau^{*j1} - \tau^{*j0})$ conforms to reciprocity provided that, for $j \in N^*$,

$$\tilde{p}^{wj0} \times [E_x^{*j}(p^{*j}(\tau^{*j1}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) - E_x^{*j}(p^{*j}(\tau^{*j0}, \tilde{p}^{wj0}), \tilde{p}^{wj0})] = M_y^{*j}(p^{*j}(\tau^{*j1}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) - M_y^{*j}(p^{*j}(\tau^{*j0}, \tilde{p}^{wj0}), \tilde{p}^{wj0}).$$

Trade balance (condition (13)) implies that this expression can be reduced to

$$[\tilde{p}^{wj1} - \tilde{p}^{wj0}] \times E_x^{*j}(p^{*j}(\tau^{*j1}, \tilde{p}^{wj1}), \tilde{p}^{wj1}) = 0 \text{ for } j=1,2,3.$$

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

We are again interested in characterizing the conditions under which an efficient

multilateral trade agreement can be implemented under reciprocity. We therefore now consider the appropriate extension of the Bilateral Negotiation Game of the previous section to our multi-country model. As before, we posit a negotiation process that begins with an initial stage (corresponding to Article XXVIII bis) in which tariffs are bound at specified levels, determining a set of bilateral world prices. In the second stage of negotiation (corresponding to Article XXVIII) 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 (corresponding to GATT dispute settlement panels) in which tariffs are implemented that maximize multilateral trade volume, subject to 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. Let $\{\bar{p}^{wj}\}$ represent the set of bilateral world prices determined in the first stage of negotiations. In analogy with the two-country model of the previous section, we will say that a set of tariffs $(\{\tau^j\}, \{\tau^{*j}\})$ satisfies the restriction of reciprocity if $\bar{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\}) = \bar{p}^{wj}$ for each $j \in N^*$. We wish now to explore the foreign tariffs and bilateral trade volumes that are "implied" by the domestic government's announcement in the renegotiation stage. If the domestic government announces a set $\{\hat{\tau}^j\}$ of domestic tariffs that satisfy (12), then, in contrast to the two-country model, the announced tariff set when combined with a fixed set of bilateral world prices $\{\bar{p}^{wj}\}$ does not uniquely imply domestic import volumes nor foreign tariffs.²² We therefore assume that the domestic government also announces the shares $\{\hat{s}_x^{*j}\}$ of its total import volume that are to come from each foreign trading partner, where these announced shares are non-negative and sum to one. If in the renegotiation stage the domestic government announces domestic tariffs $\{\hat{\tau}^j\}$ and trade-volume shares $\{\hat{s}_x^{*j}\}$, then we define the implied foreign tariffs,

²²For a fixed set of domestic tariffs $\{\hat{\tau}^j\}$ and bilateral world prices $\{\bar{p}^{wj}\}$, the local domestic price $p(\tau^j, \bar{p}^{wj})$ is implied. In the multi-country model, however, this price alone is insufficient to determine domestic import volume, since T is affected by the set of foreign tariffs, $\{\tau^{*j}\}$, when domestic tariffs are discriminatory. See the market clearing condition (14).

$\tau^{*j} = \tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$, by the requirements that the tariffs $(\{\hat{\tau}^j\}, \{\tau^{*j}\})$ satisfy the restriction of reciprocity and generate the announced set of trade volume shares:

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

for all $j \in N^*$, where $\tau^{*j}(\cdot)$ denotes the value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$.²³

We consider next the foreign trade volumes and domestic import tariffs that are implied by the announcements of the foreign governments in the renegotiation stage. We assume that, in the renegotiation stage, each foreign government j announces its tariff, $\hat{\tau}^{*j}$. Given the bilateral world price \bar{p}^{wj} , this announcement directly implies an import volume for foreign country j , given as $M_y^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$. In addition, the three foreign tariff announcements together imply a set of domestic tariffs, when the bilateral world prices are fixed.²⁴ Thus, if in the renegotiation stage each foreign government j announces 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 announcements $(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\})$ 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 value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$ and where $\tau^j(\cdot)$ denotes the value $\tau^j(\{\hat{\tau}^{*j}\}, \{\bar{p}^{wj}\})$. Second, when the announcements do not agree, the tariff set $(\{\tau^j\}, \{\tau^{*j}\})$ that is implemented in the final stage is said to satisfy the restriction of

²³Given $\{\bar{p}^{wj}\}, \{\hat{\tau}^j\}$ and $\{\hat{s}_x^{*j}\}$, foreign tariffs and bilateral trade volumes are implied as follows. Observe that p is determined as $p = p(\hat{\tau}^j, \bar{p}^{wj})$ while T is determined as $T = \sum_{j \in N^*} \hat{s}_x^{*j} \times \bar{p}^{wj}$. It follows that total import volume is determined as $M_x = M_x(p, T)$, where under (14) we have as well that $M_x = \sum_{j \in N^*} E_x^{*j}$. We then have that E_x^{*j} is implied as $E_x^{*j} = \hat{s}_x^{*j} \times \sum_{j \in N^*} E_x^{*j}$, and this in turn implies a value for p^{*j} as $p^{*j} = p^{*j}(\tau^{*j}, \bar{p}^{wj})$, and hence a value for τ^{*j} , for each $j \in N^*$.

²⁴Given $\{\bar{p}^{wj}\}$ and $\{\hat{\tau}^{*j}\}$, we have that $\{p^{*j}\}$ is determined, and so the right-hand side of (14) is also determined. Furthermore, with $\{p^{*j}\}$ determined, we see that T is determined as well. Thus, satisfaction of (14) determines p . But this means that τ^j is implied as $\tau^j = \bar{p}^{wj}/p$.

announced 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 $M_y^*(p^*(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$, for every $j \in N^*$. This restriction ensures that no government can be forced to import a bilateral volume greater than implied by its own proposal in the renegotiation stage.

We now define the *Multilateral Negotiation Game*:

- Stage 1:* Governments bargain and a set of bilateral world prices, $\{\bar{p}^{wj}\}$, is determined.
- Stage 2:* The domestic government announces 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 announces a foreign tariff, $\hat{\tau}^{*j}$. If the announcements agree, then the tariffs are implemented as the outcome of the negotiation.
- Stage 3:* If the announcements do not agree, then the tariffs that are implemented are those which maximize multilateral trade volume, subject to the constraints that the tariffs satisfy the restrictions of reciprocity and announced import limits.

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.

Taking the bilateral world prices, $\{\bar{p}^{wj}\}$, and announcements, $(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\})$ and $\{\hat{\tau}^{*j}\}$, as given, we begin by characterizing the tariffs that are actually implemented. A first possibility is that the announcements agree, with $(\{\hat{\tau}^j\}, \{\tau^{*j}(\cdot)\}) = (\{\tau^j(\cdot)\}, \{\hat{\tau}^{*j}\})$, in which case the announced tariffs $(\{\hat{\tau}^j\}, \{\hat{\tau}^{*j}\})$ are implemented. The second possibility is that the governments fail to reach agreement in the renegotiation stage. In this case, the implemented tariffs are determined by the stage-3 maximization program:

$$\text{Max}_{\{\tau^j\}, \{\tau^{*j}\}} \sum_{j \in N^*} E_x^{*j}(p^{*j}(\tau^{*j}, \bar{p}^{wj}(.)))$$

subject to

$$(A). \quad \bar{p}^{wj}(.)=\bar{p}^{wj}, \text{ for all } j \in N^*$$

$$(B). \quad E_x^{*j}(p^{*j}(\tau^{*j}, \bar{p}^{wj}(.))) \leq E_x^{*j}(p^{*j}(\tau^{*j}(.), \bar{p}^{wj}), \bar{p}^{wj}), \text{ for all } j \in N^*$$

$$(C). \quad M_y^{*j}(p^{*j}(\tau^{*j}, \bar{p}^{wj}(.))) \leq M_y^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj}), \text{ for all } j \in N^*,$$

where $\bar{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\})$ is represented as $\bar{p}^{wj}(\cdot)$ and where $\tau^{*j}(\cdot)$ again denotes the value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{S}_x^{*j}\}, \{\bar{p}^{wj}\})$. This program chooses tariffs to maximize multilateral trade volume, subject to the constraints that the tariff selection satisfies the restrictions of reciprocity (given in constraint (A)) and announced import limits (given in constraints (B) and (C)).

As before, we substitute constraint (A) into the objective and constraints (B) and (C). Next, we use (13) to represent constraint (C) in terms of bilateral export volumes. These steps yield the following equivalent program:

$$\text{Max}_{\{\tau^{*j}\}} \sum_{j \in N^*} E_x^{*j}(p^{*j}(\tau^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$$

subject to

$$E_x^{*j}(p^{*j}(\tau^{*j}, \bar{p}^{wj}), \bar{p}^{wj}) \leq \min\{E_x^{*j}(p^{*j}(\tau^{*j}(.), \bar{p}^{wj}), \bar{p}^{wj}), E_x^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})\}, \text{ for all } j \in N^*,$$

where the choice of $\{\tau^{*j}\}$ implies a selection for $\{\tau^j\}$ under the restriction of reciprocity. The solution to the program is now immediate: for each $j \in N^*$, τ^{*j} is set optimally when the constraint associated with the stage-2 announcements concerning the bilateral trading volume between the domestic country and foreign country j binds.

To convert this finding about export volumes into an implication for tariffs, we observe that, under the assumptions that substitution effects dominate income effects and that the Metzler paradox is ruled out, it follows that $\partial E_x^{*j} / \partial p^{*j} > 0 > \partial p^{*j} / \partial \tau^{*j}$ for each $j \in N^*$. Under these assumptions, the export volume of foreign country j is lower when the foreign tariff τ^{*j} is higher, and so the constraint binds at the highest announced (or implied) tariff for imports into foreign

country j . Letting $(\{\hat{\tau}^j(\{\bar{p}^{wj}\})\}, \{\hat{\tau}^{*j}(\{\bar{p}^{wj}\})\})$ denote the tariffs implemented in stage 3, we thus have that, for each $j \in N^*$:

$$\hat{\tau}^{*j}(\{\bar{p}^{wj}\}) = \max\{\tau^{*j}(\cdot), \hat{\tau}^{*j}\}; \quad \bar{\tau}^j(\{\bar{p}^{wj}\}) = \tau^j(\{\hat{\tau}^{*j}(\{\bar{p}^{wj}\})\}, \{\bar{p}^{wj}\}),$$

where $\tau^{*j}(\cdot)$ again denotes the value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{s}_x^{*j}\}, \{\bar{p}^{wj}\})$ and where $\hat{\tau}^j(\{\bar{p}^{wj}\})$ is thus set to satisfy the restriction of reciprocity. Notice that the stage-3 implementation solution generates the stage-2 tariff announcements when governments agree in stage 2. We thus now have a complete mapping from stage-2 announcements to welfare functions: a set of announcements in stage 2 results in an implemented set of tariffs, $(\{\hat{\tau}^j(\{\bar{p}^{wj}\})\}, \{\hat{\tau}^{*j}(\{\bar{p}^{wj}\})\})$, and these tariffs in turn determine local prices and therefore W and W^{*j} , for all $j \in N^*$.

With stage 3 characterized, we next determine the stage-2 announcements. Consider first the government of any foreign country j . Let us define the following tariff:

$$\tau^{*j0}(\bar{p}^{wj}) \text{ satisfies } W_{p^{*j}}^{*j}(p^{*j}(\tau^{*j0}(\bar{p}^{wj}), \bar{p}^{wj})) = 0 \quad (21)$$

This tariff is the preferred tariff of the government of foreign country j , under the restriction of reciprocity. In the subgame corresponding to stages 2 and 3, for fixed \bar{p}^{wj} , it is straightforward to verify that it is a dominant strategy for the government of foreign country j to announce $\hat{\tau}^{*j} = \tau^{*j0}(\bar{p}^{wj})$.²⁵ The implied export volume associated with this announcement is denoted as:

$$E_x^{*j0}(\bar{p}^{wj}) \equiv E_x^{*j}(p^{*j}(\tau^{*j0}(\bar{p}^{wj}), \bar{p}^{wj}), \bar{p}^{wj}).$$

Consider next the domestic government. As its share announcements must sum to unity, this government seeks to allocate its share announcements in the most advantageous fashion. This

²⁵Consider the government of foreign country j and suppose $\hat{\tau}^{*j} > \tau^{*j0}(\bar{p}^{wj})$. If the announcement $\hat{\tau}^{*j}$ is most restrictive (i.e., if $\hat{\tau}^{*j} \geq \tau^{*j}(\cdot)$), then the implemented export volume is $E_x^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$, generating welfare $W^{*j}(p^{*j}(\hat{\tau}^{*j}, \bar{p}^{wj}), \bar{p}^{wj})$. By announcing instead $\tau^{*j0}(\bar{p}^{wj})$, the government of foreign country j would receive the higher welfare $W^{*j}(p^{*j}(\tau^{*j0}(\bar{p}^{wj}), \bar{p}^{wj}), \bar{p}^{wj})$ if $\tau^{*j0}(\bar{p}^{wj}) \geq \tau^{*j}(\cdot)$. On the other hand, if $\tau^{*j}(\cdot) \in (\tau^{*j0}(\bar{p}^{wj}), \hat{\tau}^{*j}]$, then the announcement $\tau^{*j0}(\bar{p}^{wj})$ produces welfare $W^{*j}(p^{*j}(\tau^{*j}(\cdot), \bar{p}^{wj}), \bar{p}^{wj})$, which is no lower than and perhaps higher than (if $\hat{\tau}^{*j} > \tau^{*j}(\cdot)$) that received with the announcement $\hat{\tau}^{*j}$ under the second order condition $W_{p^{*j}p^{*j}}^{*j} < 0$. The other possibilities can be handled similarly.

calculation, however, depends on the anticipated volumes that are implied by the foreign announcements. There is little hope, therefore, in finding a dominant strategy for the domestic government. We thus assume that the domestic government recognizes that foreign governments will choose their dominant strategies, and hence chooses a best response to $\{\tau^{*j0}(\bar{p}^{wj})\}$.

Without loss of generality, let us order the bilateral world prices that the domestic government confronts as $\bar{p}^{wL} \leq \bar{p}^{wM} \leq \bar{p}^{wH}$. Our maintained assumption that bilateral trade volumes in any negotiated agreement are positive ensures that the domestic government chooses to trade with all partners. Thus, when the domestic government chooses its announcements optimally, it must be that:

$$E_x^{*L}(p^{*L}(\tau^{*L}(\cdot), \bar{p}^{wL}), \bar{p}^{wL}) = E_x^{*L0}(\bar{p}^{wL}) \quad (22)$$

$$E_x^{*M}(p^{*M}(\tau^{*M}(\cdot), \bar{p}^{wM}), \bar{p}^{wM}) = E_x^{*M0}(\bar{p}^{wM}), \quad (23)$$

where again $\tau^{*j}(\cdot)$ denotes the value $\tau^{*j}(\{\hat{\tau}^j\}, \{\hat{S}_x^{*j}\}, \{\bar{p}^{wj}\})$. Intuitively, the domestic government chooses its announcements so that it trades as much as possible with the partners with whom it has the most favorable terms of trade.

Consider finally the bilateral volume between the domestic country and foreign country H. Suppose first that when the composition of export volumes is $\{E_x^{*j0}(\bar{p}^{wj})\}$, the domestic government has $W_p \leq 0$, indicating that it (weakly) seeks more trade. In this case, it is optimal for the domestic government to set its announcements so that

$$E_x^{*H}(p^{*H}(\tau^{*H}(\cdot), \bar{p}^{wH}), \bar{p}^{wH}) = E_x^{*H0}(\bar{p}^{wH}). \quad (24a)$$

In the implemented outcome, we have agreement in stage 2 with $W_p \leq 0 = W_p^{*j}$ for all $j \in N^*$. Suppose second that, when the composition of export volumes is $\{E_x^{*j0}(\bar{p}^{wj})\}$, the domestic government has $W_p > 0$, indicating that this volume of trade is higher than it prefers. In this second case, our maintained assumption that bilateral trade volumes in any negotiated agreement are positive implies that there exists a lower (but still positive) trade volume with foreign country H, given as $E_x^{*H}(\{\bar{p}^{wj}\})$, which when combined with the volumes in (22) and (23) gives $W_p = 0$.

The domestic government then optimally sets its announcements so that

$$E_x^{*H}(p^{*H}(\tau^{*H}(\cdot), \bar{p}^{wH}), \bar{p}^{wH}) = E_x^{*H}(\{\bar{p}^{wj}\}). \quad (24b)$$

In the implemented outcome, we then have agreement in stage 2 with $W_p = 0 = W_p^{*L} = W_p^{*M}$ and $W_p^{*H} > 0$, as the government of foreign country H prefers more trade.

We now 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 tariffs satisfy (21)-(23) and (24a) or (24b) (as appropriate). The results derived above may now be summarized as follows:

Lemma 2: A tariff set $(\{\tau^j\}, \{\tau^{*j}\})$ can be implemented under reciprocity only if there exists a set of bilateral world prices $\{\bar{p}^{wj}\}$ such that at $(\{\tau^j\}, \{\tau^{*j}\})$ we have $\bar{p}^{wj}(\{\tau^j\}, \{\tau^{*j}\}) = \bar{p}^{wj}$ for all $j \in N^*$ and either $\{W_p = 0, W_p^{*j} \geq 0 \text{ for } j \in N^*\}$ or $\{W_p \leq 0, W_p^{*j} = 0 \text{ for } j \in N^*\}$.

With this lemma in place, we are prepared to determine the conditions under which an efficient multilateral agreement can be implemented under reciprocity. Our result is contained in the 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.

Proof: Suppose first that the world prices are set at their politically optimal and MFN levels. Then the foreign governments announce their politically optimal tariffs, as (21) requires, and the domestic government achieves $W_p = 0$ by announcing its politically optimal MFN tariffs, as (22)-(24a) require. Thus, the politically optimal MFN tariffs can be implemented under reciprocity in a stage-2 agreement. By Proposition 6, they are also efficient. Suppose next that an agreement is implemented under reciprocity which does not entail politically optimal MFN tariffs. If tariffs are politically optimal but not MFN, then by Proposition 6 they are not efficient. Suppose then, that the tariffs are not politically optimal (and may or may not conform to MFN). As they are implementable under reciprocity, Lemma 2 implies that there are then two cases to consider:

(i) $\{W_p = 0, W_p^{*j} \geq 0 \text{ for } j \in N^* \text{ with a strict inequality for at least one } \tilde{j}\}$: In this case,

(17) implies that we have efficiency if and only if $\partial \bar{T} / \partial \tau^{*j} = 0$ for $j \in N^*$. By (16), we must have $\partial \bar{P}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} > 0$ and thus, by (19), efficiency requires discriminatory tariffs. But then let k solve $\min_j \{P^{wj}\}$ and observe that $\partial \bar{T} / \partial \tau^{*k} > 0$.²⁶ This implies that efficiency is not achieved whenever $W_p^{*j} > 0$ for at least one j .

(ii) $\{W_p < 0, W_p^{*j} = 0 \text{ for } j \in N^*\}$: In this case, (16) implies that $\partial \bar{P}^{wj}(\tau^{*j}, \bar{W}^{*j}) / \partial \tau^{*j} = 0$ for each j , and thus that $\partial \bar{T} / \partial \tau^{*j}$ is given by (20) for each j . Then by (17) and (20), tariffs must be discriminatory if they are to be efficient. Moreover, 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 each j , it follows from (17) 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 $\min_j \{P^{wj}\}$ and observe that $\partial \bar{T} / \partial \tau^{*k} > 0$ by (20), implying that efficiency is not achieved when $W_p < 0$. **QED**

The broad implication behind Proposition 7 is that the principle of reciprocity serves well as a means to promote efficient multilateral agreements when trade policy externalities travel only through world prices. When governments abide by the principle of MFN, externalities indeed travel in this way, and so reciprocity and non-discrimination work in concert as principles that guide governments to efficient multilateral trade agreements.

V. Preferential Agreements

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. This exception, embodied in Article XXIV of GATT, was controversial in its inception and has met with renewed controversy recently as many GATT members -- but most especially the United States -- have increasingly exercised their rights under this article to negotiate preferential agreements. In this section we use our framework to address a central question in this controversy: Will preferential agreements interfere with a multilateral trading

²⁶This follows 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.

system that is built upon the pillars of reciprocity and non-discrimination?

In accord with Article XXIV, we consider two forms of preferential agreements. We will say that the domestic country forms a free trade area with foreign country i if $\tau^i=0=\tau^{*i}$ and $\tau^j > 0$ for some $j \neq i$. A customs union is distinguished from a free trade area in that, in addition to eliminating all internal trade barriers, the members of the customs union adopt a common external tariff policy as well. As the external tariff decisions of the customs union are centralized, the objectives of the tariff authorities in the customs union must be defined. If the domestic country forms a customs union with foreign country i , we represent the objectives of the customs union by the function $U(W, W^{*i})$ and assume that U is increasing in both arguments and satisfies globally the second-order conditions associated with the maximization problem developed below.

We consider first the presence of free trade areas. In particular, suppose that the domestic government establishes a free trade area with foreign country i . We may now report an immediate 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.

As Proposition 8 indicates, free trade agreements are fundamentally at odds with a multilateral trading system that is built on the pillars of reciprocity and non-discrimination: the legitimacy of reciprocity at the multilateral level is undermined when exceptions from non-discrimination are granted for the creation of free trade areas. 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 (as when some countries form a free trade area). Consequently, the efficiency properties of politically optimal MFN external tariffs are lost when a free trade agreement is created.

Now consider the creation of a customs union between the domestic country and foreign country i . Proposition 7 no longer directly applies, 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 an efficient multilateral agreement in the presence of a customs union, provided that the union became as a single country in the previous analysis and that all external tariffs were then set at the politically optimal MFN levels.

To explore this possibility, we note that a customs union between the domestic country and foreign country i will eliminate internal barriers to trade and set external barriers according to the objectives of the common tariff-setting authority, $U(W, W^{*i})$, implying that $p = p^{*i} = \tilde{p}^{wi} \equiv p^{cu}$ and also that the two countries share in the tariff revenue associated with their common external terms of trade, $T \equiv T^{cu}$. It therefore follows that the objectives of the customs union are given by $U(W, W^{*i}) = U(W(p^{cu}, T^{cu}), W^{*i}(p^{cu}, T^{cu}) \equiv W^{cu}(p^{cu}, T^{cu})$, with $W_{T^{cu}}^{cu} < 0$. With $W^{*j}(p^{*j}, \tilde{p}^{wj})$ still representing the objectives of each foreign government $j \neq i$ that is not a member of the customs union, it follows as a consequence of Proposition 7 that efficiency with respect to $W^{cu}(p^{cu}, T^{cu})$ and $W^{*j}(p^{*j}, \tilde{p}^{wj})$ $j \neq i$ 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. The remaining question is then whether it is also 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 between its members in such a way that internal efficiency is achieved at the common price prevailing in the local market, (a possibility that is ensured if the political preferences and income levels of the two countries are sufficiently similar), we will call the two countries *natural integration partners*, as the formation of a customs union then need not create internal inefficiencies. 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 coexist in harmony with a multilateral trading system built on the pillars of reciprocity and non-discrimination. These results are summarized in a final proposition:

Proposition 10: An efficient multilateral trade agreement can be implemented under reciprocity in the presence of a preferential agreement if and only if the multilateral agreement is characterized as follows:

- (i). Each country that is not a member of a preferential agreement must abide by the principle of non-discrimination (MFN) and set its tariffs at a level which is politically optimal; and
- (ii). Each country that is a member of a preferential agreement must belong to a customs union between natural integration partners that sets its external tariffs in accordance with the principle of non-discrimination (MFN) and at a level which is politically optimal for the customs union.

VI. Conclusion

Working within a general equilibrium model and adopting a representation of government trade policy objectives that includes each of the major formulations of political economy motives, we have shown that governments can shift the cost of their domestic intervention onto foreign trading partners by manipulating world prices with their unilateral tariff choices, and that this is the source of the inefficiency which a reciprocal trade agreement must address. Arguing 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 to efficient multilateral trade agreements. While we have established 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 existing 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 thus enables governments to achieve 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 again delivers an efficient outcome. 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 influence the 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). It is therefore 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).²⁷

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

²⁷In 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 impart no externality; see Bagwell and Staiger, 1996.) To some extent, this treatment is represented in GATT through the "principle supplier" rule (see Dam, 1970, p. 61).

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.²⁸

We conclude by mentioning two caveats that apply to our analysis as it relates to the role of preferential agreements in the multilateral trading system. First, we have interpreted reciprocity and non-discrimination as principles that guide governments from inefficient unilateral outcomes to the efficiency frontier. In practice, however, enforcement difficulties at the multilateral level (see, e.g., Dam, 1970) may preclude governments from eliminating fully the terms-of-trade driven restrictions in trade volume and arriving at the efficiency frontier. 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. As we show in other work (Bagwell and Staiger, forthcoming c), 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.²⁹

Second, while the government welfare function that we have employed in our analysis is quite general, it does not capture many of the reasons that governments might pursue preferential 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 may be understood in terms of the broader benefits that regional integration may confer.

²⁸At 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.

²⁹See also Bagwell and Staiger (forthcoming a,b), Bond and Syropoulos (1996, forthcoming) and Bond, Syropoulos and Winters (1996). Maggi (1996) offers a broader perspective as to role of enforcement in the multilateral trading system.

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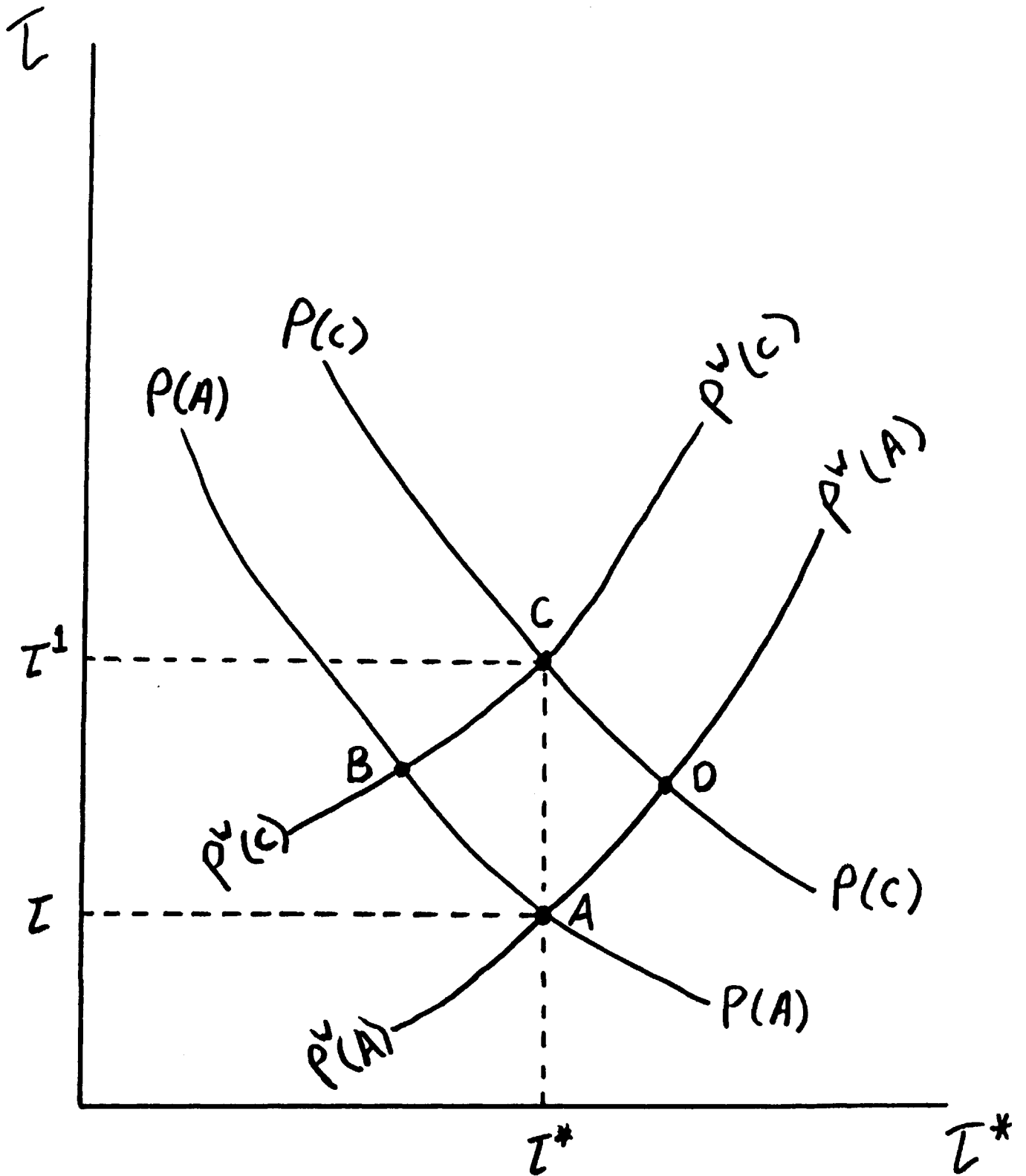


Figure 1

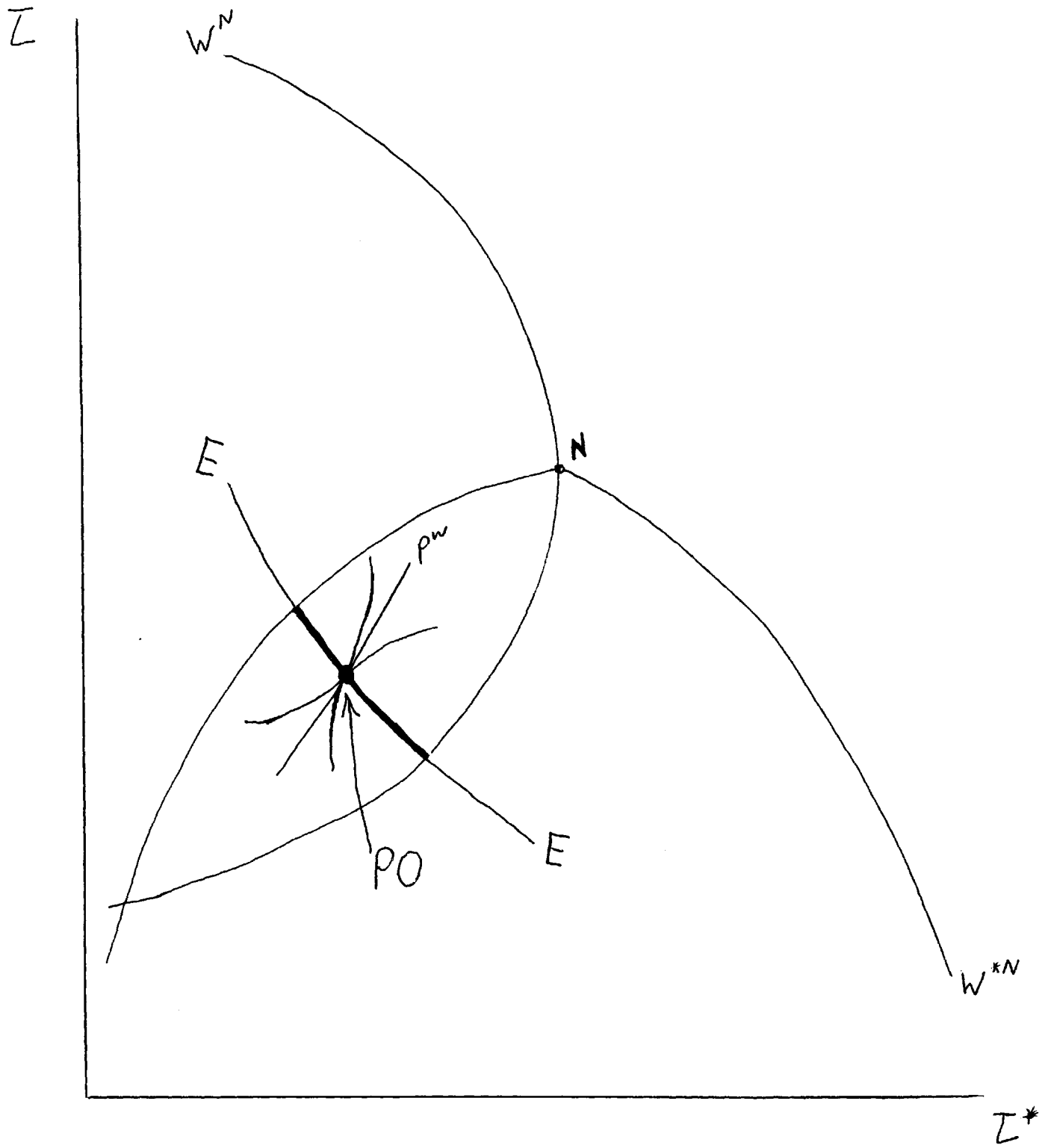


Figure 2

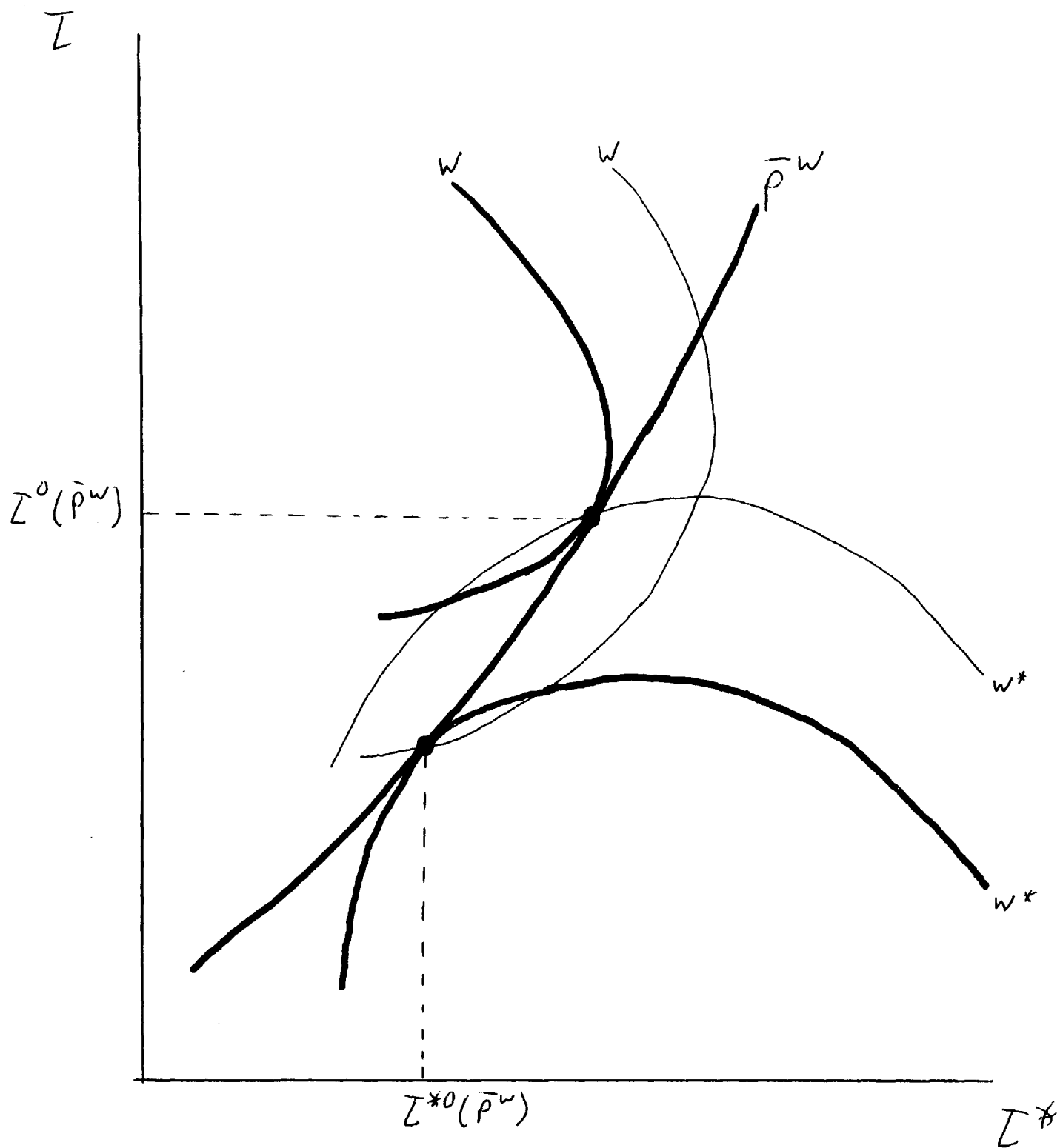


Figure 3

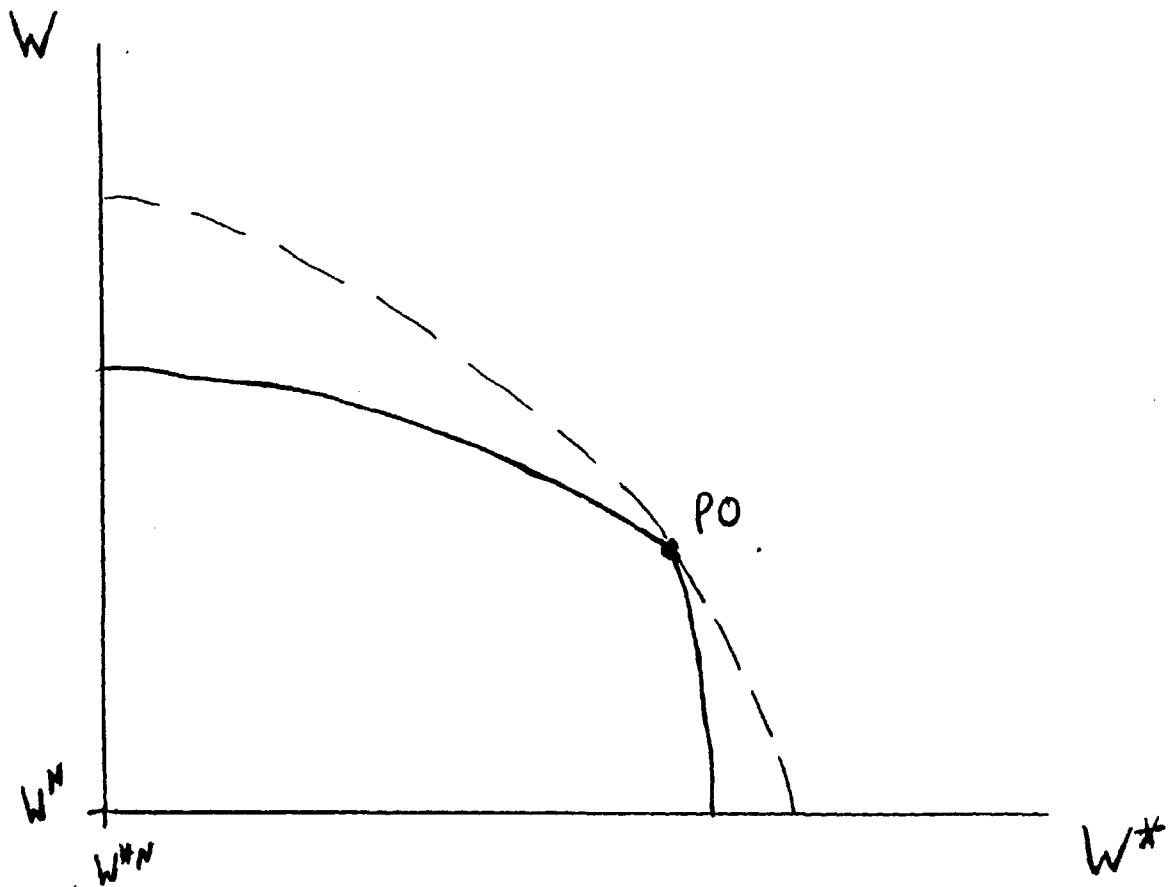
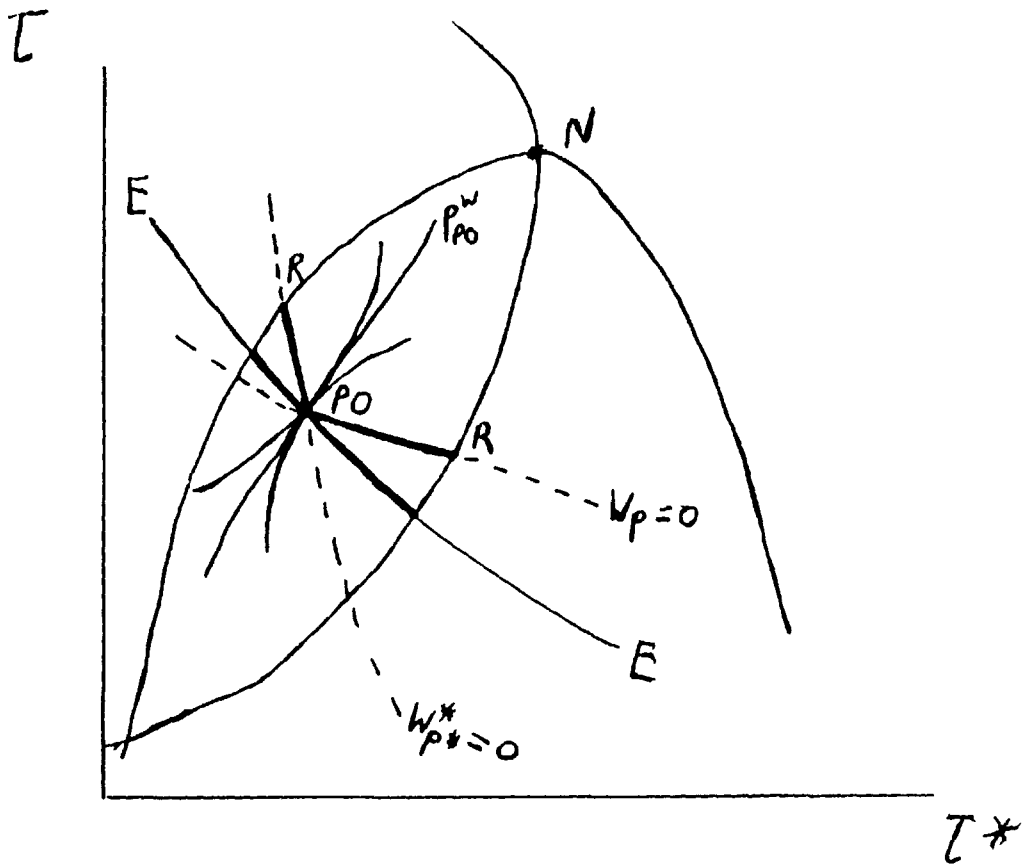


Figure 4

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