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MULTILATERAL TARIFF COOPERATION DURING THE FORMATION OF REGIONAL FREE TRADE AREAS*

by

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May 1993

*We have received helpful comments from Phil Levy, Ron McKinnon, and seminar participants at The University of Western Ontario International Trade Conference, Princeton University, and The University of Pennsylvania. Staiger gratefully acknowledges financial support from Stanford's Center for Economic Policy Research, and as an Alfred P. Sloan Research Fellow.

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Abstract

We explore the impact of the formation of regional free trade agreements on the ability of countries to maintain low cooperative multilateral tariffs. We assume that countries can not make binding international commitments, but are instead limited to self-enforcing arrangements. Specifically, we model cooperation in multilateral trade policy as involving a constant balance between, on the one hand, the gains from deviating unilaterally from an agreed-upon trade policy, and on the other, the discounted expected future benefits of maintaining multilateral cooperation, with the understanding that the latter would be forfeited in the trade war which followed a unilateral defection in pursuit of the former. In this context, we explore the way in which the formation of regional free trade agreements upsets the balance between current and future conditions, and trace through the dynamic ramifications of these effects for multilateral cooperation. Our results suggest that the emergence of regional free trade areas will be accompanied by a temporary retreat from liberal multilateral trade policies. Eventually, however, as the full impact of the emerging free trade agreement on multilateral trade patterns is felt, the initial balance between current and expected future conditions tends to reemerge, and liberal multilateral trade policies can be restored.

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I. Introduction

The recent move toward further regional integration embodied in events ranging from EC1992 to the signing of the North American Free Trade Agreement to the elimination of tariffs among the Mercursor Countries of South America has generated intense interest in the ramifications of regional trade agreements for the prospects of continued multilateral trade cooperation. Since its inception, the General Agreement on Tariffs and Trade (GATT) has maintained a somewhat uneasy coexistence with regional exceptions to its Most Favored Nation (MFN) principle through Article XXIV which permits the formation of both free trade areas and customs unions (which also have common external tariffs) subject to certain stipulations. But the recent proliferation of such agreements, with the United States in particular now apparently viewing active use of Article XXIV as an attractive element of its trade policy, has triggered the concern that Article XXIV might be a loophole to the principle of MFN through which regional trade agreements could undercut multilateral cooperation.

From a historical perspective, this concern appears unfounded, at least judging from the experience with the formation and later broadening of the European Community (EC) and its impact on multilateral cooperation. Far from undercutting enthusiasm for further multilateral liberalization, the future prospect of an integrated EC market devoid of internal barriers but with common external tariffs appears to have been a major factor leading to the Kennedy Round of multilateral GATT negotiations initiated in 1962. For example, in testimony before the Senate Finance Committee on the Trade Expansion Act of 1962 (which provided U.S. negotiating authority for the

Kennedy Round), then Secretary of Commerce Luther Hodges testified that:

> ...It is generally accepted that if we have to pay the scheduled common external tariff rates of the Common Market while our European competitors go duty-free, we stand to lose a substantial amount in annual sales we would otherwise be able to make to the expanded EEC market...To avoid this possibility, Mr. Chairman, and gentlemen, the Common Market must be encouraged to implement its announced policy of liberal trade by making substantial reductions in its external tariffs...There is only one way to accomplish this. We must negotiate a new trade agreement with the Common Market countries. (p. 34)

Similarly, former Secretary of State Christian Herter testified in front of the Joint Economic Committee that:

> ...If we are to go in one direction and Europe go in the other, inevitably, you will find trade barriers growing as between two large free trade areas. With these trade barriers growing, you would find...the slowing down of trade, both imports and exports...So what is the alternative in the picture? The alternative, to my mind, is to reconcile our policies with those of Europe, with a view to increasing trade on both sides...[p. 12].

Impetus for the Tokyo round of multilateral GATT negotiations initiated in 1974 can be similarly linked in large part to EC enlargement to include the United Kingdom and others. Indeed, Bhagwati (1991) has observed that the perception in the 1960s was one of a general compatibility between regionalism and GATT, and that only recently did the view that regionalism might be antithetical to GATT gain prominence.

Whether or not this newly pessimistic view turns out to be correct, it has sparked a resurgence in the study of regional trade arrangements. Building on the classic customs union analysis of Viner (1950) and the insights of Kemp and Wan (1976), Krugman (1991a,b) has explored the welfare consequences of customs-union formation when blocs produce differentiated products for both local consumption and export, and exploit their power to affect world prices by setting optimal tariffs on the imports of differentiated goods from other blocs. Krugman's analysis highlights a basic tradeoff that can emerge when welfare is compared across equilibria as trading blocs become larger in size and fewer in number: The increasing size of each bloc allows a greater variety of products to be available duty-free to consumers within the bloc, but the decreasing number of blocs leads to higher optimal tariffs on trade among blocs.[1] As a result, the welfare consequences of a movement towards a world made up of increasingly larger trading blocs will depend on just how important consumption of within-bloc varieties is relative to consumption of varieties produced outside the bloc. When the goods from all the blocs enter symmetrically into utility, Krugman shows that welfare in a world of small numbers of big blocs is likely to be low, while if blocs are formed on the basis of "natural" trading partners who trade disproportionately with each other, Krugman's analysis shows that bloc formation may have more benign welfare consequences. Following on Krugman's work, several additional papers (Deardorff and Stern, 1991, and Bond and Syropoulos, 1992) have taken issue with the pessimistic view of trading blocs emerging from Krugman's symmetric-traders model and have instead provided models of regional bloc formation that yield results more in line with the benign view associated with his natural bloc model.

As useful as these papers are in providing insights into the mechanics of the welfare tradeoffs involved in regional bloc formation, they nevertheless fail to address what is perhaps the central question in the debate over the wisdom of forming regional trading blocs: What is their impact on the prospects for continued multilateral trade cooperation? The answer to this question can not be found in Krugman's model or models like it which focus on the implications of bloc formation when all blocs set non-cooperative tariffs on external trade.[2] This point is made forcefully by Fred Bergsten's (Bergsten, 1991) commentary on Krugman (1991b):

> Regional trading arrangements are clearly going to happen...The crucial question is whether these arrangements take place within the context of an effective and credible global system. If so, they will be - and will be viewed as - supplements to that system...Indeed, it is the existence of tariff bindings under GATT (along with the proscriptions of Article XXIV itself) that prevent bloc members from raising barriers toward the outside world to exploit the potential gains described by Krugman. (p. 53, author's emphasis).

To explore the effects of regional agreements on multilateral tariff cooperation under GATT, one must turn to cooperative models of tariff formation. Papers that do consider the impact of regional agreements on cooperative multilateral tariffs include those of Ludema (1992), Kowalczyk (1990), Kowalczyk and Wonnacott (1991), and Kowalczyk and Sjostrom (1992). These papers focus on the bargaining aspect of international tariff cooperation, and explore how multilateral bargains can be altered by the opportunity to negotiate bilateral deals. However, these papers assume that binding commitments can be made to enforce the bargaining outcome. As we and others have argued elsewhere (Dixit, 1987, Thursby and Jensen, 1984, Bagwell and Staiger, 1990), in the context of international agreements, such as GATT, it is not clear how such binding commitments could be enforced: In practice, the enforcement of agreed-upon behavior under GATT is limited by the severity of retaliation that can be credibly threatened against an offender by its trading partners.[3] A different emphasis is pursued by Levy (1993), who adopts a median-voter model to explore the degree to which regional options could undermine political support for multilateral liberalization. But again, as with other existing work, Levy takes the ability to make binding international commitments as given.

In this paper, we begin an exploration of the impact of the formation of regional trade agreements on the ability of countries to maintain cooperative multilateral tariffs when they cannot make binding international commitments, but are instead limited to self-enforcing arrangements. We adopt the view, as in Bagwell and Staiger (1990), that enforcement issues are central to an understanding of the dynamic behavior of trade intervention in a world where countries attempt to maintain cooperative trade policies. Specifically, we view cooperation in multilateral trade policy as involving a constant balance between, on the one hand, the gains from deviating unilaterally from an agreed-upon trade policy, and on the other, the discounted expected future benefits of maintaining multilateral cooperation, with the understanding that the latter would be forfeited in the trade war which followed a unilateral defection in pursuit of the former. In such a setting, changes in current conditions or in expected future conditions can upset this balance, requiring changes in existing trade policy that will bring incentives back into line. In Bagwell and Staiger (1990), we adopted this view of tariff-setting to explore the implications of temporary import surges for the ability to maintain low cooperative tariffs, and interpreted managed trade as a cooperative response to deal with temporary incentive problems in the presence of volatile trade swings. We explore in this and a companion paper (Bagwell and Staiger, 1993) the sense in which the formation of regional trade agreements upsets the balance between current and future conditions, and trace through the dynamic ramifications of these effects for multilateral cooperation.

A crucial focus of our analysis is the period of transition, during which the regional agreement is being negotiated, and then implemented. Both because regional trade agreements typically involve a lengthy staging of tariff reductions, and because trade patterns take time to reflect changes in trade barriers in any event, there will inevitably be a lag between the conclusion of negotiations and ratification of the agreement on the one hand, and final changes in trading patterns reflecting the fully implemented regional agreement on the other.[4] Together with the period of negotiation, this lag creates a period of transition within which, at least initially, the formation of the regional trade area has its biggest impact on expected future trade patterns rather than on current conditions. It is this basic observation that is central to our results.

Specifically, in this paper we consider regional free trade agreements, placing the analysis of customs unions in a companion paper (Bagwell and Staiger, 1993). We argue that the emergence of regional free trade agreements will be associated with temporarily heightened multilateral trade tensions between member and non-member countries, and consequently, to a temporary retreat from liberal multilateral trade policies. This tension arises during the period of transition, when current trade flows between member and non-member countries (and hence current incentives to deviate unilaterally from an agreed-upon multilateral tariff) are more or less unchanged at the same time that expected future trade flows between member and non-member countries (and hence the value of maintaining future multilateral cooperation) have diminished.[5] Intuitively, under such conditions, countries are apt to confront long-standing trade disputes more readily, as the risks of a possible trade war no longer pose the deterrent to confrontation that they once did. Our results suggest, however, that the tension between regional free trade agreements and multilateral liberalization is temporary: Eventually, as the full impact of the emerging regional agreement on multilateral trade patterns becomes felt, the initial balance between current and expected future conditions reemerges, and liberal multilateral trade policies can be restored.

The remainder of the paper is devoted to establishing and elaborating on these points. The next section sets out the basic model within which we will study free trade agreements, and establishes several properties in a stationary setting that will be useful in the dynamic non-stationary analysis to follow. Section III then characterizes the dynamic behavior of equilibrium multilateral tariffs in the non-stationary environment of emerging regional free trade agreements. Section IV derives various comparative statics results and discusses the institutional implications of our analysis with regard to the design of Article XXIV. Section V concludes.

II. Multilateral Tariff Determination in Stationary Environments

In this section we describe a simple model of trade between two countries, under the assumption that the trading environment between the two countries is stationary through time. In this way, a useful benchmark is created, against which we can contrast a nonstationary model which allows for the emergence of free trade agreements, as depicted in the following sections.

A. A Static Model

We consider two countries, who trade G goods. To distinguish the countries, we use an "*" to denote one of the countries (henceforth referred to as the "foreign" country) while the absence of an "*" corresponds to the "no *" country (henceforth referred to as the domestic country).

In order to make our points as simply as possible, we ignore the process of production in the countries, assuming instead that the respective countries are simply endowed with certain amounts of each good. Specifically, we assume a symmetric endowment distribution, whereby for each of $G/2$ goods (e.g., the even-numbered goods) the foreign country has an endowment of two units whereas the domestic country has an endowment of zero units; and for each of the other $G/2$ goods (e.g., the odd-numbered goods), the situation is reversed, with the foreign country having an endowment of zero units and the domestic country being endowed with two units. Thus, $G/2$ of the goods are potentially exported from the foreign to the domestic country, and the other $G/2$ goods follow the opposite trade direction. In each case, the exporting country is endowed with two units of the good, and the importing country has an endowment of zero units.

We assume that demand functions in the two countries are symmetric across products and countries, and that the demand for any product i is independent of the prices of other products $j \neq i$. Specifically, the demand functions for product $i \in \{1,...G\}$ are given by:

$$(1) \qquad C(P^i) = \alpha - \beta P^i; \; C(P^{i^*}) = \alpha - \beta P^{i^*}$$

where $(\alpha,\beta)>0$, P^i is the price of good i in the domestic country and P^{i*} is the corresponding price in the foreign country.

Given the symmetry between the two countries, for any product i, we may simply speak of "the exporting country" and "the importing country." Accordingly, let P^i_x denote the price of good i in the exporting country and P^i_m give the price of good i in the importing country. We focus here on the determination of (specific) import tariffs, and so τ^i_m is used to represent the import tariff levied on good i. It follows that:

(2) $\quad P^i_m = P^i_x + \tau^i_m$

for each good i.

The structure of the basic model is completed with the further requirement of market clearing for each product i. Using the specifications of the endowment distribution, (1) and (2), we thus require for every good i that:

(3) $\quad 2 = \alpha - \beta P^i_x + \alpha - \beta(P^i_x + \tau^i_m).$

Solving (3) for P^i_x and using (2) then gives the market-clearing prices:

(4a) $\quad \hat{P}^i_x(\tau^i_m) = (\alpha-1)/\beta - \tau^i_m/2$

(4b) $\quad \hat{P}^i_m(\tau^i_m) = (\alpha-1)/\beta + \tau^i_m/2.$

Finally, letting $M^i = C(P^i_m)$ denote the import volume of good i, it is direct to use (1) and (4b) to determine good i's market-clearing import volume, $\hat{M}^i(\tau^i_m) = C(\hat{P}^i_m(\tau^i_m))$, which is given by:

(5) $\quad \hat{M}^i(\tau^i_m) = 1 - (\beta/2)\,\tau^i_m.$

At this point, given the symmetry of the model, it is apparent that no basis exists for asymmetric tariffs across products. Accordingly, we may drop the i superscript, and summarize our analysis so far with the definitions of market-clearing export prices, import prices, and import volume for any good. Using (4a), (4b), and (5), these are given by:

(6a) $\hat{P}_x(\tau_m) = (\alpha-1)/\beta - \tau_m/2$

(6b) $\hat{P}_m(\tau_m) = (\alpha-1)/\beta + \tau_m/2$

(6c) $\hat{M}(\tau_m) = 1 - (\beta/2)\,\tau_m.$

Notice that under free trade import volume per import good would be one unit, with each country's import volume from the other then amounting to G/2.

With (6a)-(6c) in place, we are now ready to define welfare. For either country, we represent welfare by the sum of consumer surplus, producer surplus, and import-tariff revenue. Thus, the domestic country's welfare function is given by:

$$(7) \qquad W(G,\tau_m,\tau_m^*) = \frac{G}{2}\Big[\int_{\hat{P}_m(\tau_m)}^{\alpha/\beta} C(P)dP + \int_{\hat{P}_x(\tau_m^*)}^{\alpha/\beta} C(P)dP + \int_0^{\hat{P}_x(\tau_m^*)} 2dP + \tau_m \hat{M}(\tau_m)\Big]$$

where τ_m is the import tariff levied by the domestic country on all imports, and τ_m^* is the import tariff imposed by the foreign country on all imports. The welfare of the foreign country is defined in an exactly symmetric fashion.

Consider now the optimal import tariff for a country. Using (7) and $C(\hat{P}_m(\tau_m)) = \hat{M}(\tau_m)$, it is direct to verify that:

$$(8) \qquad \frac{dW(G,\tau_m,\tau_m^*)}{d\tau_m} = \frac{G}{2}\left[C(\hat{P}_m(\tau_m))(1-\hat{P}_m'(\tau_m)) + \tau_m \hat{M}'(\tau_m)\right]$$

where primes denote derivatives. There are two features of (8) that deserve special comment. First, observe that the marginal effect of an import tariff for the domestic country is completely independent of the trade policy of the foreign country. This arises because of our assumption of demand independence and because export taxes are not considered. Second, since $\hat{P}_m'(\tau_m) < 1$ from (6b), it is clear that a small import tariff improves welfare.

For more specific results, we use (1), (6b) and (6c) to re-write (8) as:

$$(9) \qquad \frac{dW(G,\tau_m,\tau_m^*)}{d\tau_m} = \frac{G}{2}\left[\frac{1}{2} - \frac{3}{4}\beta\tau_m\right].$$

It follows that $W(G,\tau_m,\tau_m^*)$ is concave in τ_m. Thus, for any fixed τ_m^*, the welfare-maximizing response is $\tau_m = 2/3\beta$.

Let us now define the static tariff game to be the game in which both countries simultaneously select an import tariff for all goods, with each country seeking to maximize its own welfare. Since each country's best-response tariff is independent of the tariff imposed by the other country, we have that the Nash equilibrium of the static tariff game occurs when each country selects the import tariff given by:

$$(10) \qquad \hat{\tau}^N = \frac{2}{3\beta}.$$

As it is easily verified that $W(G,\tau,\tau)$ is strictly decreasing in τ, the static tariff game resembles a Prisoners' Dilemma game: both countries are better off when there is free trade and are monotonically made better off with any symmetric movement towards free trade, but in the Nash equilibrium the countries impose positive tariffs and experience the consequent lower welfare.

Figure 1 illustrates all this by depicting the gains from importing a representative import good in the top left panel, and the gains from exporting a representative export good in the top right panel. Under free trade, these gains would be given by the area under the import demand curve $(m_1m_2m_3)$ and the area above the export supply curve

$(x_1x_2x_3)$, respectively. Under the optimal tariff, the additional gains from importing are given by the net tariff revenue collected from abroad $(m_1m_4m_5m_6)$ minus the dead weight loss triangle $(m_6m_7m_3)$. Facing the optimal tariff abroad, the reduction in the gains from exporting are given by the net import taxes paid by exporters $(x_1x_4x_5x_6)$ and the dead weight loss triangle $(x_5x_6x_3)$. Taken together, when both countries impose their optimal tariffs, the losses in each country's export market outweigh the gains in its import market, with the net loss for a representative import and export good amounting to the sum of the dead weight loss triangles $(m_6m_7m_3 + x_5x_6x_3)$. The lower panel of Figure 1 depicts the domestic and foreign tariff reaction curves, with domestic indifference curves reflecting the relative welfare rankings associated with reciprocal free trade, unilateral optimal tariff setting, and Nash equilibrium tariffs in the static tariff game.

B. A Stationary Dynamic Model

We now consider a stationary dynamic tariff game, which is defined by the infinite repetition of the static tariff game described above. In each period the countries observe all previous import tariff selections and simultaneously choose import tariffs. For the reasons given above, we continue to assume that each country applies the same tariff to each imported good in any given period. The game is stationary in the sense that none of the model's parameters changes through time. Let $\delta \in (0,1)$ denote the discount factor between periods.

In order to express our ideas in a simple manner, we focus on a particular class of subgame perfect equilibria for the stationary dynamic tariff game. Specifically, we consider equilibria in which (i) symmetric stationary non-negative import tariffs are selected along the equilibrium path, meaning that in equilibrium the two countries select the same import tariff in each period, and (ii) if a deviation from this common tariff occurs, then in the next period and forever thereafter the countries revert to the Nash equilibrium tariffs of the static tariff game. We then refer to the most-cooperative equilibrium of the stationary dynamic tariff game as the subgame perfect equilibrium which yields the lowest possible equilibrium tariff while satisfying restrictions (i) and (ii). The corresponding import tariff is then termed the most-cooperative tariff for the stationary dynamic tariff game.[6]

In a dynamic model, countries have the possibility of supporting a cooperative tariff, τ^c with $\tau^c < \hat{\tau}^N$, since any attempt to raise the current-period tariff will be greeted with the retaliatory (Nash) tariff from the trading partner in future periods. Intuitively, a cooperative tariff τ^c can then be supported in an equilibrium for the stationary dynamic tariff game if the one-time incentive to cheat is sufficiently small relative to the future value of maintaining a cooperative relationship with the trading partner.

To formalize this intuition, let us first examine the incentive a country has to cheat. For a fixed cooperative tariff $\tau^c < \hat{\tau}^N$, and given the class of subgame perfect equilibria upon which we focus, if a country is to deviate and select $\tau \neq \tau^c$, then it will deviate to its best-response Nash tariff, $\hat{\tau}^N$. Thus, the gain from cheating is given by:

(11) $\Omega(G,\tau^c) \equiv W(G,\hat{\tau}^N,\tau^c) - W(G,\tau^c,\tau^c)$.

When a country cheats, however, it also causes future welfare to drop, and we now examine this cost of cheating. Define the one-period value to cooperation to be:

(12) $\omega(G,\tau^c) = W(G,\tau^c,\tau^c) - W(G,\hat{\tau}^N,\hat{\tau}^N)$.

Then the cost to cheating is $\delta/(1-\delta)\cdot\omega(G,\tau^c)$, since once a country defects and selects a high import tariff, cooperative tariffs are thereafter replaced by the higher Nash tariffs.

Using (11) and (12), the fundamental "no-defect" condition is that the benefit of cheating be less than the discounted future value of cooperation, or:

(13) $$\Omega(G,\tau^c) \leq \frac{\delta}{1-\delta}\,\omega(G,\tau^c).$$

Any cooperative tariff τ^c that satisfies (13) can be supported in a subgame perfect equilibrium of the stationary dynamic tariff game.

Our interest lies in the most-cooperative tariff, $\hat{\tau}^c$, which is the smallest non-negative tariff that satisfies (13). To characterize this tariff, we first investigate the properties of $\Omega(G,\tau^c)$ and $\frac{\delta}{1-\delta}\,\omega(G,\tau^c)$. Straightforward calculations reveal that:

(14) $$\Omega(G,\tau^c) = \left(\frac{G}{4}\right)\left[\frac{1}{3\beta} - \tau^c + \frac{3}{4}\beta(\tau^c)^2\right] > 0 \quad if \quad \tau^c < \hat{\tau}^N.$$

Using (14), it follows that:

(15) $$\frac{\partial\Omega(G,\tau^c)}{\partial G} = \frac{1}{G}\Omega(G,\tau^c) > 0 \quad if \quad \tau^c < \hat{\tau}^N$$

(16) $$\frac{\partial\Omega(G,\tau^c)}{\partial\tau^c} = \left(\frac{G}{4}\right)\left[\frac{3}{2}\beta\tau^c - 1\right] < 0 \quad if \quad \tau^c < \hat{\tau}^N.$$

Thus, a larger number of traded products, which corresponds to a greater volume of trade, acts to raise the benefit from a tariff hike, since the larger tariff is then applied to more units. Notice also that lower cooperative tariffs heighten the incentive to cheat, because a deviation to the Nash tariff then represents a more significant tariff increase.

Calculations also reveal that:

(17) $$\frac{\delta}{1-\delta}\,\omega\,(G,\tau^c)=\frac{\delta}{1-\delta}\,\frac{G}{4}\,[\frac{2}{9\beta}-\frac{\beta}{2}(\tau^c)^2]>0 \quad \textit{if} \quad \tau^c<\hat{\tau}^N.$$

Using (17), it follows that:

(18) $$\frac{\partial}{\partial G}(\frac{\delta}{1-\delta}\,\omega\,(G,\tau^c))=\frac{1}{G}\,\frac{\delta}{1-\delta}\,\omega\,(G,\tau^c)>0 \quad \textit{if} \quad \tau^c<\hat{\tau}^N$$

(19) $$\frac{\partial}{\partial \tau^c}(\frac{\delta}{1-\delta}\,\omega\,(G,\tau^c))=\frac{-\delta}{1-\delta}\,\frac{G}{4}\,\beta\tau^c<0 \quad \textit{if} \quad \tau^c<\hat{\tau}^N.$$

Thus, a greater volume of trade enhances the future discounted value of cooperative tariffs, but higher cooperative tariffs lower the discounted value of future cooperation.

The determination of the most-cooperative tariff is now nicely illustrated by Figure 2. Observe in Figure 2 that the no-defect condition (13) is satisfied for all $\tau^c \epsilon\, [\hat{\tau}^c,\hat{\tau}^N]$. These are the set of tariffs that are supportable as subgame perfect equilibrium tariffs for our stationary dynamic tariff game, given the class of equilibria upon which we focus. Solving (13) for the tariff that gives equality yields the most-cooperative tariff, which is given by:

(20) $$\hat{\tau}^c=\frac{2}{3\beta}\,(\frac{3-5\delta}{3-\delta}).$$

Two observations are immediately apparent. First, note that $\hat{\tau}^c$ is decreasing in δ, with $\hat{\tau}^c = 0$ at $\delta = 3/5$ and $\hat{\tau}^c = \hat{\tau}^N$ at $\delta = 0$. This decreasing relationship is intuitive: as δ increases, the discounted value of future cooperation is enhanced, and so a lower tariff can be supported (despite the consequent greater incentive to cheat). This process is easily illustrated in Figure 2, if one imagines increases in δ causing an upward shift in $\frac{\delta}{1-\delta}\,\omega\,(G,\tau^c)$. To avoid cases in which the most-cooperative tariff corresponds to either of the extreme polar outcomes of free trade or the non-cooperative tariff $\hat{\tau}^N$, we assume $\delta \,\epsilon\, (0,3/5)$ in all that follows.

Second, observe that the most-cooperative tariff is independent of G. In other words, the most-cooperative tariff level between two countries trading many goods would be the same as that between two countries trading few goods, provided that the country pairs are otherwise identical and that for both trading pairs the number of goods traded is constant through time. This "neutrality" feature of our dynamic stationary model is purposeful, as we will use this feature in the next section to clarify the essential consequences of the formation of free-trade agreements for multilateral tariff determination.

C. Summary

We may summarize the findings of this section with the following proposition:

Proposition 1:

(a) For the static tariff game, the Nash equilibrium occurs when each country sets an import tariff of level $\tau^N = 2/3\beta$ on each imported good.

(b) For the stationary dynamic tariff game, the most-cooperative equilibrium occurs when each country sets the most-cooperative import tariff $\hat{\tau}^c = \frac{2}{3\beta}(\frac{3-5\delta}{3-\delta})$ on each imported good.

III. The Formation of Free-Trade Areas

We turn now to a dynamic model in which, at some point in time, the foreign and domestic countries enter into free-trade agreements with other (unmodeled) countries. We focus on how the formation of their own separate free trade areas affects the ability of the domestic and foreign countries to continue to cooperate multilaterally. Our modeling approach is to assume that the free-trade agreements result in the foreign and domestic countries trading fewer goods with each other, as more of their trade is diverted into the respective free-trade zones. Thus, the formation of free-trade areas marks a real change in the multilateral trading environment between the domestic and foreign countries, and our goal here is to examine the ramifications of this non-stationarity for the multilateral tariffs that these countries are able to support.

A. The Free-Trade Agreement Model

We again assume that the domestic and foreign countries set import tariffs simultaneously in each of an infinite number of periods. The game we consider in this section, however, differs from the stationary dynamic tariff game considered above, in that the structural environment within which the two countries trade is now assumed to change through time.

Specifically, we envision a trading relationship that passes through three phases. In phase 1, the foreign and domestic countries trade G goods with one another, just as described in the previous section. They are aware, however, that a time may come at which it becomes politically feasible for each to negotiate respective free-trade agreements with other countries. Phase 2 corresponds to a transition phase, in which the foreign and domestic countries continue to trade all G goods with one another, but in which each of these two countries has already begun discussion with other countries about future free-trade agreements. Finally, in phase 3, the free-trade agreements are fully implemented, the foreign and domestic countries now trade less with one another as they each divert some trade to their respective free-trade partners, and these new trading patterns are stationary into the infinite future. We model this trade diversion effect by assuming that the domestic and foreign countries trade only $G\text{-}F \geq 1$ goods in phase 3.

We choose not to rigorously examine the political process, the direct welfare benefits of the free trade agreements for the domestic and foreign countries, the welfare of other (free-trade-partner) countries, or the free-trade-agreement negotiation process. Instead, we assume simply that in any period, if free-trade discussions have not yet begun, then there is a probability of $\rho \in (0,1)$ that they will begin (for both countries and their respective partners) in the next period. Thus, if the countries are in phase 1 at date t, then ρ is the probability of being in phase 2 at date $t+1$. We model the transition from phase 2 to phase 3 in a similar way: if the various countries have already begun negotiating their respective free-trade agreements, then there is a probability of $\lambda \in (0,1)$ that all free-trade agreements will be finalized and that implementation will be complete by the beginning of the next period. Thus, if countries are in phase 2 at date t, then λ is the probability of being in phase 3 at date $t+1$.

This set-up has two features that require special comment.[7] First, we assume that all free-trade-agreement discussions begin at the same (random) date, and that the free-trade agreements also are all completed and implemented at the same (random) date. These assumptions are not intended to be interpreted literally; rather, they ensure that the foreign and domestic countries face symmetric situations, and this in turn considerably simplifies the analysis. Second, we assume that the enactment of the respective free-trade agreements results in the domestic and foreign countries trading fewer goods. This assumption appears to conflict with Article XXIV of GATT, which requires free-trade agreements to apply to substantially all trade, suggesting that $F=G$. This conflict is only superficial, however. For example, it might be assumed that the (unmodeled) countries that participate in the respective free-trade agreements do not trade in the remaining G-F goods. More generally, free-trade agreements yield trade-diversion consequences that are more pronounced for some goods than others, and our model represents a situation in which trade is strongly diverted into free-trade unions for F goods, but the extent of trade diversion is minor for the other G-F goods.[8]

In any case, for this free-trade agreement game, we examine a class of subgame perfect equilibria, in which (i). along the equilibrium path, in any given phase of the game, the foreign and domestic countries select a common import tariff for all goods at all dates within the phase; and (ii). if at any point in the game a deviation from the equilibrium tariff for the corresponding phase occurs, then in the next period and forever thereafter the two countries revert to the Nash equilibrium tariffs of the static tariff game.

For such equilibria, there will be three cooperative tariff levels, with each corresponding to a different phase. Let τ_1^c, τ_2^c and τ_3^c refer to the cooperative tariff levels in phases 1, 2 and 3, respectively.

We again look for a most-cooperative equilibrium, and we solve for the corresponding most-cooperative tariffs, $\hat{\tau}_1^c, \hat{\tau}_2^c$ and $\hat{\tau}_3^c$, in a recursive fashion. Specifically, we first identify the no-defect condition for phase-3 and find the lowest tariff that can be supported in this phase in an equilibrium of the desired class. Having thus solved for $\hat{\tau}_3^c$, we next turn to phase 2, represent the relevant no-defect condition for this phase, and then solve for the most-cooperative tariff at this phase. Finally, with $\hat{\tau}_2^c$ and $\hat{\tau}_3^c$ then determined, we characterize the no-defect condition for phase 1 and solve for the lowest tariff that doesn't invite cheating. This tariff is $\hat{\tau}_1^c$. Since the discounted value of future cooperation rises as the level of future tariffs falls, and since current tariffs are minimized by choosing future tariffs which maximize the discounted value of future cooperation, solving recursively as we do for the lowest sustainable tariff in phase 3 first, followed by phase 2 and phase 1, provides the lowest tariff sustainable in each phase of the model.

This, then, outlines the basic structure of our model as well as the method by which we will characterize the most-cooperative tariffs. The next step is to formally derive the no-defect conditions for each of the three phases.

Let us begin with phase 3. At this point, the domestic and foreign countries trade only G-F goods, and the future is stationary, so the no-defect condition for phase 3 is:

$$(21) \qquad \Omega\,(G-F,\tau_3^c) \leq \frac{\delta}{1-\delta}\,\omega\,(G-F,\tau_3^c).$$

This has the same form as (13), the no-defect condition in our stationary model, except that the number of goods traded is now G-F rather than G. But since $\hat{\tau}^c$, which as defined by (20) is the most-cooperative tariff in our stationary model, is independent of the number of goods traded, it follows immediately from (20) that:

$$(22) \qquad \hat{\tau}_3^c = \hat{\tau}^c = \frac{2}{3\beta}\left(\frac{3-5\delta}{3-\delta}\right)$$

is the most-cooperative tariff that can be supported in phase 3.

The fact that the most-cooperative tariff in phase 3 when G-F goods are traded and the future is stationary, $\hat{\tau}_3^c$, is equal to the most-cooperative tariff in our stationary model when G goods are traded, $\hat{\tau}^c$, reflects once again the "neutrality" property of our model with regard to (stationary) levels of the volume of trade. This property suggests an intuitive benchmark from which our results can be measured. That is, if the formation of free trade agreements were to come as a complete surprise and were implemented instantaneously, then $\hat{\tau}^c$ would be the most-cooperative multilateral tariff up until the instant that the free trade agreements arose, at which point F goods would become non-traded multilaterally and the same level of multilateral tariff cooperation ($\hat{\tau}_3^c = \hat{\tau}^c$) would continue to prevail thereafter. In this case, the presence or absence of free trade areas would be completely irrelevant for the level of multilateral tariff cooperation sustainable. This benchmark helps to emphasize the fact that, in our model, the emergence of free-trade areas can have an effect on the most-cooperative multilateral tariff levels only in so far as the transition process associated with their formation is explicitly considered.[9]

We turn now to phase 2. The no-defect condition in this case is:

$$\text{(23a)}\quad \Omega(G,\tau_2^c) \leq \delta \sum_{r=1}^{\infty} \lambda(1-\lambda)^{r-1}\Big[\sum_{q=1}^{r-1} \delta^{q-1}\omega(G,\tau_2^c) + \sum_{k=r}^{\infty} \delta^{k-1}\omega(G-F,\hat{\tau}_3^c)\Big]$$

where r indexes the period at which phase 3 begins, with $r=1$ meaning that phase 3 begins in the next period, and where q and k correspond to periods within phases 2 and 3, respectively.[10] Notice also that all G goods are traded between the two countries in phase 2, as reflected by the use of G in Ω. With some further algebra, the phase-2 no-defect condition may be re-written in an easier-to-use form:

(23b) $\Omega(G,\tau_2^c) \leq \frac{(1-\lambda)\delta}{1-(1-\lambda)\delta}\,\omega(G,\tau_2^c) + \frac{\lambda\delta}{1-(1-\lambda)\delta}\,\frac{\omega(G-F,\hat{\tau}_3^c)}{1-\delta} \equiv V_2(\tau_2^c;\lambda,\delta,F)$,

where V_2 is understood to be the expected discounted value to continued cooperation, as viewed in phase 2. The lowest tariff satisfying (23b) defines $\hat{\tau}_2^c$, which we characterize below.

Before doing this, however, we represent the phase-1 no-defect condition:

(24a) $\Omega(G,\tau_1^c) \leq \delta \sum_{s=1}^{\infty} \rho(1-\rho)^{s-1}[\sum_{t=1}^{s-1} \delta^{t-1}\omega(G,\tau_1^c) + \delta^{s-1}(\omega(G,\hat{\tau}_2^c) + V_2(\hat{\tau}_2^c;\lambda,\delta,F))]$

where s indexes the period at which phase 2 begins, with $s=1$ meaning that phase 2 begins in the next period, and where t represents periods within phase 1. Using (23b), we may re-write (24a) as:

(24b)

$$\Omega(G,\tau_1^c) \leq \frac{(1-\rho)\delta}{1-(1-\rho)\delta}\,\omega(G,\tau_1^c) + \frac{\rho\delta}{1-(1-\rho)\delta}\left[\frac{\omega(G,\hat{\tau}_2^c) + \frac{\lambda\delta}{1-\delta}\,\omega(G-F,\hat{\tau}_3^c)}{1-(1-\lambda)\delta}\right] \equiv V_1(\tau_1^c;\rho,\lambda,\delta,F)$$

where V_1 gives the expected discounted value to cooperation, from a phase-1 perspective. The smallest tariff satisfying (24b) is then defined to be $\hat{\tau}_1^c$.

B. Characterization of the Most-Cooperative Tariffs

We now investigate the properties of $\hat{\tau}_1^c$, $\hat{\tau}_2^c$ and $\hat{\tau}_3^c$, in order to determine the consequences of bilateral free-trade agreements for multilateral tariff determination. In particular, we seek to rank the relative magnitude of the three most-cooperative tariffs, and in this way to assess the impact of the formation of regional free trade areas on the ability to maintain low multilateral tariffs.

We characterize these tariffs recursively, through a sequence of lemmas. To begin, let us recall from (22) that:

Lemma 1: $0 < \hat{\tau}_3^c = \hat{\tau}^c = \frac{2}{3\beta}\left(\frac{3-5\delta}{3-\delta}\right) < \hat{\tau}^N.$

Thus, for the permissible range of δ, the phase-3 most-cooperative tariff lies between free-trade and the Nash tariff.

Consider next the transition or phase-2 tariff, $\hat{\tau}_2^c$. In order to characterize this tariff, some features of the function $V_2(\tau_2^c;\, \lambda, \delta, F)$ must be determined. We have the following observations:

(25a) $\frac{dV_2}{d\tau_2^c}(\tau_2^c;\lambda,\delta,F) < 0$

(25b) $V_2(\hat{\tau}^N;\lambda,\delta,F) > 0$

(25c) $V_2(\hat{\tau}_3^c;\lambda,\delta,F) < \frac{\delta}{1-\delta}\,\omega(G,\hat{\tau}_3^c).$

The first two observations follow easily from (19) and (23b) and also (17) and $\omega(G,\hat{\tau}^N) = 0$, respectively. To prove (25c), note that (18) implies:

$$\begin{aligned} V_2(\hat{\tau}_3^c;\lambda,\delta,F) &\equiv \frac{(1-\lambda)\delta}{1-(1-\lambda)\delta}\,\omega(G,\hat{\tau}_3^c) + \frac{\lambda\delta}{1-(1-\lambda)\delta}\,\frac{\omega(G-F,\hat{\tau}_3^c)}{1-\delta} \\ &< \frac{(1-\lambda)\delta}{1-(1-\lambda)\delta}\,\omega(G,\hat{\tau}_3^c) + \frac{\lambda\delta}{1-(1-\lambda)\delta}\,\frac{\omega(G,\hat{\tau}_3^c)}{1-\delta} \\ &= \frac{\delta}{1-\delta}\,\omega(G,\hat{\tau}_3^c). \end{aligned}$$

With these observations in place, we are now prepared to characterize $\hat{\tau}_2^c$, which is the lowest tariff for which $\Omega(G,\tau_2^c) \leq V_2(\tau_2^c;\lambda,\delta,F)$. As Figure 3 illustrates, $\hat{\tau}_2^c$ must lie strictly between $\hat{\tau}_3^c$ and $\hat{\tau}^N$:

Lemma 2: $0 < \hat{\tau}_3^c < \hat{\tau}_2^c < \hat{\tau}^N.$

In words, a high multilateral tariff is required while free-trade agreements are being negotiated and implemented, but once the agreements are fully implemented and the pattern of trade reflects fully the changed conditions brought about by the regional agreements, the multilateral tariff rate declines.

The intuition underlying Lemma 2 is actually quite direct. If the trade volume (number of traded goods) between the domestic and foreign countries were stationary through time, then the two countries could support a tariff level of $\hat{\tau}_3^c$. But, in the transition phase of the free-trade agreement game, the two countries recognize that their current trade volume exceeds that which will obtain between them once the free-trade agreements are finalized and fully implemented. Thus, as compared to the stationary environment that supports $\hat{\tau}_3^c$, the countries perceive the expected discounted value of future cooperation now to be lower (as (25c) states). Hence, to maintain cooperation, the incentive to cheat also must be diminished, and this is accomplished by endogenously reducing the volume of trade in the transition phase with the selection of a higher import tariff. In this way, the anticipation of the eventual trade diversion associated with the free-trade-agreement results in the selection of a high import tariff during the period of time over which the agreements are negotiated and implemented.[11]

We turn next to the initial phase-1 tariff, $\hat{\tau}_1^c$, which is the lowest tariff for which $\Omega(G,\tau_1^c) \leq V_1(\tau_1^c;\rho,\lambda,\delta,F)$. To characterize this tariff, we first record the following:

Lemma 3: $\omega(G,\hat{\tau}_2^c) > \omega(G\text{-}F,\hat{\tau}_3^c)$.

This lemma states that the per-period equilibrium value of cooperation declines as the countries move from the transition phase 2 to the final phase 3. Intuitively, two offsetting effects are involved in this calculation: the per-period value of cooperation will be greater in the transition phase relative to the final phase due to the relatively greater volume of trade associated with that phase, but this value is also diminished by the presence of high transition-phase tariffs. The lemma, which is proved in the Appendix, indicates that the direct effect of higher trade volume in the transition phase outweighs the indirect effect of high transition-phase equilibrium tariffs.

With lemma 3 in place, some observations about the V_1 function may be made:

(26a) $$\frac{dV_1}{d\tau_1^c}(\tau_1^c;\rho,\lambda,\delta,F) < 0$$

(26b) $$V_1(\hat{\tau}_2^c;\rho,\lambda,\delta,F) > V_2(\hat{\tau}_2^c;\lambda,\delta,F)$$

(26c) $$V_1(\hat{\tau}_3^c;\rho,\lambda,\delta,F) < \frac{\delta}{1-\delta}\,\omega\,(G,\hat{\tau}_3^c).$$

The first observation again follows directly from (19) and (24b). To prove (26b), one can use the definitions of V_2 and V_1 given in (23b) and (24b), respectively, to show that:

$$V_1(\hat{\tau}_2^c;\rho,\lambda,\delta,F) - V_2(\hat{\tau}_2^c;\lambda,\delta,F) = \frac{\lambda\delta}{(1-(1-\rho)\delta)(1-(1-\lambda)\delta)}\,[\omega\,(G,\hat{\tau}_2^c) - w(G-F,\hat{\tau}_3^c)] > 0$$

where the inequality follows from Lemma 3. Finally, for (26c), note that Lemma 2, (18) and (19) imply that:

$$V_1(\hat{\tau}_3^c;\rho,\lambda,\delta,F) \equiv \frac{(1-\rho)\delta}{1-(1-\rho)\delta}\,\omega\,(G,\hat{\tau}_3^c) + \frac{\rho\delta}{1-(1-\rho)\delta}\left[\frac{\omega\,(G,\hat{\tau}_2^c) + \frac{\lambda\delta}{1-\delta}\,\omega\,(G-F,\hat{\tau}_3^c)}{1-(1-\lambda)\delta}\right]$$

$$< \frac{(1-\rho)\delta}{1-(1-\rho)\delta}\,\omega\,(G,\hat{\tau}_3^c) + \frac{\rho\delta}{1-(1-\rho)\delta}\left[\frac{\omega\,(G,\hat{\tau}_3^c) + \frac{\lambda\delta}{1-\delta}\,\omega\,(G,\hat{\tau}_3^c)}{1-(1-\lambda)\delta}\right]$$

$$= \frac{\delta}{1-\delta}\,\omega\,(G,\hat{\tau}_3^c).$$

With these observations established, we may now return to Figure 3 and conclude that $\hat{\tau}_3^c < \hat{\tau}_1^c < \hat{\tau}_2^c$.[12]

Summarizing:

Lemma 4: $\hat{\tau}_3^c < \hat{\tau}_1^c < \hat{\tau}_2^c$.

Thus, the initial-phase tariff is higher than the final-phase tariff, although it is not as large as the tariff that occurs in the transition phase.

To gain some intuition for this lemma, let us first consider why tariffs are higher in the transition phase than the initial phase. As the proof to (26b) suggests, this is in fact a consequence of the conclusion of Lemma 3, that the per-period equilibrium value of cooperation declines as the countries pass from the transition to the final stage. An essential difference between the initial and the transition phase is that the lower-stakes final stage is expected to arrive sooner when the countries are already in the transition phase. This effect raises the discounted expected value of cooperation in the initial relative to the transition phase, and as a consequence a lower tariff can be supported in the initial phase.

Consider next the finding that the initial-phase tariff exceeds the final-phase tariff. Recall that the final-phase tariff, $\hat{\tau}_3^c$, is the minimal tariff which can be supported in a stationary dynamic environment. This tariff, however, cannot be supported in the initial phase of the free-trade agreement model, and for two reasons. First, higher tariffs are required in the transition phase of the free-trade agreement model, and the prospect of this difficult transition process reduces the expected discounted value of cooperation relative to that found in the stationary dynamic setting. Second, free-trade agreements eventually will be established, and so the volume of trade will drop relative to that which would be maintained in a stationary dynamic model. Both of these effects, which are each used in the proof of (26c), act to lower the expected discounted value of cooperation for the initial phase of the free-trade agreement game to a value that is below that which would be found in a stationary dynamic setting. Thus, a high initial-phase tariff is required, in order to slow the volume of trade and reduce the incentive to cheat.[13]

Observe that an interesting corollary of Lemmas 3 and 4 is that the per-period equilibrium value of cooperation declines in each successive phase of the free-trade agreement game:

Corollary 1: $\omega(G,\hat{\tau}_1^c) > \omega(G,\hat{\tau}_2^c) > \omega(G\text{-}F,\hat{\tau}_3^c)$.

The first inequality uses $\hat{\tau}_1^c < \hat{\tau}_2^c$ from Lemma 4 and (19), while the final inequality is just a restatement of Lemma 3. This corollary will be useful below, when we do comparative statics.

Our main results may now be summarized in the following proposition:

Proposition 2: For the free-trade agreement game, in the most-cooperative equilibrium, the domestic and foreign countries set the most-cooperative import tariffs, $\hat{\tau}_1^c$, $\hat{\tau}_2^c$ and $\hat{\tau}_3^c$, in phases 1, 2 and 3, respectively, on each imported good. Furthermore, $0 < \hat{\tau}_3^c < \hat{\tau}_1^c < \hat{\tau}_2^c < \hat{\tau}^N$.

Figure 4 reflects the result of Proposition 2 by depicting the multilateral tariff during the pre-transition, transition, and post-transition phases of the free trade agreement model. As illustrated, regional free-trade agreements are detrimental to multilateral tariff liberalization, in the sense that the prospect of eventual free-trade agreements and the consequent diversion of trade puts upward pressure on multilateral tariffs both before free-trade agreement negotiations begin and, particularly, during the negotiation and implementation phase. On the other hand, however, once the agreements are in place, low multilateral tariffs again can be supported.

IV. Comparative Statics and Article XXIV

The free-trade agreement model developed in the previous sections has a variety of parameters, and it is important to assess the sensitivity of the most-cooperative tariffs to these parameters. Moreover, several of the parameters of the model can be associated loosely with GATT policy toward free trade agreements as embodied in Article XXIV. Hence, in this section we present comparative statics results and discuss their implications with regard to the design of Article XXIV. Examining the respective no-defect conditions (21), (23b) and (24b), it is apparent that the most-cooperative tariffs have the following functional dependencies: $\hat{\tau}_3^c = \hat{\tau}_3^c(\delta)$, $\hat{\tau}_2^c = \hat{\tau}_2^c(\lambda, \delta, F)$ and $\hat{\tau}_1^c =$

$\hat{\tau}_1^c(\rho,\lambda,\delta,F)$.

A. Comparative Statics on ρ

The parameter ρ reflects the speed with which free-trade negotiations will begin. It affects only the phase-1 tariff, $\hat{\tau}_1^c$, and it is clear from Figure 3 that $\hat{\tau}_1^c$ is increasing in ρ if $V_1(\tau_1^c;\rho,\lambda,\delta,F)$ decreases in ρ at $\tau_1^c = \hat{\tau}_1^c$. Intuitively, if a higher value for ρ lowers the expected discounted value of cooperation, then a higher tariff is required to hold the incentive to defect in check.

We are therefore led to consider the following calculation:

$$\frac{\partial V_1(\hat{\tau}_1^c;\rho,\lambda,\delta,F)}{\partial\rho} = \frac{\delta}{(1-(1-\rho)\delta)^2}\left[\frac{1-\delta}{1-(1-\lambda)\delta}(\omega(G,\hat{\tau}_2^c)+\frac{\lambda\delta}{1-\delta}\omega(G-F,\hat{\tau}_3^c))-\omega(G,\hat{\tau}_1^c)\right]$$

$$< \frac{\delta}{(1-(1-\rho)\delta)^2}\left[\frac{1-\delta}{1-(1-\lambda)\delta}(\omega(G,\hat{\tau}_1^c)+\frac{\lambda\delta}{1-\delta}\omega(G,\hat{\tau}_1^c))-\omega(G,\hat{\tau}_1^c)\right]$$

$$= 0,$$

where the inequality follows from Corollary 1.

We thus have:

Lemma 5: $\dfrac{\partial\hat{\tau}_1^c}{\partial\rho} > 0.$

Intuitively, as ρ rises, the transition and final stages are encountered earlier, and this diminishes the discounted expected value of cooperation in the initial phase, since the per-period equilibrium value of cooperation declines in each successive phase. A higher initial tariff is therefore required. We may conclude that a greater prospect of entering the free-trade agreement negotiation process acts to raise the initial-phase tariff.

B. Comparative Statics on λ

An increase in λ affects both $\hat{\tau}_2^c$ and $\hat{\tau}_3^c$, and a higher λ means that the free-trade negotiation and implementation process will take less time once it begins. Arguing as above, $\hat{\tau}_1^c$ and $\hat{\tau}_2^c$ increase with λ, if $V_1(\tau_1^c;\rho,\lambda,\delta,F)$ and $V_2(\tau_2^c;\lambda,\delta,F)$ decline in λ at $\tau_1^c = \hat{\tau}_1^c$ and $\tau_2^c = \hat{\tau}_2^c$, respectively.

It is direct to show that:

$$\frac{\partial V_1(\hat{\tau}_1^c;\rho,\lambda,\delta,F)}{\partial\lambda} = \frac{\rho\delta}{(1-(1-\rho)\delta)(1-(1-\lambda)\delta)^2}\left[(1-(1-\lambda)\delta)\frac{\partial\omega(G,\hat{\tau}_2^c)}{\partial\tau}\frac{\partial\hat{\tau}_2^c}{\partial\lambda} - \delta\left(\omega(G,\hat{\tau}_2^c)-\omega(G-F,\hat{\tau}_3^c)\right)\right]$$

and

$$\frac{\partial V_2(\hat{\tau}_2^c;\lambda,\delta,F)}{\partial\lambda} = \frac{-\delta}{(1-(1-\lambda)\delta)^2}[\omega(G,\hat{\tau}_2^c)-\omega(G-F,\hat{\tau}_3^c)].$$

Using Corollary 1, it follows that the latter partial derivative is negative, and thus that $\hat{\tau}_2^c$ increases with λ. Using this finding and Corollary 1 once more then gives that the first partial derivative is also negative, so that $\hat{\tau}_1^c$ increases with λ.

Summarizing, we have:

Lemma 6: $\dfrac{\partial\hat{\tau}_1^c}{\partial\lambda} > 0, \dfrac{\partial\hat{\tau}_2^c}{\partial\lambda} > 0.$

The intuition here is also quite simple. A higher value for λ expedites the transition into the final phase, where cooperation is less valuable. Hence, $\hat{\tau}_2^c$ must rise to maintain cooperation in the transition phase. Finally, from the perspective of the initial phase, a greater value for λ lowers the expected discounted value of cooperation, both because it expedites entry into the lower-stakes final phase and because it raises transition-phase tariffs along the way. We may therefore conclude that a more rapid free-trade agreement negotiation and implementation process will cause higher multilateral tariffs in the initial and transition phases.

C. Comparative Statics on F

One may think of F as reflecting the degree of trade diversion corresponding to the formation of free-trade areas. In other words, for larger F, there will be greater trade diversion following the implementation of the free-trade agreements.

As has been previously established (see (20)), $\hat{\tau}_3^c$ is independent of F. To evaluate the dependence of $\hat{\tau}_2^c$ and $\hat{\tau}_1^c$ on F, observe that:

$$\frac{\partial V_1(\hat{\tau}_1^c;\rho,\lambda,\delta,F)}{\partial F} = \frac{\rho\delta}{1-(1-\rho)\delta}\left[\frac{\dfrac{\partial\omega(G,\hat{\tau}_2^c)}{\partial\tau_2^c}\dfrac{\partial\hat{\tau}_2^c}{\partial F} - \dfrac{\lambda\delta}{1-\delta}\dfrac{\partial\omega(G-F,\hat{\tau}_3^c)}{\partial G}}{1-(1-\lambda)\delta}\right]$$

and

$$\frac{\partial V_2(\hat{\tau}_2^c;\lambda,\delta,F)}{\partial F} = \frac{-\lambda\delta}{1-(1-\lambda)\delta}\left[\frac{\dfrac{\partial\omega(G-F,\hat{\tau}_3^c)}{\partial G}}{1-\delta}\right] < 0.$$

Thus, as F grows, V_2 is diminished, and so $\hat{\tau}_2^c$ rises. This in turn implies that V_1 also falls with F, so that $\hat{\tau}_1^c$ must increase with F.

Summarizing, we have that:

Lemma 7: $\frac{\partial \hat{\tau}_1^c}{\partial F} > 0, \frac{\partial \hat{\tau}_2^c}{\partial F} > 0.$

The essential intuition is quite clear. When F is big, a free-trade agreement will cause a big loss in trade volume between the foreign and domestic countries. This means that the discounted expected value to cooperation is diminished, and so higher tariffs are required to block the incentive to cheat. In other words, free-trade blocs with a high degree of trade diversion require greater adjustment in initial- and transition-phase multilateral tariff rates.

D. Comparative Statics on δ

The patience of trading partners is captured by the parameter δ. It has been established previously (see (20)) that $\hat{\tau}_1^c$ declines with δ. To verify that $\hat{\tau}_2^c$ and $\hat{\tau}_3^c$ also decline with δ, observe that:

$$\begin{aligned}\frac{\partial V_2}{\partial \delta}(\hat{\tau}_2^c;\lambda,\delta,F) = {} & \frac{\lambda\delta/(1-\delta)}{1-(1-\lambda)\delta}\frac{\partial\omega(G-F,\hat{\tau}_3^c)}{\partial\tau}\frac{\partial\hat{\tau}_3^c}{\partial\delta} + \\ & \omega(G-F,\hat{\tau}_3^c)[\frac{\lambda\delta/(1-\delta)^2}{(1-(1-\lambda)\delta)} + \frac{\lambda/(1-\delta)}{(1-(1-\lambda)\delta)^2}] + \\ & \omega(G,\hat{\tau}_2^c)\frac{(1-\lambda)}{(1-(1-\lambda)\delta)^2} > 0\end{aligned}$$

where the inequality follows since $\hat{\tau}_3^c$ declines in δ. Thus, we have that $\hat{\tau}_2^c$ also declines in δ. Using these findings, and re-writing V_1 as

$$V_1(\tau_1^c;\rho,\lambda,\delta,F) = [\frac{(1-\rho)\delta}{(1-(1-\rho)\delta)}][\omega(G,\hat{\tau}_1^c(\delta))]$$
$$+[\frac{\rho\delta}{(1-(1-\rho)\delta)(1-(1-\lambda)\delta)}][\omega(G,\hat{\tau}_2^c(\lambda,\delta,F))]$$
$$+[\frac{\rho\delta}{(1-(1-\rho)\delta)(1-(1-\lambda)\delta)}][\frac{\lambda\delta}{1-\delta}][\omega(G-F,\hat{\tau}_3^c(\delta))],$$

it is direct to verify that each bracketed term is increasing in δ. Thus,

$$\frac{\partial V_1}{\partial\delta}(\hat{\tau}_1^c;\rho,\lambda,\delta,F) > 0$$

and so $\hat{\tau}_1^c$ also declines in δ.

Collecting these results, we have:

Lemma 8: $\dfrac{\partial\hat{\tau}_1^c}{\partial\delta} < 0, \dfrac{\partial\hat{\tau}_2^c}{\partial\delta} < 0, \textit{and} \dfrac{\partial\hat{\tau}_3^c}{\partial\delta} < 0.$

E. Summary

We may now summarize the preceding lemmas as follows:

Proposition 3: For the free-trade agreement game the most-cooperative tariffs satisfy the following relationships:

(i) $\hat{\tau}_1^c(\rho,\lambda,\delta,F)$ is decreasing in δ and increasing in ρ, λ, and F.

(ii) $\hat{\tau}_2^c(\lambda,\delta,F)$ is decreasing in δ and increasing in λ and F.

(iii) $\hat{\tau}_3^c(\delta)$ is decreasing in δ.

The general message of this proposition, then, is that parameter changes that make the eventual free-trade agreements more imminent (higher ρ,λ) or more trade-diverting (higher F) result in higher multilateral tariffs up until the point that the agreements are actually implemented.[14]

F. Article XXIV

It is interesting at this point to assess the nature of the proscriptions placed on free trade agreements by Article XXIV in light of these results. In particular, Article XXIV requires that (i) free trade agreements provide for the elimination of duties on "substantially all" trade, and that (ii) any interim agreement which serves as a stepping stone to the free trade agreement be of "reasonable" duration.

The economic rationale for condition (i) has been the subject of a long and inconclusive literature, but it can be argued (see Bhagwati, 1991) that the main intent of this condition is simply to reduce the frequency with which free trade agreements are negotiated. At the same time, condition (i) limits the ability of countries to define what trade is and is not covered in the free trade agreement, and in so doing limits the ability of countries to selectively liberalize sectors where the main impact of liberalization would be to divert trade from non-member countries. Condition (ii), on the other hand, places limits on the length of the transition to a fully implemented free trade agreement. One interpretation of Article XXIV, in light of our model, is therefore that it is an attempt to restrict the behavior of GATT member countries with regard to regional agreements in an effort to alter (a) the frequency with which such agreements occur (related to the parameter ρ), (b) the degree of trade diversion which accompanies such agreements (related to the parameter F), and (c) the length of the transition period to the fully implemented agreement (related to the parameter λ) from what these parameters would look like in an unrestricted world.

Discussions of Article XXIV in the Uruguay Round of GATT negotiations have centered on how strictly to interpret and enforce condition (i), and on how long the maximum transition period should be. The current working text for the Uruguay Round--the so-called Dunkel Text--calls for tighter interpretation of condition (i), and shorter maximum transition periods. In terms of the parameters of our free trade agreement model, this corresponds loosely to a lower ρ, a lower F, and a higher λ. While we do not here attempt a normative assessment of these changes, our comparative statics results suggest that such changes could have important affects on the dynamic path of multilateral protection.[15]

In particular, our model suggests three observations which could be relevant in the redesign of Article XXIV. First, our results provide an additional rationale for designing Article XXIV with the intent of reducing trade diversion. According to our model, the lower F is all else equal, the less will be the multilateral tensions created by the formation of free trade agreements, and the lower will be multilateral tariffs, both during the transition phase and prior to the start of the transition ($\hat{\tau}_1^c$ and $\hat{\tau}_2^c$). Second, our results suggest that efforts to raise the hurdles over which GATT-approved free trade agreements must pass, and in so doing to lower the frequency with which free trade agreements are negotiated, will help to lower multilateral tariffs in the pre-free-trade-agreement world ($\hat{\tau}_1^c$), and in this sense are good for multilateral cooperation, although such efforts by themselves would also lead to a longer period before the low post-free-trade area tariffs ($\hat{\tau}_3^c$) would be reached. Finally, our results point to a potential cost in forcing a speedier transition period, in that multilateral tariffs both prior to and during the transition period ($\hat{\tau}_1^c$ and $\hat{\tau}_2^c$) must rise to accommodate the faster transition. Again, offsetting this to some degree is the earlier arrival at the low post-free-trade area tariffs $(\hat{\tau}_3^c)$.

V. Conclusion

This paper has taken as its focus the consequences of the formation of regional trade agreements for the ability to maintain effective multilateral cooperation. We have argued that the formation of free trade areas can interfere with the ability to maintain low multilateral tariffs, both before the process of free trade area formation begins and especially once the process has begun during the transition to the fully implemented regional agreement. The predictions of our model are thus consistent with the fairly pessimistic view of regionalism as antithetical to GATT that has emerged recently with the increased interest that the United States has shown in negotiating free trade agreements. However, our model does suggest that these heightened multilateral tensions should be temporary, and that greater multilateral cooperation can reemerge once the new trading patterns are more firmly established.

We began this paper, however, focusing on the major historical episode of regional bloc formation involving the EC, the other major player in determining the course of multilateral liberalization. In that episode of regionalism, the evidence seems to paint a distinctly different picture, with the formation and later enlargement of the EC being credited for stimulating major multilateral liberalization efforts undertaken in the Kennedy and Tokyo Rounds. An intriguing puzzle is why these two episodes of regionalism are viewed so differently.

There are undeniably many dimensions over which conditions in the 1960's and 1970's were different from those in the 1990's, spanning economic, political, and military issues, and such differences might contribute to the changing implications of regionalism for multilateral cooperation. However, one way in which these two episodes differ is that the formation of the EC brought the original six countries together into a customs union with a united external tariff policy and a productive capacity second only to the United States, and in so doing introduced important changes in market power considerations that factored into the determination of multilateral cooperation, changes that are absent in the recent pursuit of free trade agreements by the United States. In a companion paper (Bagwell and Staiger, 1993), we explore the distinct market power considerations that arise with the formation of custom's unions but which are absent under free trade agreements, and find that the distinction between customs unions and free trade agreements can help provide an answer to this puzzle: if the market power effect is sufficiently important, the emergence of customs unions will be associated with a temporary easing of trade tensions between member and non-member countries, and consequently to a temporary "honeymoon" for liberal trade policies.

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Appendix

Proof of Lemma 3: $\omega(G,\hat{\tau}_2^c) > \omega(G\text{-}F,\hat{\tau}_3^c)$.

Define $D(\tau_2^c) \equiv \omega(G,\tau_2^c) - \omega(G\text{-}F,\hat{\tau}_3^c)$. Observe that $D(\hat{\tau}_3^c) > 0 > D(\hat{\tau}^N)$ and that $D(\tau_2^c)$ declines; thus, there exists a unique $\tau^* \in (\hat{\tau}_3^c,\hat{\tau}^N)$ such that $D(\tau^*) = 0$. The lemma is thus proved if $\hat{\tau}_2^c < \tau^*$.

Let $\hat{\tau}_2^c(\lambda=1)$ denote the most-cooperative phase-2 tariff when $\lambda=1$. Since $D(\tau^*) \equiv \omega(G,\tau^*) - \omega(G\text{-}F,\hat{\tau}_3^c) = 0$ and since (23b) gives that

$$\Omega(G,\hat{\tau}_2^c(\lambda=1)) = \frac{\delta}{1-\delta}\,\omega(G-F,\hat{\tau}_3^c),$$

it follows that

$$\text{(A1)} \qquad \Omega(G,\hat{\tau}_2^c(\lambda=1)) = \frac{\delta}{1-\delta}\,\omega(G,\tau^*).$$

Now, if $\hat{\tau}_2^c(\lambda=1) = \tau^*$, then the examination of Figure 1 indicates that $\tau^* = \hat{\tau}_3^c$ or $\tau^* = \hat{\tau}^N$. But this contradicts $\tau^* \in (\hat{\tau}_3^c,\hat{\tau}^N)$, and so $\hat{\tau}_2^c(\lambda=1) \neq \tau^*$. Since it is a simple matter to confirm that $\hat{\tau}_2^c(\lambda=1) \in (\hat{\tau}_3^c,\hat{\tau}^N)$ as well, we see from Figure 2 that (A1) can hold only if

$$\text{(A2)} \qquad \hat{\tau}_3^c < \hat{\tau}_2^c(\lambda=1) < \tau^* < \hat{\tau}^N$$

Thus, the desired relationship between $\hat{\tau}_2^c$ and τ^* holds when $\lambda=1$, and so (A2) implies $D(\hat{\tau}_2^c(\lambda=1)) > 0$.

Next, in the text (see the analysis preceding Lemma 6), it is shown that:

$$\text{(A3)} \qquad \begin{aligned} sign\,\frac{\partial\hat{\tau}_2^c}{\partial\lambda} &= sign\,[\omega(G,\hat{\tau}_2^c) - \omega(G-F,\hat{\tau}_3^c)] \\ &\equiv sign\,[D(\hat{\tau}_2^c)] \end{aligned}$$

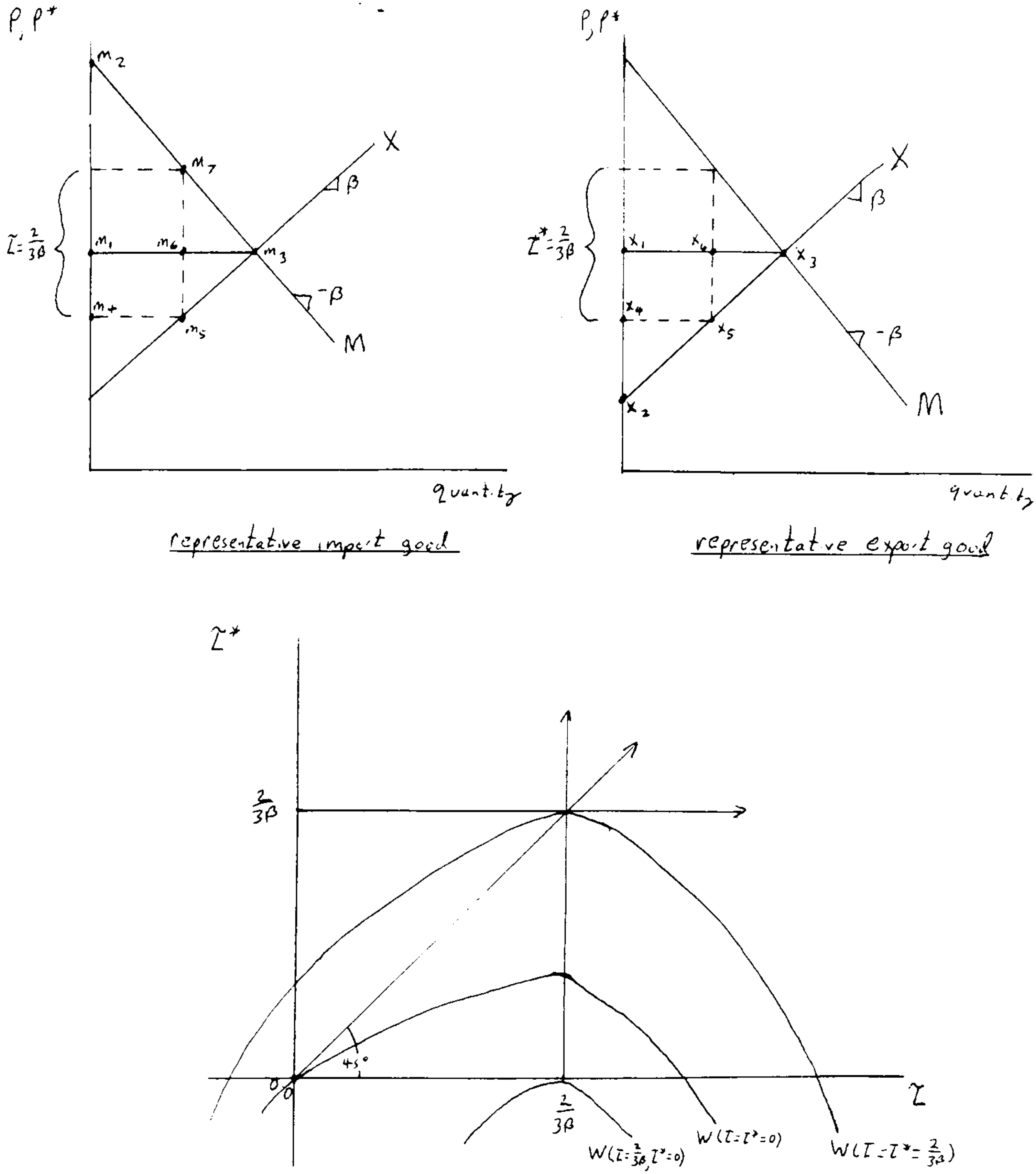
It is also direct to verify from (23b) that $\hat{\tau}_2^c(\lambda=0) = \hat{\tau}_3^c < \tau^*$. Thus, $D(\hat{\tau}_2^c(\lambda=0)) > 0$

is also true.

Now, suppose that $\lambda^{+} \epsilon (0,1)$ exists for which $D(\hat{\tau}_2^c(\lambda^{+})) = 0$. From (A3), it follows that $\hat{\tau}_2^c(\lambda) = \tau^*$ for all $\lambda \geq \lambda^{+}$. But this contradicts $\hat{\tau}_2^c(\lambda = 1) < \tau^*$, as given in (A2).

Thus, it must be that $D(\hat{\tau}_2^c(\lambda)) > 0$ for all $\lambda \epsilon [0,1]$, and the lemma is proved.

Figure 1



p, p*
m2
m7
X
β
τ = 2/3β
m1
m6
m3
m4
-β
m5
M
quantity
representative import good
p, p*
X
β
τ* = 2/3β
x1
x6
x3
x4
x5
-β
x2
M
quantity
representative export good
τ*
2/3β
45°
0
τ
2/3β
W(τ = 2/3β, τ* = 0)
W(τ = τ* = 0)
W(τ = τ* = 2/3β)

Figure 2

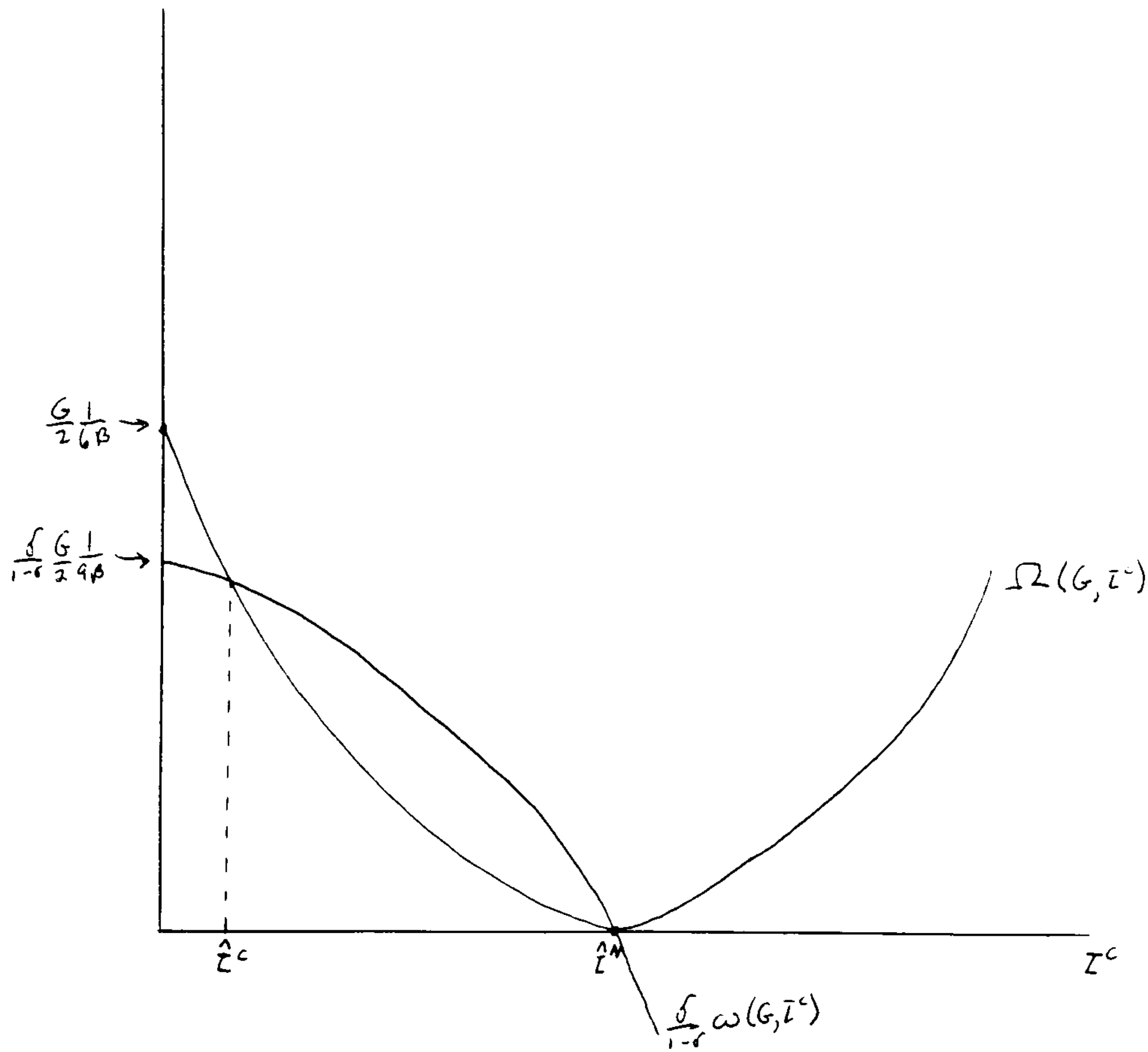
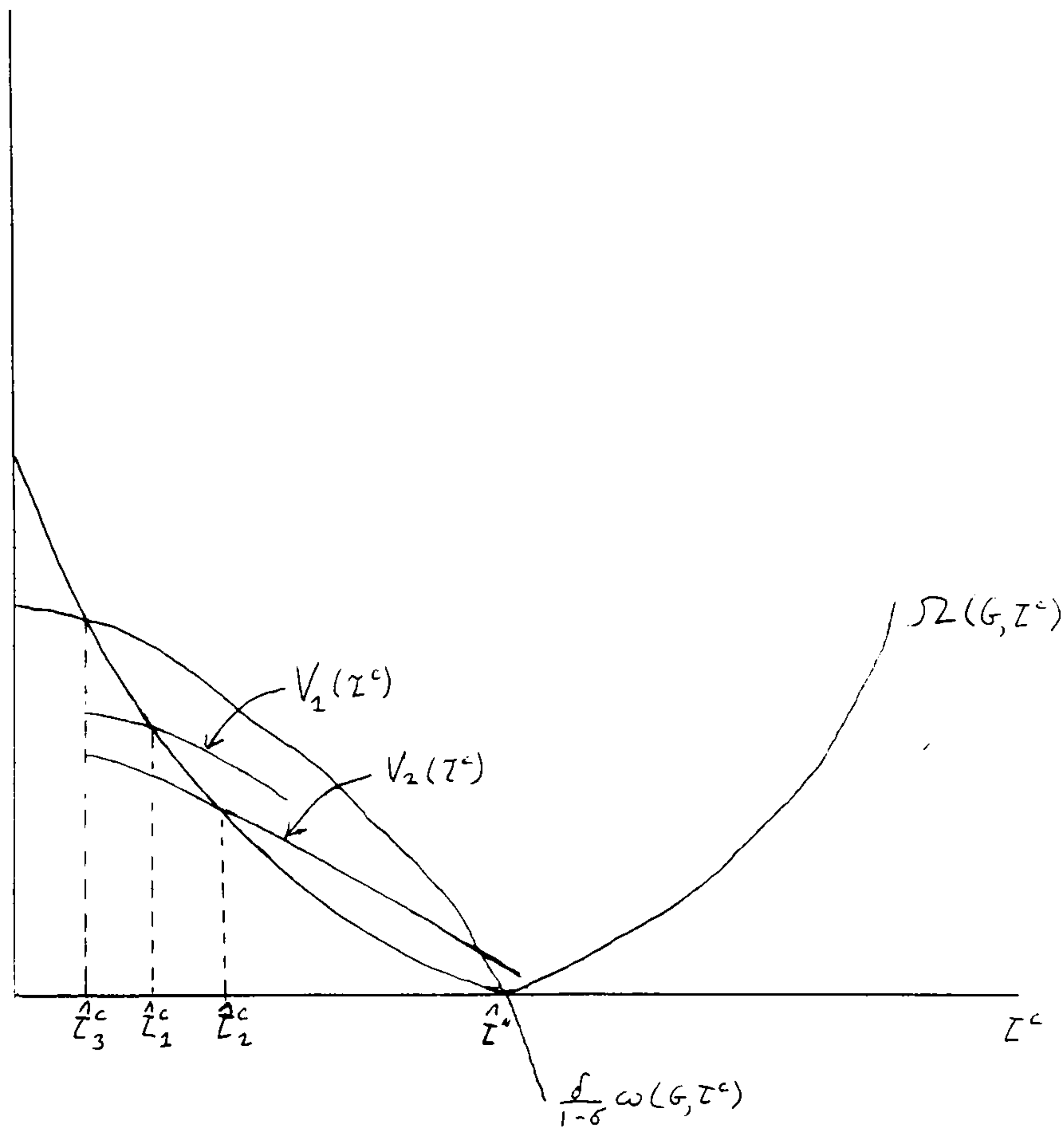
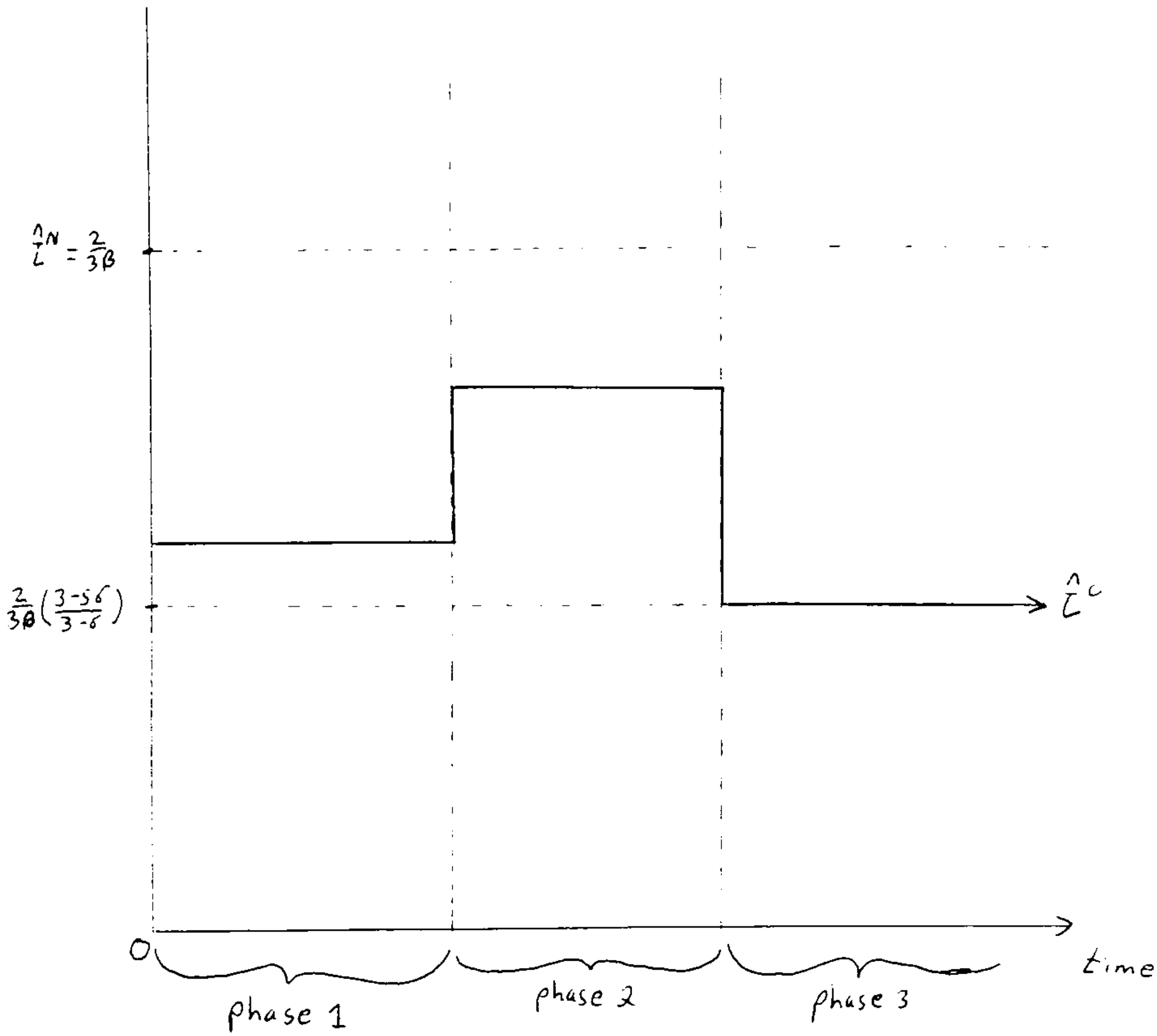

$\frac{G}{2}\frac{1}{6\beta}$
$\frac{\delta}{1-\delta}\frac{G}{2}\frac{1}{9\beta}$
$\Omega(G,\bar{\tau}^c)$
$\hat{\tau}^c$
$\hat{\tau}^M$
τ^c
$\frac{\delta}{1-\delta}\omega(G,\bar{\tau}^c)$

Figure 3



$\Omega(G, \tau^c)$
$V_1(\tau^c)$
$V_2(\tau^c)$
$\hat{\tau}^c_3$
$\hat{\tau}^c_1$
$\hat{\tau}^c_2$
$\hat{\tau}^*$
τ^c
$\frac{\delta}{1-\delta}\omega(G, \tau^c)$

Figure 4



$\hat{L}^N = \frac{2}{3\beta}$
$\frac{2}{3\beta}\left(\frac{3-5\delta}{3-\delta}\right)$
$\hat{L}^c$
0
time
phase 1
phase 2
phase 3

Endnotes

1. Bond and Syropoulos (1992) have challenged the generality of this latter assertion, and show that it can in fact be overturned with appropriately chosen patterns of comparative advantage and trade.

2. Other recent work on regional trade agreements carried out in a non-cooperative framework include Riezman (1985) and Kennan and Riezman (1990).

3. In this regard, drawing up "retaliation lists" of imported products against which retaliatory tariffs are to be imposed is not a trivial task, as there are often strong export interests that are opposed to retaliation on a significant scale, fearing the loss of export markets under counter-retaliation.

4. Dam (1970, p 282-83) provides further evidence that transitional periods in practice are often quite long, despite the fact that GATT's Article XXIV seeks to place limits on them. For example, GATT officials viewed a 22 year transitional period for the inclusion of Greece into the EC as being "reasonable."

5. In principle, increasing income associated with regional integration could so stimulate trade that inter-region trade could actually grow relative to what it would have been absent regional integration. In practice, though, a substantial drop in inter-bloc trade can be expected with regional integration. Krause (1968) estimated, for example, that U.S. exports of manufactures to the EC market would eventually drop by 15% as a result of the formation of the EC.

6. We could consider other forms of punishment, some of which would allow for greater levels of cooperation than the infinite Nash reversion considered here. However, the qualitative nature of our dynamic results concerning the behavior of cooperative tariffs is unlikely to be affected (see also note 13). Moreover, infinite reversion is not an entirely implausible representation of actual tariff wars: the high U.S. tariffs on imports of light-duty trucks imposed as a result of the "chicken war" with the EC in 1963, for example, are still in place 30 years later.

7. Several other features also warrant some discussion. In particular, we are maintaining the assumptions that there is only one episode of free trade area formation, that it is irreversible, that it is enforceable, and that its timing is exogenous. Allowing any finite number of episodes of free trade area formation to occur would not alter our results in any fundamental way. Nor would the possibility of reversal: if free trade agreements were allowed to exogenously collapse and reverse themselves, there would be added non-stationarities to consider but the effects of free trade area formation on the cooperative multilateral tariff in the various stages of the formation process would remain qualitatively unaffected. Our assumption that free-trade partners can enforce free trade while free trade cannot be supported multilaterally reflects the view that there are underlying differences in

bilateral relationships. For example, greater cooperation could be enforced in bilateral trade relationships that were more stable (had a greater exogenous probability of continuing into the future) since this would translate into a higher discount factor relevant for the enforcement of bilateral agreements. Finally, taking the timing of free trade area formation as exogenous reflects our focus on exploring the implications of the formation of free trade areas for multilateral cooperation and the view that many of the important determinants of this timing are outside the scope of our analysis. An interesting element of endogeneity could be explored, however, if one allowed the changes in the effectiveness of multilateral cooperation brought about by the formation of initial free trade agreements to feed back into the incentives for the emergence of further free trade agreements. This, however, is beyond the scope of the present paper.

8. In addition, as Dam (1970, ch. 16) argues, the actual enforcement of Article XXIV by GATT has been lax, resulting in the approval of regional economic agreements for which restrictions on inter-member trade remained for a significant subset of the goods traded.

9. More generally, the presence of non-neutralities with regard to stationary trade volume could in principle impart either an upward or a downward bias in the direction of cooperative multilateral tariff movements over the three phases of our model. While small non-neutralities with regard to stationary trade volume would not alter the nature of our results, non-neutralities of sufficient magnitude could: the accompanying biases would have to be weighed against the movements in tariffs across phases that come directly from the process of free trade agreement formation and the non-stationarity that it entails. However, since there is no presumption as to the sign of such biases, we choose to carry out our analysis in a model that exhibits "neutrality" in this regard, allowing us to highlight the implications for multilateral tariff cooperation of the non-stationarity associated with the process of free trade agreement formation.

10. $\sum_{q=1}^{0} \delta^{q-1}\omega(G,\tau_2^c) \equiv 0$ is understood here.

11. Our model is thus related to the analysis of collusion developed by Rotemberg and Saloner (1986), who also argue that equilibrium behavior must be adjusted to maintain cooperation when "shocks" occur. Rotemberg and Saloner, however, focus on shocks that affect the current incentive to cheat and leave unaltered the discounted value of future cooperation. In our model, the transition to a free trade agreement represents a shock of exactly the opposite nature: the current incentive to defect is unaltered, but the discounted value of future cooperation is reduced.

12. Figure 3 is drawn under the assumption that $V_1(\hat{\tau}_2^c) < (\delta/1-\delta)\omega(G,\hat{\tau}_2^c)$ and $V_1(\hat{\tau}_3^c) > V_2(\hat{\tau}_3^c)$. Neither inequality is needed for our conclusions, though the former is in fact true and the latter is true if $\rho \leq \lambda$. It is also true that $V_1(\hat{\tau}^N) > 0$ and that $V_1(\tau)$ and $V_2(\tau)$ are concave. In general, $V_1(\tau)$ and $V_2(\tau)$ may sometimes intersect at $\tau \notin [\hat{\tau}_1^c, \hat{\tau}_2^c]$. If, however, $\rho = \lambda$, then $V_1(\tau)$ and $V_2(\tau)$ are parallel, with $V_1(\tau)$ always exceeding $V_2(\tau)$ for $\tau \in [0, \hat{\tau}^N]$.

13. Having now described how our results reflect fundamentally the declining value of cooperation through time, it is apparent that our basic findings would be preserved under a variety of alternative punishments, the key point being that our assumed reduction in the volume of trade through time leads naturally to a declining value of cooperation.

14. We have not reported here comparative statics results on the extent of change in tariffs across phases. In particular, when λ and/or F increase, one wonders if $\hat{\tau}_1^c$ or $\hat{\tau}_2^c$ increases more. Clean results for these questions have proved elusive, but we can show that

$$\frac{\partial \hat{\tau}_2^c}{\partial F} > \frac{\partial \hat{\tau}_1^c}{\partial F} \text{ and } \frac{\partial \hat{\tau}_2^c}{\partial \lambda} > \frac{\partial \hat{\tau}_1^c}{\partial \lambda}$$

if ρ or $|\rho - \lambda|$ are sufficiently small.

15. An important omission from this discussion is the enforcement of Article 24 itself. While we treat the proposed changes to Article 24 as enforceable, whether or not they are in fact self-enforcing would depend on what the private gains would be to negotiating a free trade agreement which violated Article 24, as compared to the future multilateral punishment suffered as a result. We abstract from such considerations here, and simply assume that the relevant incentive constraints associated with changes in Article 24 are met.