Accession Rules and Trade Agreements:

The Case of the WTO

by Eric W. Bond*, Stephen Ching**, and Edwin Lai**

This version: August 1, 2000

We thank Phil Levy, Costas Syropoulos, Stephen Chiu, Tadashi Inoue, participants in a seminar in Hong Kong Monetary Authority and "International Conference on Global Economic Transformation after the Asian Economic Crisis" in Hong Kong, for comments on an earlier draft.

* Department of Economics, Penn State, University Park, PA 16802, ewb1@psu.edu

**Department of Economics and Finance, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon, Hong Kong, steve.ching@cityu.edu.hk (Stephen Ching), efedwin@cityu.edu.hk (Edwin Lai)

I. Introduction

The multilateral trading system has experienced a dramatic increase in the participation in its trade negotiations. When the General Agreement on Tariffs and Trade was initially signed in 1947 there were 23 contracting parties. By the end of 1998, the membership in the World Trade Organization had grown to 134 parties, with another 30 countries having applied for admission. While this increase in membership has included a number of relatively small countries, the increase in size of the GATT is still significant if one uses a measure of the economic size of the participants. Figure 1 illustrates the growth in GATT membership over the period 1949 - 1999 as measured by the 1985 GDP of GATT members in the respective time periods divided by world GDP in 1985.[1] The original membership of the GATT represented 42% of world income. The current membership comprises 77.4% of world income, and if the countries that have applied for membership are all admitted the share will rise to 98% of world income. While the recent negotiations concerning China's accession to the WTO have attracted considerable attention, there have been a number of other cases where the GATT has added countries that had the potential to have significant impact on existing members.[2]

The addition of member countries to a trade organization can create conflicts both within the organization and between the members and the acceding country, particularly when the acceding countries involved are large. Countries applying for membership complain that members attempt to extract unusually severe tariff concessions for membership, including concessions that are greater than those made by

[1]A common base year for measuring country size is used in Figure 1 so that the change in income share reflects addition of new countries, and not differences in the growth rate between member countries and non-member countries. The year 1985 was chosen because it is the year for which the most comprehensive data was available from the Penn Mark 5.6 World Tables.

[2]Measuring the significance of an accession by the income of the acceding country relative to that of the existing members, the most significant accessions have been those of Japan (1955, 7.6% share of member income), West Germany (1951, 4.1%), Italy (1950, 3.3%), Mexico (1986, 2.2%), Spain (1963, 1.5%), Indonesia (1.4%) and Korea (1967, 1.1%). The addition of China (7%) and the former Soviet Republics (10%) would represent some of the most significant accessions to date.

countries that are already members of the organization. On the other hand, member countries are concerned that entrants are free riding on the results of previous rounds of tariff negotiations. In particular, members may find that the entry of a new member will significantly affect the cost of tariff concessions that have been made in previous negotiating rounds. For example, organized labor in the U.S. is concerned that China's entry into the WTO will result in a flood of labor intensive imports into the U.S. market.

The purpose of this paper is to present a model of the WTO accession process, and to examine how previous rounds of trade liberalization affect the distribution of gains from accession between the members and the acceding countries. We consider a three country model in which two countries have previously negotiated a trade agreement, with the third country being initially left out of the agreement for exogenous (e.g. political) reasons. We then examine the negotiation between the acceding country and the member countries over the tariff concessions to be made by the acceding country as a condition of entry, using a model of the negotiation process suggested by the WTO accession process. Our modeling approach is intended to capture several key features of the WTO tariff negotiation process. First, we assume that negotiations are governed by the MFN principle, so that non-member countries make tariff concessions in return for MFN treatment by the member countries. Second, we assume that the initial tariffs of the member countries are the result of negotiations between the member countries, so they reflect the politically weighted preferences of the trade negotiators for the member countries. Finally, we assume that the member countries do not coordinate in their setting of tariffs against the non-member.[3]

We identify two effects of the existing trade liberalization on accession negotiations. The first is due to the fact that an existing trade liberalization agreement between member countries raises the gains from trade between the member countries. This benefits the member countries in accession negotiations

[3]These assumptions distinguish the problem of WTO accession from that which arises with membership in a customs union or a free trade area (FTA). The endogeneity of the degree of liberalization among members contrasts with an FTA or customs union, where free trade prevails among all member countries. The lack of coordination on external tariffs is similar to an FTA, but contrasts with a customs union.

because it makes the threat point (i.e. a continuation of the existing agreement without the non-member) relatively more attractive for the member countries. We term this the *member trade liberalization effect*.

The second effect, which we term the *external tariff spillover effect*, results from changes in tariffs on trade between members and non-members that are induced by changes in member country tariffs. One form of induced tariff change occurs when tariff reductions on goods from member countries result in reductions in tariffs on similar goods imported from the non-member countries. This creates a favorable spillover to the non-member countries, who are able to free ride on tariff reductions of the member countries. We illustrate this effect by considering a *competing supplier model* in which each member country imports the same good from both the member and non-member country. Whether the accession negotiations favor the member or non-member countries in the competing supplier model depends on whether the member trade liberalization effect dominates the external tariff spillover. We show that a sufficient condition for the members to benefit is that a commodity arbitrage condition, which constrains the level of discrimination by members against non-members, is not binding

The second type of external tariff spillover arises from changes in the tariff of non-member countries as a result of trade liberalization by the member countries. In this case the external tariff spillover from member liberalization is favorable to members, because it induces non-member countries to liberalize their markets for member country goods. We illustrate this effect using a *principal supplier* model, in which each country is the only exporter of a good to all other countries. Member countries will have an unambiguous advantage over non-member countries in accession in the principal supplier model, because both the member liberalization effect and the external tariff spillover effect work to the benefit of member countries.

Our research is related to several strands of the international trade literature. Caplin and Krishna (1987) were the first to analyze the strategic aspects of the MFN principle in trade negotiations. They provided examples of how the MFN principle could affect trade negotiations in a simultaneous bilateral

bargaining game, and also provide an example of how it can affect payoffs when countries are engaged in a sequential alternating offers bargaining game. Bagwell and Staiger (1999b) argue that in the absence of an MFN principle, countries may be unwilling to make concessions in bilateral negotiations because of a fear that the partner will make tariff concessions with other countries that will erode the benefits received. They suggest that the presence of the MFN and reciprocity rules in the GATT is required in order to eliminate this bilateral opportunism problem and allow for successful tariff reductions among members. Our analysis differs in that we are not focusing on the efficiency of the rules of GATT in facilitating trade negotiations, but rather on how the rules of GATT affect the distribution of the gains from the expansion of membership between the member countries and the acceding countries. In particular, we emphasize the role played by the pattern of trade in such negotiations.

Section II of the paper presents a review of the WTO accession process. The purpose of this review is to argue that the WTO accession process can be modeled as a Nash bargaining game between the acceding country and the members, with the threat points in the bargaining game being determined by the previous round of negotiations. Section III derives the results for the accession process in the competing supplier model, and Section IV analyzes the principal supplier model. Section V discusses the role of asymmetries in country size, and Section VI offers some concluding remarks.

II. The WTO Accession Process

The basis of the GATT negotiation process is the MFN principle, which requires that a tariff reduction that is negotiated between two member countries be extended to all other members. Thus, one of the benefits to a country from becoming a WTO member is that it receives access to member country markets at MFN rates negotiated in previous negotiating rounds. In addition, the country can have trade disputes with other countries adjudicated under the WTO dispute settlement process and can participate in

future rounds of tariff negotiations. Member countries expect that a new entrant will pay for these benefits upon entry by making concessions on its tariffs to member countries. In particular, the extension of concessions to a new entrant may substantially alter the costs of previous concessions, since entry of imports from a new member may reduce profits in politically powerful import-competing producers in member countries. Thus, one goal of the accession process is to ensure that existing members will not be made worse off as a result of the entry of a new member. The purpose of this section is to illustrate how the accession process that has evolved since 1947 deals with these issues, and to use these rules to suggest a simple bargaining model for analyzing the accession process.

Under Article XXXIII of the GATT Agreement, a party can accede to the agreement on "terms to be agreed between such government and the contracting parties," with decisions of the members being taken by a two thirds majority.[4] The 1947 agreement did not spell out the details of the accession process, so the current accession process used by the WTO is one that has evolved over time in response to applications of member countries.[5] The accession process begins with a formal notification by the applicant country that it would like to apply for membership in the WTO. Upon the receipt of this notification, the WTO creates a working party consisting of all interested member countries to consider the application. Recent working parties have averaged 40 members, with a range from 23 (Syechelles) to 68 (China). The applicant then submits a Memorandum on its Foreign Trade Regime that summarizes the level of tariffs and the extent to which its domestic economic policies are in conflict with WTO

[4]The details in this section are drawn from WTO (1995a), which summarizes the formal procedures of the WTO accession process and WTO (1999), which summarizes the outcome of recent WTO accessions and the status of current applications.

[5]A second route to membership is contained in Article XXVI:5(c), which provides that a territory of a contracting party that attains autonomy can be sponsored for membership by the contracting party. This has been the primary route of entry for newly independent countries. Of the 128 countries that were GATT members in 1995, 64 had succeeded to membership under Article XXVI:5(c) and 45 had acceded under Article XXXIII. However, the countries that have acceded under Article XXVI 5(c) have tended to be small countries, accounting for only 2.4 % of world GDP in 1985 GDP. Therefore, we will focus exclusively on Article XXXIII accessions.

requirements on foreign trade regimes. The fact-finding process is followed by market access negotiations between the applicant and the members of the working party. The negotiation process typically begins with the applicant offering a Schedule of Concessions and Commitments. This schedule serves as a basis for further negotiations, which proceed on a bilateral or plurilateral basis. The accession negotiations are primarily focused on the trade policy of the acceding country: the tariff rates to be applied by the member countries on trade with each other are fixed at the MFN levels that were negotiated in the most recent round of multilateral negotiations.

At the conclusion of these negotiations, the working party provides a draft Decision and Protocol of Accession that lists all of the commitments that have been agreed to by the applicant and the members of the working party. If the Protocol of Accession is approved by a two-thirds majority of WTO members, it then goes into effect 30 days after it is accepted by the applicant. Although the process only requires a two-thirds approval of member countries, Article XXXV of the GATT gives member countries the right to notify the WTO that it will not apply MFN rates to the acceding country. This effectively requires unanimity on the part of major trading countries with respect to accession, because benefits to an acceding country would be substantially reduced if it did not obtain tariff concessions from a major country. The evolution of Articles XXXIII and XXXV provide some insights about the concerns of the contracting parties regarding accession. The original drafts of the General Agreement called for unanimity on the part of the contracting parties with regard to accession.[6] This was viewed as being too strong because it would give a country a veto over membership, particularly since objections to membership might be on political rather than economic grounds. Therefore, Article XXXIII was amended to require only a two thirds majority. However, it was also felt that a country should not be forced to enter into a trade agreement against its will, so Article XXXV was added giving countries the right to

[6] The first application of this Article was between initial contracting parties to the GATT, because India wanted to impose an economic boycott of South Africa and did not want to enter into trade negotiations with that country.

withhold MFN status. The right to withhold MFN status must be taken at the time of accession, however, and cannot be utilized once the two countries have engaged in trade negotiations.[7]

In the subsequent sections, we will present a 3 country model of the WTO accession process. We assume that countries 1 and 2 have an existing trade agreement in place, and focus on how the tariffs under the existing trade agreement between countries 1 and 2 affect the negotiations during the accession process for country 3. The negotiations over tariffs to be imposed on trade between the member and non-member countries in the accession stage will be modeled using the Nash bargaining solution, assuming that lump sum transfers between countries are possible. These transfers can be thought of as concessions made on non-trade issues that may take place as part of the negotiation process. We will also impose two restrictions on the tariffs that can be negotiated between the countries that are suggested by the rules of the WTO. The first is the MFN requirement. Let t_{jk}^{i} denote the tariffs imposed by country i on imports of good j from country k. If countries i,k, and l are members, MFN requires that $t_{jk}^{i} = t_{jl}^{i}$ for all goods j under any trade agreement. Second, we will assume that the initial trade agreement between countries 1 and 2 did not involve negotiation over the tariff to impose on the non-member countries. This reflects the fact that WTO members do not coordinate in the tariffs that they impose on non-member countries, as might occur in a customs union.

Several points should be made regarding our assumptions concerning the bargaining process. First, the Nash bargaining game with transfers will result in an agreement in which the parties split the surplus from the agreement equally, with the surplus from the trade agreement being the difference between the aggregate payoff under the agreement and the aggregate payoff when the trade agreement

[7] The only one case in which Article XXXV has been invoked by a significant number of countries against a new member occurred in the accession of Japan in 1955. Although Japan received the required unanimous agreement on entry, 14 countries (accounting for 40% of Japan's export sales) invoked Article XXXV against Japan. One of the major issues was the concern that Japan's low wage textile industries might wipe out existing textile producers in many higher wage member countries. By the mid 1960s, most of the major countries had extended MFN status to Japan. This followed bilateral negotiations between the countries and also the formation of a GATT agreement on trade in cotton textiles.

continues without country 3 as a member. One justification for taking this approach is that it approximates the solution obtained in a n-player bargaining game when players can make alternating offers and unanimity is required for an agreement.[8] We view this approach as being consistent with the WTO accession process discussed above, which requires that interested parties be satisfied with the terms being offered by the acceding country before they are proposed for entry to the agreement.[9]

Second, our purpose is not to explain why the process of expansion of the WTO was gradual. We believe that politics (e.g. the fact that certain countries were centrally planned economies) and the level of development of the countries played a significant role in the timing of their entry. It is for this reason that we treat the initial makeup of the agreement as exogenously given.[10] For example, the breakup of the Soviet Union had a significant impact on trade patterns and the desirability of GATT membership for Eastern European countries and the former Soviet Republics, so the decision of these countries to apply for membership in the 1990s rather than the 1950s can hardly be thought to result from a strategic decision about the timing of entry.

Finally, our model will also give predictions about how the initial tariff choices of the member

---

[8] Osborne and Rubinstein (1990) show that if attention is limited to stationary strategies, the unique subgame perfect equilibrium in this bargaining game is for players to receive shares of the surplus given by ($>$, $>\delta$, $>\delta^2$... $>\delta^{n-1}$), where $\delta < 1$ is the discount parameter and $>$ is chosen such that the shares sum to 1. The size of shares is determined by the order of moves in the bargaining game.

[9] The difficulties associated with Japan's entry (noted in footnote 7) could be interpreted as reflecting the difficulties associated with finding such compensation when explicit cash transfers are not being used. Patterson (1966, p. 280) describes the reasons for opposition to Japan's entry as being based on the fact that since previous tariff reductions were negotiated when it had not been anticipated that Japan would enter, it was not clear whether equivalent concessions could be found for some of the member countries that would allow the member countries to sustain previous tariff reductions. In fact, the U.S. (a major supporter of Japan's entry) offered concessions to third countries to encourage them to support Japan's accession.

[10] In contrast, Seidman and Winter (1999) analyze a coalition formation game in which countries make offers that specify the membership and payoffs to members of the coalition. This sequential game allows for interim coalitions, so that whether coalitions form gradually or immediately is endogenously determined. Our formulation differs in that we take the initial coalition as exogenously given, and we assume that the initial tariff bindings are not renegotiated and hence affect the payoff under the final agreement.

countries affect the negotiations with the non-member countries. This suggests that strategic considerations may arise in the setting of initial tariffs among the member countries if members anticipate that the concessions will have to be extended to non-member countries in the future. In light of our motivation for the model, it is not clear that it is appropriate to assume that negotiators in the first stage tariff negotiations take into account the potential entry of the outside country in the second stage. Thus most of our attention will be devoted into the second stage of the game in which the initial trade agreement has already been determined.

III. The Competing Supplier Model

In this section we examine a simple three country model in which each country imports one good from each of the two other countries. This model is useful for analyzing the role played by the MFN principle in the accession process, since countries can impose different tariffs on non-member countries than on member countries. We begin by presenting the basic trade model and deriving the preferences of trade negotiators over tariff rates given an objective of maximizing weighted national welfare. We then use this model to analyze how the payoffs to accession negotiation process are affected by initial trade liberalization between the member countries. We conclude with a brief discussion of strategic incentives for the member countries in the choice of their initial level of trade liberalization.

We assume that each country has an identical utility function $U = \sum_{i=1}^{3} \left(AD_i - .5D_i^2\right) + D_0$, where D_i denotes consumption of good i and good 0 is the numeraire good. This utility function yields a demand function for the non-numeraire good *j* in country *i* of $D_j^i = A - P_j^i$, where P_j^i is the domestic price of good *j* in country *i*. Country *i* is assumed to have a fixed endowment x_0 of good 0, *y* of good *i* and an endowment *x* (where $x > y$) of non-numeraire good *j ... i*. There is assumed to be a unit transport cost of *c* between each country for each good. Under these assumptions, the non-numeraire goods would each sell for a price of $A - (2(x-c) + y)/3$ in a free trade equilibrium, with country i importing good $(x - y - c)/3$ units of good *i* from each of the other countries. The numeraire good will not be traded under free

trade, but is introduced to serve as a means of making transfers between the countries.

We assume that country i's only trade instrument is an import tariff. Since country i is the only importer of good i and only imposes tariffs on good i, we can drop the country superscript and let t_{ij} be the specific tariff imposed on imports of good i from country j. If $|t_{ij} - t_{ik}| \le c$ for $j,k \ne i$, then both j and k will prefer to export to country i and $P_i^j = P_i^i - t_{ij} - c$. This condition can then be substituted into the market clearing conditions to solve for P_i^i and imports by country i from country j, M_{ij},

$$P_i^i = A - \left(\frac{2x+y-\sum_{k \ne i} t_{ik} - 2c}{3} \right); \quad M_{ij} = \frac{x-y-2t_{ij}+t_{ik}-c}{3} \qquad |t_{ij} - t_{ik}| \le c \text{ for all } k \ne j,i \quad (1)$$

When transport costs are significant enough to allow price discrimination, an increase in t_{ij} will improve the terms of trade of countries i and k, but will worsen the terms of trade of country j.

If country i chooses $t_{ik} > t_{ij} + c$, the prices determined by (1) yield $P_i^j - P_i^k > c$. If country j does not impose a tariff on imports of good i from k, then exporters in k could earn more by selling in j than by selling in i. Commodity arbitrage would then yield $P_i^j = P_i^i - t_{ij} - c$ and $P_i^k = P_i^j - c$. Note in particular that with the assumption made here on endowments, such trade would not violate any rules of origin imposed by country i, because the market in *i* can be satisfied by exports from *j*.[11] We show in the Appendix that in the event of such arbitrage, it would not be in the interest of country j to impose a tariff

[11] At these prices, $M_{ij} = (2(x-y) - 2t_{ij} - 3c))/3 < x$. Therefore, the entire demand in country i can be supplied by country j. This arbitrage is similar to that in a free trade area when there are rules of origin (e.g. Richardson (1992)). Arbitrage constraints can be a significant issue in the application of discriminatory trade policies against non-member countries. For example, the study of the economic impact of China's accession on the U.S. by the International Trade Commission (USITC (1999)) noted that transshipments of Chinese products through third countries represented a significant problem in the enforcement of discriminatory quotas on Chinese textile and apparel products. The U.S. has imposed sanctions on China for violations, but government officials believe they have caught only a small fraction of the illegal shipments. When enforcement is costly, commodity arbitrage may continue to impose a constraint on policy makers even when endowments are such that rules of origin are binding.

on imports of good *i*. Furthermore, it will not be in the interest of *i* to choose a tariff that creates such arbitrage. Therefore, the no arbitrage condition will serve as a constraint on the tariff choice of the countries. To simplify the presentation, we will assume that if $t_{ik} = t_{ij} + c$, country *k* exporters will sell in country *i* (which minimizes world transaction costs).

It will be assumed that the trade negotiators choose tariffs to maximize a weighted social welfare function. Tariff revenue, consumer welfare, and producer welfare in the export sectors all receive equal weight (normalized to 1), while producers in the import-competing sector receive a weight of " $ 1. Under this assumption, the national welfare function can be expressed as

$$W^i(t_{12},t_{13},t_{21},t_{23},t_{31},t_{32}) = \sum_{j=1}^{3} \frac{1}{2}(A-P_j^i)^2 + \sum_{j \neq i} P_j^i x + \alpha P_i^i y + \sum_{j \neq i} t_{ij} M_{ij} + x_0 \qquad (2)$$

This weighted social welfare function is intended to capture the idea that organized sector specific interests are able to exert influence on politicians and thus obtain policies that are favorable to their interest at the expense of consumer groups that are not organized. For example, the Grossman and Helpman (1994) model would generate such an objective function. The following lemma summarizes the impact of tariffs on national welfare:

Lemma 1: *The welfare functions W^i have the properties:*

(a) W^i is strictly concave in t_{ij}, and is increasing in t_{ij} at $t_{ij} = t_{ik} = 0$

(b) W^i is decreasing in t_{ji} for $j \neq i$ and is increasing in t_{jk} for $j,k \neq i$ and $j \neq k$.

Part (a) shows that each country will have a positive optimal tariff against the other countries. Part (b) implies that country *i* is harmed by being discriminated against in country j's market but benefits from being favorably treated in country j's market.

In the absence of a trade agreement, the optimal tariff policy for country i is obtained by choosing t_{ij} to maximize (2). It is straightforward to show that due to the symmetry between the countries, the

optimal tariff policy will have equal tariffs on imports from all partners at a value given by

$$t^N = \frac{x + (3\alpha - 4)y - c}{4} \qquad for\ \alpha < \frac{x - c}{y} \tag{3}$$

The restriction on the weight on import-competing producers, which will be maintained throughout the analysis, ensures that the optimal equilibrium tariff is not prohibitive. Due to the separability of markets and the endowment pattern, the optimal trade policy of country i is independent of tariffs set by other countries and (3) will be the tariffs in the non-cooperative Nash equilibrium.

The welfare functions W^i reflect the standard prisoner's dilemma problem of trade policy, since all countries would gain by multilateral tariff reductions in the neighborhood of the Nash equilibrium tariff. If countries can commit to tariff rates in negotiations, then the multilateral tariff negotiations involving all three countries can be modeled as a Nash bargaining problem in which the threat point of each country is its Nash equilibrium payoff. The solution to this problem is the tariff vector that maximizes world welfare, $\sum_{i=1}^{3} W^i$, which yields the solution

$$t_{ij} = t^C = (\alpha - 1)y \tag{4}$$

This will yield a free trade outcome in the case where import-competing producers receive equal weight with other interest groups in the national objective function. However, when $\alpha > 1$ the efficient tariffs in multilateral negotiations will be positive because of the desire of policymakers to protect domestic producers.

A. The Accession Game

We analyze the accession process by assuming that countries 1 and 2 have an existing trade agreement that specifies the tariffs that they impose on trade with each other. Due to the symmetry of the member countries, we assume that they choose a common tariff $\bar{t}_{12} = \bar{t}_{21} = t^M$ on trade with each other. We model the accession process as a bargaining game in which the non-member country makes

tariff concessions on the tariff it imposes on imports from member countries, $t^a = t_{31} = t_{32}$, in return for receiving MFN treatment by the member countries, $t_{13} = t_{23} = t^m$. We allow for the possibility of transfers between the countries in terms of the numeraire good as part of the bargaining process, with Z denoting the transfer made by the acceding country to each of the member countries as part of the agreement. With these restrictions on the accession negotiation, the payoff to a representative member country under an agreement will be $W^m(t^m,t^a) + Z$, where $W^m(t^m,t^a) = W^1(t^m,t^m,t^m,t^a,t^a)$. The payoff to the acceding country will be $W^a(t^m,t^a) - 2Z$, where $W^a(t^m,t^a) = W^3(t^m,t^m,t^m,t^a,t^a)$.

If an agreement is not reached between the countries, then we assume that the member countries impose t^m on each other and the optimal discriminatory tariff on imports from the non-member country. Note that since the national welfare functions defined in (2) are separable in tariffs on different goods, the optimal tariff imposed by 1 on 3 is a function of t_{12} only. Using symmetry, we can express the optimal tariff of the member on non-members as $t_{i3} = \tilde{t}(t^m)$ for $i = 1,2$. Similarly, this separability implies that the optimal tariff of the non-member on members will be its Nash equilibrium tariff, t^N, from (3). The payoff to a member (acceding) country in the absence of an agreement can thus be represented by $W_D^m(t^m) = W^1(t^m,\tilde{t}(t^m),t^m,\tilde{t}(t^m),t^N,t^N)$; $W_D^a(t^m) = W^3(t^m,\tilde{t}(t^m),t^m,\tilde{t}(t^m),t^N,t^N)$. Given these agreement and threat point payoff functions, the Nash bargaining solution to the accession game will be the values of t^a and Z that solve the following optimization problem:

$$\max_{Z,t^a} \quad \left(W^a(t^m,t^a) - W_D^a(t^m) - 2Z\right)\left(W^m(t^m,t^a) - W_D^m(t^m) + Z\right)^2 \qquad \textbf{(5)}$$

It is straightforward to show that the solution to this problem will involve the choice of t^a to maximize the total payoff to the parties, $W^W(t^m,t^a) \equiv W^a(t^a,t^m) + 2W^m(t^a,t^m)$, which results in $t^a = t^C$ from (4). The transfer level equates the surplus to the member and non-members and will be $Z = (1/3)\left|\left(W^a(t^m,t^a) - W_D^a(t^m)\right) - \left(W^m(t^m,t^a) - W_D^m(t^m)\right)\right|$. The payoff to the member country under the

agreement will then be

$$V^m(t^m) = W^m(t^m,t^C) + Z = (1/3)\left[W^W(t^m,t^C)+W_D^m(t^m)-W_D^a(t^m)\right] \quad (6)$$

(6) shows that the member countries will receive more than 1/3 of W^W iff $W_D^m(t^m) > W_D^a(t^m)$. If the member countries had negotiated no initial tariff reduction, then $t^m = t^N$ and $W_D^m(t^N) = W_D^a(t^N)$ is the payoff in the symmetric Nash equilibrium. This is illustrated by the point N in Figure 1. In this case, an agreement would give each country an equal share of the $W^W(t^N,t^C)$. Tariff reduction by member countries will thus have two effects on the payoffs of the countries. The first is that a reduction in t^m will raise the surplus to be split among the countries (i.e. $W^W(t^m,t^C)$) as long as $t^m > t^C$. The second point is that a reduction in t^m can affect the split of surplus between the countries by changing the threat points. For example, if the disagreement point is at point E in Figure 2, the payoff to the respective countries under the accession agreement will be the point at which a line with slope of 1 through point E intersects the payoff frontier (point H). In order to determine how the initial agreement affects the split of surplus between the member and non-member countries, we have to derive how changes in t^m affect $W_D^m(t^m) - W_D^a(t^m)$. Therefore, we now turn to an analysis of how reductions in t^m affect the disagreement points in the accession game.[12]

In order to derive the threat point payoffs, we must first derive the optimal tariff for members to impose on non-members in the absence of an agreement.

Lemma 2: *If $t^m < t^N$, the optimal tariff by a member country against the non-member is*

$$\tilde{t}(t^m) = \min\left[\frac{7t^m + x - c + (3\alpha-4)y}{11},\ t^m+c\right] \quad (7)$$

[12]Equation (6) can also be used to illustrate how the analysis would be altered if we allowed the countries to renegotiate t^m as part of the accession bargaining game. Clearly in this case it would be desirable to also set $t^m = t^C$. This renegotiation, which also could be thought of as the subsequent tariff negotiating round following the entry of the new member, would lead to a higher level of world welfare. However, the question of whether the member or acceding country achieves a higher share would still be determined by the sign of $W_D^m(t^m) - W_D^a(t^m)$.

where $\tilde{t}(t^m) > t^m$ *for c > 0. Liberalization by member countries induces lower tariffs by the member countries against non-members.*

The first term on the right hand side of (7) is the optimal discriminatory tariff in the absence of the arbitrage constraint, which reflects both political economy and terms of trade considerations. A greater political weight on import-competing producers will result in a higher tariff. The terms of trade motivation for tariffs will be greater when the volume of trade with the non-member is higher, (due for example to a higher tariff against members or a greater degree of comparative advantage (*x-y-c*)), because a larger trade volume leads to a lower elasticity of supply. It is the latter effect which creates tariff complementarity: tariff reductions with member countries will reduce the optimal tariff against non-members.[13] The second term on the right hand side of (7) shows that the extent of discrimination is limited by the possibility of arbitrage, and can be used to define the critical value c^* for which the arbitrage constraint holds with equality.

$$c^*(t^m) = \frac{x+(3\alpha-4)y-4t^m}{12} \qquad \textbf{(8)}$$

When $c < c^*$, meaning that the level of transport costs is sufficiently low that the arbitrage constraint is binding, the tariff complementarity is even stronger because reductions in member tariffs will be accompanied by an equal reduction in the tariff on the non-member.

Using (1), (2), and (8) we obtain the following characteristics of the welfare functions in the event of a disagreement, which are illustrated in Figures 3a and 3b.

Lemma 3: *For values of* $t^m < t^N$,

(a) If $c > c^*(t^m)$, $W_D^m(t^m)$ *is concave with* $\frac{\partial W_D^m}{\partial t^m} = \frac{2x+(61\alpha-63)y-63t^m-2c}{121}$. $W_D{}^m$ *attains a maximum at* $\tilde{t}_D^m = (2(x-c) + (61\alpha-63)y)/63$, *where* $\tilde{t}_D^m \in (t^C,t^N)$. $W_D^m(t^m)$ *is convex with*

[13]Tariff complementarity arises in a variety of models. See for example Bagwell and Staiger (1998) and Bond, Syropoulos, and Winters (2000). Thus, these results are likely to generalize to more general models.

$$\frac{\partial W_D^a}{\partial t^m} = \frac{2(-3x+(2\alpha+1)y+t^m+3c)}{121} < 0 \text{ for } t^m \in [t^C, t^N].$$

(b) If $c < c^*(t^m)$, $W_D^m(t^m)$ *is concave with* $\frac{\partial W_D^m}{\partial t^m} = \frac{x+(6\alpha-7)y-7t^m-6c}{9}$. $W_D^a(t^m)$ *is convex with*

$$\frac{\partial W_D^a}{\partial t^m} = \frac{2(y - x + t^m + 3c)}{9} < 0 \text{ for } t^m \in [t^C, t^N].$$

Lemma 3 indicates that trade liberalization by the member countries confers an unambiguous benefit on the non-member country in the event an agreement is not reached for $t^m \in [t^C, t^N]$, as illustrated by the dashed curves in Figure 2. The acceding country benefits from trade liberalization of the member countries because it receives an improvement in its terms of trade. This gain is relatively larger when the arbitrage constraint is binding because the full amount of the members' tariff reduction is passed along to the non-member country.[14]

For the representative member country, on the other hand, there is a concave relationship between the tariff and welfare as illustrated in Figure 2. The concavity of W_D^m results from the trade-off of the gains from internal liberalization against the losses from spillovers to the non-member. From our definition of W_D^m, $\partial W_D^m/\partial t^m = \partial W^1/\partial t_{12} + \partial W^1/\partial t_{21} + \left(\partial W^1/\partial t_{23}\right)\left(\partial \tilde{t}/\partial t_m\right)$. The first two terms in the expression are the *member trade liberalization effect*, because a member giving a tariff reduction in its own market also receives an equal tariff reduction on exports to the other member country. This effect must be negative in the neighborhood of t^N by Lemma 1b, because $\partial W^1/\partial t_{12} = 0$ at t^N and $\partial W^1/\partial t_{21} <$

---

[14] From (3), the effect of a change in t^m on the acceding country is the terms of trade on its exportables, $\partial W_D^a/\partial t^m = \sum_{j=1,2} M_{j3}\left(dP_j^3/dt^m\right)$, where $dP_j^3/dt^m = \left[1-2\left(\partial \tilde{t}/\partial t^m\right)\right]/3$ from (1). Trade liberalization by members has two conflicting effects on P_j^3. The first effect is that a reduction in t^m will tend to reduce P_j^3 because it discriminates against the non-member. The second effect is due to the induced reduction in the tariff against non-member identified in Lemma 2. When the arbitrage constraint is not binding, $\partial \tilde{t}/\partial t^m$ = 7/11 and $dP_j^3/dt^m = -1/11$. When the arbitrage constraint is binding, the acceding country gains more from liberalization since $\partial \tilde{t}/\partial t^m$=1 and $dP_j^3/dt^m = -1/3$.

0. On the other hand, this effect must be positive at t^C because members do not internalize the benefits of tariff reductions for the outside country. The last term is the *external tariff spillover effect*, which will be positive and results from the fact that an increase in 2's tariff against 3 benefits country 1 (Lemma 1b). This spillover to the non-member is greater when the arbitrage constraint is binding. Combining these effects, we obtain the result that welfare of the members must be increasing in the neighborhood of t^C and decreasing in the neighborhood of t^N.

It can be established using Lemma 3 that if $c > c^*(t^m)$, then $W_D^M(t^m) - W_D^A(t^m)$ is decreasing in t^m in the neighborhood of t^N, and it can also be shown that $W_D^M(t^C) - W_D^A(t^C) > 0$. Therefore, $W_D^M(t^m) - W_D^A(t^m) > 0$ for all $t^m \in (t^C,t^N)$ as illustrated in Figure 3a. In terms of the bargaining game illustrated in Figure 2, as t^m decreases, the threat point moves along a locus such as ***NE*** in Figure 2 in this case, and remains below the 45° line for all $t^m \geq t^C$. This guarantees that members will be better off than non-members in any agreement for an initial $t^m \in [t^C,t^N]$ when the arbitrage constraint is not binding. It can also be established using Lemma 3 that if c = 0, $W_D^M(t^m) - W_D^A(t^m)$ is increasing in t_m in the neighborhood of t^N as illustrated in Figure 3b. It then follows from the properties of the respective functions that $W_D^M(t^m) - W_D^A(t^m) < 0$ for all $t^m \in (t^C,t^N)$ in this case, and trade liberalization by members will cause a movement of the threat point along a locus such as ***NF*** in Figure 2 in this case. This guarantees that the acceding country will be better off than a representative member country for any $t^m \in [0,t^N]$ when $c = 0$.

These results can be summarized using Figure 4. We have shown that for values (t^m, c) lying above the $c^*(t^m)$ line, $W_D^M(t^m) - W_D^A(t^m) > 0$. For c = 0, we have $W_D^M(t^m) - W_D^A(t^m) < 0$. It is shown in the appendix that for $t^m \in (t^C,t^N)$ there will be a unique value $c \in (0, c^*(t^m))$ for which $W_D^M(t^m) - W_D^A(t^m) = 0$, which is represented by the ***AB*** locus in Figure 4. It then follows that $W_D^M(t^m) > (<) \; W_D^A(t^m)$ for (t^m,c) lying above (below) the ***AB*** locus in Figure 4. This yields:

Proposition 1: *The solution to the bargaining problem (5) yields*

(a) The tariff of the acceding country will be at the efficient level, $t^a = (\theta-1)y$.

(b) If the arbitrage constraint is not binding in the absence of an agreement, then members will be better off than non-members in the agreement for all $t^m \in [t^C,t^N]$.

(c) If the arbitrage constraint is binding, the payoff to non-members will be greater than that to members if c is sufficiently low.

This result shows the trade-off between the gains from internal liberalization to the member countries against the losses resulting from the spillovers to the non-member countries from reductions in tariffs on non-members. The members will gain as long as transport costs are sufficiently high that the former effect dominates.

B. First Stage Tariff Setting

The above analysis has focused on the outcome of the accession game, treating the tariff of the member countries as exogenously given. In this section we provide a brief analysis of the incentives of the member countries in setting t^m. We consider a two-period game in which the member countries choose t^m in the first period, assuming that an agreement with the non-member country is not possible in the first period. In the second period, the non-member applies for membership. Assuming that the endowment and preference parameters are the same in the first and second periods, the first period payoff to members is $W_D^m(t^m)$ and the second period payoff is $V^m(t^m)$ from (6).

If member countries correctly anticipate the application of the non-member country in the second period, t^m will be chosen to maximize $W_D^m(t^m)+\delta V^m(t^m)$, where δ is the discount on second period utility.[15] It follows from Lemma 3 and the definition of V^m that this function will be concave in t^m. Two observations can be made about the choice of t^m. The first, which follows immediately from Lemma 3, is that the value of t^m that maximizes the first period payoff will be contained in (t^C,t^N). The initial trade

[15]This discount parameter can be thought of as reflecting the probability of an application by the non-member country, or the length of time until the non-member applies.

agreement will choose less than the socially optimal amount of trade liberalization because it does not take into account the benefits of its trade liberalization to the non-member. The second observation is that the value of t^m that maximizes the payoff to members in the accession negotiation will also be contained in (t^C,t^N). The total payment under the agreement is maximized at $t^m = t^C$, but the payoff to members must be increasing in t^m at $t^m = t^C$ because $W_D^m(t^m) - W_D^n(t^m)$ is increasing in t^m at that point. This yields:

Proposition 2*: The payoff to the member countries of the accession game will be maximized at a value* $t^m \in (t^C,t^N)$.

The initial members will engage in less than the socially optimal amount of trade liberalization, regardless of the weight that they put on the accession stage in their first period tariff setting.

IV. The Principal Supplier Model

In this section we examine a variation of the model in the previous section to consider the case in which the endowment pattern is such that country *i* has an endowment of *x* of good *i* and *y* of good *j ...i*, where $x > y$. The national utility functions are assumed to be identical to those in the previous section, so that in the free trade equilibrium the price in each country will be $A - (x + 2y)/3$ and country i will import $(x-y)/3$ of goods *j ...i*. Since good i is being imported by countries *j ...* i, we can simplify our tariff notation by letting t_i^j denote the tariff imposed by country j on imports of good i. Since there is only one supplier of a good in each market, the MFN principle will not play a role in this model and we will set transportation cost to 0.

Letting P_i^j denote the price of good i in country j, commodity arbitrage for this trade pattern will ensure that $P_i^j = P_i^i + t_i^j$. This yields the following equilibrium price and imports of good i by country j, M_i^j

$$P_i^i = A - \frac{x+2y+\sum_{j \neq i} t_i^j}{3}; \quad P_i^j = A - \frac{x+2y-2t_i^j+t_i^k}{3}; \quad M_i^j = \frac{x-y-2t_i^j+t_i^k}{3} \qquad \textbf{(9)}$$

An increase in t_i^j will worsen the terms of trade of the exporting country i and will result in a shift of sales by country i from country j to the other importing country.

As in the previous section, we assume that national welfare is the sum of consumer surplus, tariff revenue, and weighted producer surplus, with producers in the import-competing sector receiving a weight " $ 1. National welfare for this case can be written as

$$W^i(t_2^1, t_3^1, t_1^2, t_3^2, t_1^3, t_2^3) = \sum_{j=1}^{3} \left(\frac{1}{2}(A - P_j^i)^2 \right) + \sum_{j \neq i} \left(\omega p_j^i y + t_j^i M_j^i \right) + \omega P_i^i x + x_0 \qquad \textbf{(10)}$$

The following properties of the national welfare functions can be derived by differentiation of (10):

<u>Lemma 4:</u> *The welfare of country i is*

(a) concave in t_j^i *and increasing at* $t_j^i = t_k^i = 0$

(b) decreasing in t_i^j

(c) increasing in t_k^j *for* $k,j \neq i$ and $t_k^j + t_k^i \geq 2t^C$

Results (a) and (b) are comparable to those in the competing supplier model, in that they show that each country will have a positive optimal tariff and that a country can gain from reductions in tariffs imposed on its exportables. An increase in t_k^j will lower the price of good k, which improves the terms of trade of country i but also hurts import-competing producers of good k in country i. If the average tariff on good k is at least t^C, the former effect will dominate and country i will benefit from an increase in t_k^j. The difference from the competing supplier model is that the tariff externalities go in the opposite direction in this case: a reduction in tariffs between countries j and k will worsen the welfare of country i.

The optimal tariff for country i on good j, given the trade policy of other importing countries, can be obtained from differentiation of (10) to be

$$t_j^i(t_j^k) = \frac{x + (6\omega - 7)y + t_j^k}{8} \qquad \textbf{(11)}$$

Tariffs will be higher the greater is the political power of the import competing producers, and the greater the degree of comparative advantage of the exporting country, x - y, and the greater the tariff imposed by the other importing country, t_j^k. The latter result follows because an increase in the tariff by the other country results in a rise in the volume of exports to the i market, lowering the elasticity of export supply and raising the optimal tariff. Note that this case differs from the competing supplier model in that there is strategic interaction between the tariffs of the countries. The Nash equilibrium tariffs in the case without trade agreements can be solved from (11) to be

$$t^N = \frac{x+(6\alpha-7)y}{7} \qquad \textbf{(12)}$$

Mutual tariff reductions from the Nash equilibrium will be welfare improving, and the tariffs that maximize world welfare will be given by t^C as in the previous section. Therefore, the principal supplier model suggests a prisoner's dilemma in trade policy and gains from trade cooperation, just as in the competing supplier model.

A. Trade Agreements

We assume an initial agreement in place between countries 1 and 2 that specifies the tariff each will impose on the other's export good. We denote this tariff, which is assumed to be the same for each country from our symmetry assumption, by $t_m^m = t_1^2 = t_2^1$. These tariff negotiations would not however have specified a reduction in the tariff imposed on good 3, for which the non-member country is the principal supplier. It is not in the interest of either member to engage in tariff reductions on this good because neither country is an exporter, and we maintain our assumption that member countries do not coordinate in the setting of their tariffs against non-member exportables. We assume that negotiations between the member countries and the non-member will be over the tariff to be applied by members on the non-member good, denoted $t_a^m = t_3^1 = t_3^2$, and the tariff imposed by the non-member on exports

from the members, $t_m^a = t_1^3 = t_2^3$. The welfare of a representative member country over these tariff rates can be expressed as $W^m(t_m^m, t_a^m, t_m^a) = W^1(t_m^m, t_a^m, t_m^m, t_a^m, t_m^a, t_m^a)$, and that of the acceding country as $W^a(t_m^m, t_a^m, t_m^a) = W^3(t_m^m, t_a^m, t_m^m, t_a^m, t_m^a, t_m^a)$.

The outcome of the accession negotiation over the tariff rates $\{t_a^m, t_m^a\}$ and transfer Z to be paid by the acceding country will be the solution to the Nash bargaining problem,

$$\max_{Z, t_m^a, t_a^m} \left(W^a(t_m^m, t_a^m, t_m^a) - W_D^a(t_m^m) - 2Z\right)\left(W^m(t_m^m, t_a^m, t_m^a) - W_D^m(t_m^m) + Z\right)^2 \qquad \textbf{(13)}$$

$W_D^a(t_m^m)$ and $W_D^m(t_m^m)$ denote the payoffs to the acceding and member countries in the absence of an agreement, which will be characterized below. The solution to (13) will involve choice of $\{t_a^m, t_m^a\}$ to maximize world welfare, which yields $t_a^m = t^C$ and $t_m^a = (t^C + t_m^m)/2$. The latter tariff is the efficient tariff for the acceding country to impose on member exports, given that the member countries are imposing t_m^m on each other. The payoffs to the member in the accession game will be

$$V^m(t_m^m) = (1/3)\left[W^W(t_m^m, t^C, t_m^a) + W_D^m(t_m^m) - W_D^a(t_m^m)\right] \qquad \textbf{(14)}$$

As in the previous case, whether the member receives a larger or smaller payoff than the acceding country depends on how the tariffs in the initial agreement between 1 and 2 affect the threat points.[16]

We assume that in the absence of an accession agreement with country 3, the member countries impose their individually optimal tariffs on goods coming from the country 3. Since countries 1 and 2 will each set their tariff on 3 according to (12), the result will be the imposition of t^N on all imports of good 3 by the members. For the non-member country, we can obtain its optimal tariff from (11) to be

[16]As in the previous case, this conclusion is not affected by assumptions regarding which tariffs are negotiated at the time of accession. For example, we could restrict the negotiations by only allowing the acceding country to make tariff concessions. In practice, accession negotiations primarily involve the acceding country making concessions on its tariff. However, concessions are also sometimes made by the member countries.

$\hat{t}(t_m^m) = \left(x+(6\alpha-7)y+t_m^m\right)/8$. Both the principal supplier model and the competing supplier model suggest that there is a tariff complementarity in the optimal policies, which will mean that trade liberalization by the member countries on trade with each other will induce some tariff reduction on trade between member and non-member countries. There is an important difference in the strategic effects of trade liberalization between the two models, however. In the competing supplier model analyzed above, liberalization by the members induced lower tariffs against the non-members from (7). This spillover represented a benefit of member trade liberalization to the non-member countries. In the principal supplier model, in contrast, trade liberalization by the member countries will induce some liberalization by the non-member countries on their tariffs against member countries. This trade liberalization improves the terms of trade of the member countries, and hence is a further benefit to the member countries from trade liberalization.

The disagreement payoff to the member is $W_D^m(t_m^m) = W^1(t_m^m, t^N, t_m^m, t^N, \hat{t}(t_m^m), \hat{t}(t_m^m))$, and the payoff to the non-member is $W_D^n(t^m) = W^3(t_m^m, t^N, t_m^m, t^N, \hat{t}(t_m^m), \hat{t}(t_m^m))$. The following Lemma summarizes some useful properties of these functions, which are illustrated in Figure 5.

Lemma 5 *: The disagreement payoffs have the properties:*

(a) $W_D^m(t_m^m)$ *is concave in* t_m^m *, with* $\dfrac{\partial W_D^m(t_m^m)}{\partial t_m^m} = \dfrac{-23t_m^m - 3x + (26\alpha - 23)y}{32} < 0$ *for* $t^C < t_m^m < t^N$.

(b) $W_D^n(t_m^m)$ *is concave in* t_m^m, *with* $\dfrac{\partial W_D^n(t_m^m)}{\partial t_m^m} = \dfrac{-55t_m^m + 9x + (46\alpha - 55)y}{32} > 0$ *for* $t^C < t_m^m < t^N$

Part (a) shows that W_D^m is concave in t_m^m, and that tariff reductions will unambiguously benefit the member country for all $t_m^m \in [t^C, t^N]$ as shown by the solid line in Figure 5a. The effect on member country disagreement point is $dW_D^m/dt_m^m = \partial W^1/\partial t_2^1 + \partial W^1/\partial t_1^2 + \left(\partial W^1/\partial t_1^3 + \partial W^1/\partial t_2^3\right)\left(d\hat{t}/dt_m^m\right)$. The first two terms are the *member trade liberalization effect*, which must be negative and reflect the

benefits to the members of mutual tariff reduction as in the competing supplier model. The second term is the *external tariff spillover effect*, which results from the reduction in the optimal tariffs of the non-member country induced by the member's tariff reduction. In contrast to the competing supplier model, this effect will also be favorable for the member countries. For the acceding country, $dW_D^a/dt_m^m = \partial W^3/\partial t_2^1 + \partial W^3/\partial t_1^2$. From Lemma 5b, tariff reduction by the member countries must reduce welfare of the acceding country in this case. This is illustrated by the dashed line in Figure 5. These results indicate that trade liberalization by the member countries will move the threat point along a locus such as ***NG*** illustrated in Figure 2. It then follows from (14) that the member will receive a higher payoff than the acceding country for $t_m^m \in [t^C, t^N]$.

The favorable spillover of liberalization by member countries also provides an incentive for the members to set $t_m^m < t^C$ in their initial negotiations. Suppose that we consider the choice of t_m^m by the member countries, with the payoff to the member countries (including the anticipated future payoff from the accession) being given by $W_D^m(t_m^m) + \delta V^m(t_m^m)$. Since both $W_D^m(t_m^m)$ and $V_m(t_m^m)$ are concave in t^m and attain a maximum at a value less than t^C, the discounted payoffs to the member attains a maximum at a value less than t^C, for all $\delta \in [0,1)$. This contrasts with Proposition 2, where bargaining power was enhanced by making tariff reductions that were smaller than the multilaterally optimal level.

The results of this section can be summarized as:

Proposition 3: *In the principal supplier model, the accession agreement will have the property that:*

(a) $t_a^m = t^C$ *and* $t_m^a = (t_m^m + t^C)/2$

(b) The acceding country will receive a lower payoff than the member countries.

(c) The member tariff, t_m^m*, that maximizes the member payoff is less than* t^C.

Note that in this case the incentives of the members are to cut the tariff on member goods below the multilaterally optimal level, because reduced tariffs among the member countries tend to reduce the

payoff to the outside countries under the agreement.

V. Asymmetries in Country Size

The models of the previous sections have focused on the case in which the three countries are of equal size. In the case of WTO accessions, acceding countries are often quite small relative to the major trading countries. A natural question to ask is how our results would be changed in cases where the acceding country is small relative to the member countries. In this section we briefly sketch an extension of our basic model which is capable of addressing this issue. We then show that the basic flavor of our results continues to hold in the asymmetric country case, in the sense that the spillovers from trade liberalization by member countries have similar implications for the threat point of the bargaining game in the asymmetric country case. We illustrate this by considering an extension of the competing supplier model, and show that liberalization by large member countries has a favorable spillover to the small non-member country. As in the symmetric country case, this spillover will yield a more favorable effect to the non-member country when the arbitrage constraint binds.

A parameterization that allows asymmetries in country size is to assume that country i consists of 8^i identical agents with preferences and endowments identical to those considered in the symmetric country case. For the case of the competing supplier model, demand for good j in country i is $D_j^i = \lambda^i\left(A - P_j^i\right)$, the endowment of good i is $8^i y$, and the endowment of good $j \neq i$ is $8^i x$ (with $x > y$). Country i has comparative advantage in good i as in the symmetric country case, because the autarky prices for each country are independent of the 8^i. We will consider the case in which the member countries are large relative to the acceding country by choosing $8^1 = 8^2 / 80$ $(1,4)$ and $8^3 = 1$. An increase in 8 thus represents a reduction in the size of the outside country relative to the size of the membership as a whole and also relative to individual member countries. National welfare can be defined as the weighted sum of consumer surplus, producer surplus, and tariff revenues as in (2), with the welfare

functions of the representative member and acceding country as $W^m(t^m, t^a, \lambda)$ and $W^a(t^m, t^a, \lambda)$, respectively. The tariffs that maximize world welfare will be $t^C = (\theta-1)y$, just as in the symmetric country case. We can also derive the disagreement payoffs of the member and acceding countries, $W_D^m(t^m, \lambda)$ and $W_D^a(t^m, \lambda)$ respectively, as the payoffs when the member countries impose t^m on trade with each other and all other tariffs will be set optimally.

If we continue to assume that the countries have equal bargaining power as in the symmetric country case, then the bargaining problem will be identical to that in (5). This yields $t^a = t^C$ and the payoff to the representative member will be $(1/3)\left[W^W(t^m, t^C, \lambda) + W_D^m(t^m, \lambda) - W_D^a(t^m, \lambda)\right]$. It then follows that a member tariff of t^m will give members a higher share or world income than is obtained without trade liberalization iff $W_D^m(t^m, \lambda) - W_D^a(t^m, \lambda) > W_D^m(t^{mN}, \lambda) - W_D^a(t^{mN}, \lambda)$. We can then prove the following result:

Proposition 4: *In the case of asymmetric countries with equal bargaining power,*

(a) The accession negotiations will result in $t^a = t^C$.

(b) If the arbitrage condition does not bind, the bargaining position of the member countries is improved by trade liberalization [i.e. $W_D^m(t^m) - W_D^a(t^m) > W_D^m(t^N) - W_D^a(t^N)$] for all $t^c < t^m < t^N$. *(c) If c = 0, any tariff reduction by the member countries will worsen the bargaining position of the member countries.*

These results are essentially the same as those obtained in Proposition 1, with the primary difference being that the payoff to the member countries is higher than that of the non-member country in the benchmark case with no internal liberalization.

Alternatively, it might be assumed that the bargaining power of a country is proportional to its size in the asymmetric country case. The solution to the bargaining problem under this assumption yields $t^a = t^C$ and $W^m(t^m, t^a, \lambda) + Z = \left[\lambda W^W(t^m, t^C, \lambda) + W_D^m(t^m, \lambda) - \lambda W_D^a(t^m, \lambda)\right]/(2\lambda + 1)$. Each member country will receive more than $\lambda/(2\lambda + 1)$ of W^W iff $W_D^m(t^m) > \lambda W_D^a(t^m)$. In this case, a member tariff of t^m

will give members a higher share or world income than is obtained without trade liberalization iff $W_D^m(t^m,\lambda) - \lambda W_D^a(t^m,\lambda) > W_D^m(t^{mN},\lambda) - \lambda W_D^a(t^{mN},\lambda)$. Since $W_D^a(t^m,\lambda)$ is decreasing in t^m, this condition is more stringent than in the case of symmetric bargaining power and the resulting proposition is slightly weaker:

Proposition 5: *In the case of asymmetric countries with bargaining power proportional to country size,*

(a) The accession negotiations will result in $t^a = t^C$.

(b) If the arbitrage condition does not bind, the bargaining position of the member countries is improved [i.e. $W_D^m(t^m) - \lambda W_D^a(t^m) > W_D^m(t^M) - \lambda W_D^a(t^M)$*] for all* $t^c < t^m < t^N$ *if the members are not too large.*

(c) If c = 0, any tariff reduction by the member countries will worsen the bargaining position of the member countries.

Propositions 4 and 5 show that the external tariff spillovers work are similar to those obtained in the symmetric country case. When the arbitrage constraint is binding, the benefits of internal liberalization to members tend to be large relative to the worsening of terms of trade against non-members and trade liberalization is favorable. When the arbitrage constraint is binding, the free riding effect for non-members is large and the bargaining power of members is weakened. Thus, our results continue to hold for differences in country size.

V. Conclusions

Our analysis has shown how existing trade liberalization under a trade agreement like the GATT or WTO affects the terms negotiated with acceding countries. Whether or not the outsider is disadvantaged by not having participated in the previous rounds of trade negotiations among members depends on whether its threat point in accession negotiations worsens as a result of its having been left out in the previous rounds. We find that both cases are possible, depending on the pattern of trade

between the non-member and the member countries. When exports of non-member countries are close substitutes for those of non-members and the ability to impose discriminatory tariffs is restricted by commodity arbitrage, non-members will be able to free ride on liberalization by member countries. In this case, multilateral liberalization is likely to proceed at a rate that is less than the socially optimal rate because of the spillovers to the non-member countries. Furthermore, the acceding country will maintain high tariffs against the members until it applies for entry into the WTO.

In contrast, liberalization on goods exported by member countries may proceed at more than the socially optimal rate in the principal supplier model, because liberalization by members will induce tariff reductions by the non-members. Outside countries fare poorly from trade liberalization in this case, because members have no interest in cutting tariffs on goods for which non-members are the principal suppliers. For example, GATT was very slow to liberalize trade in textiles. This seemed to have reflected the fact that the GATT consisted primarily of more developed countries, so that principal suppliers of these goods were not members of the agreements. In this case, a primary benefit of entry for outside countries is the ability to influence the course of future negotiations in which they expect to obtain further tariff concessions from other members.

Our results can also be used to provide some insights about the efficiency of the accession process, both from the viewpoint of the world trading system and from that of the member countries. First, the results of the accession process will yield tariffs that maximize the sum of payoffs to the participating countries, conditional on the tariffs that have been negotiated in previous rounds. This process will be more efficient the greater the degree of flexibility in negotiating tariffs as part of the accession process, and it is in the interest of both the member and non-member countries to make the scope of negotiations as broad as possible when using the Nash bargaining solution. In practice, although accession negotiations usually focus on adjustments in tariffs of the acceding party, there is often an attempt to conclude negotiations prior to the launch of a new multilateral negotiating round to achieve

maximum participation. One can view this practice as a means to broaden the scope of tariff negotiations by making even existing tariffs of members negotiable in the near future. Second , the results suggest that the members would achieve a larger share of the surplus in the accession negotiations if they coordinated their external tariffs against the non-member countries. This would reduce the free rider benefits to the outside countries associated with the effects of multilateral negotiations between inside countries in the case of the competing supplier model. Such a measure would speed up trade liberalization between members, and make the outside countries more eager to join the WTO.

References

Bagwell, Kyle and Robert Staiger (1999a), An Economic Theory of the GATT, American Economic Review.

Bagwell, Kyle and Robert Staiger (1999b), Multilateral Trade Negotiations, Bilateral Opportunism, and the Rules of GATT, manuscript.

Bagwell, K. and R.W. Staiger (1998), Regionalism and multilateral tariff cooperation, in: J. Piggott and A. Woodland, eds., International Trade Policy and the Pacific Rim, (Macmillan, London).

Bond, Eric, Costas Syropoulos and Alan Winters (2000), "Deepening of Regional Integration and Multilateral Trade Agreements,"Journal of International Economics.

Caplin, Andrew and Kala Krishna (1987), "Tariffs and the Most-Favored-Nation Clause: A Game Theoretic Approach," Seoul Journal of Economics, 1987.

Grossman, Gene and Elhanan Helpman (1994), "Protection for Sale," American Economic Review, 84 (4), 833-850.

Langhammer, Rolf and Matthias Lucke (1999), WTO Accession Issues, Kiel Working Paper no. 905.

Osborne, Martin and Ariel Rubinstein (1990), Bargaining and Markets, Academic Press, San Diego.

Patterson, Gardner (1966), Discrimination in International Trade: The Policy Issues 1945-1965, Princeton University Press, Princeton.

Richardson, Martin (1992), Some Implications of Internal Free Trade in a Free Trade Area, Georgetown Working Paper.

Richardson, Martin (1995), "Tariff Revenue Competition in a Free Trade Area," European Economic Review, 39, 1429-1437.

Seidmann, Daniel and Eyal Winter (1998), "A Theory of Gradual Coalition Formation," Review of Economic Studies , 65 (4), 793-816.

United States International Trade Commission (1999), "Assessment of the Economic Effects on the United States of China's Accession to the WTO, Publication #3229.

World Trade Organization (1995a), "Accession to the World Trade Organization: Procedures for Negotiations under Article XII, WT/ACC/1.

World Trade Organization (1995b), Guide to GATT Law and Practice, Geneva.

World Trade Organization (1999), "Technical Note on the Accession Process," note by the Secretariat, WT/ACC/7.

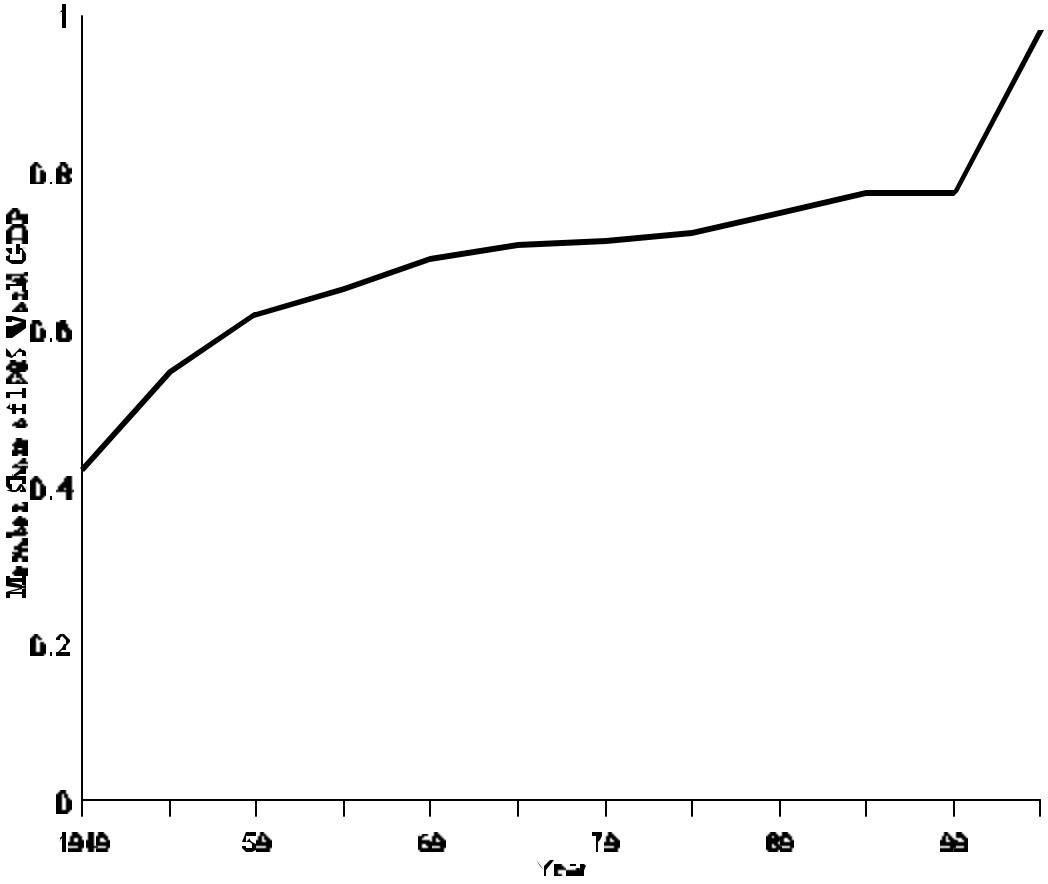

Figure 1 WTO or GATT Membership as a Share of 1985 World GDP

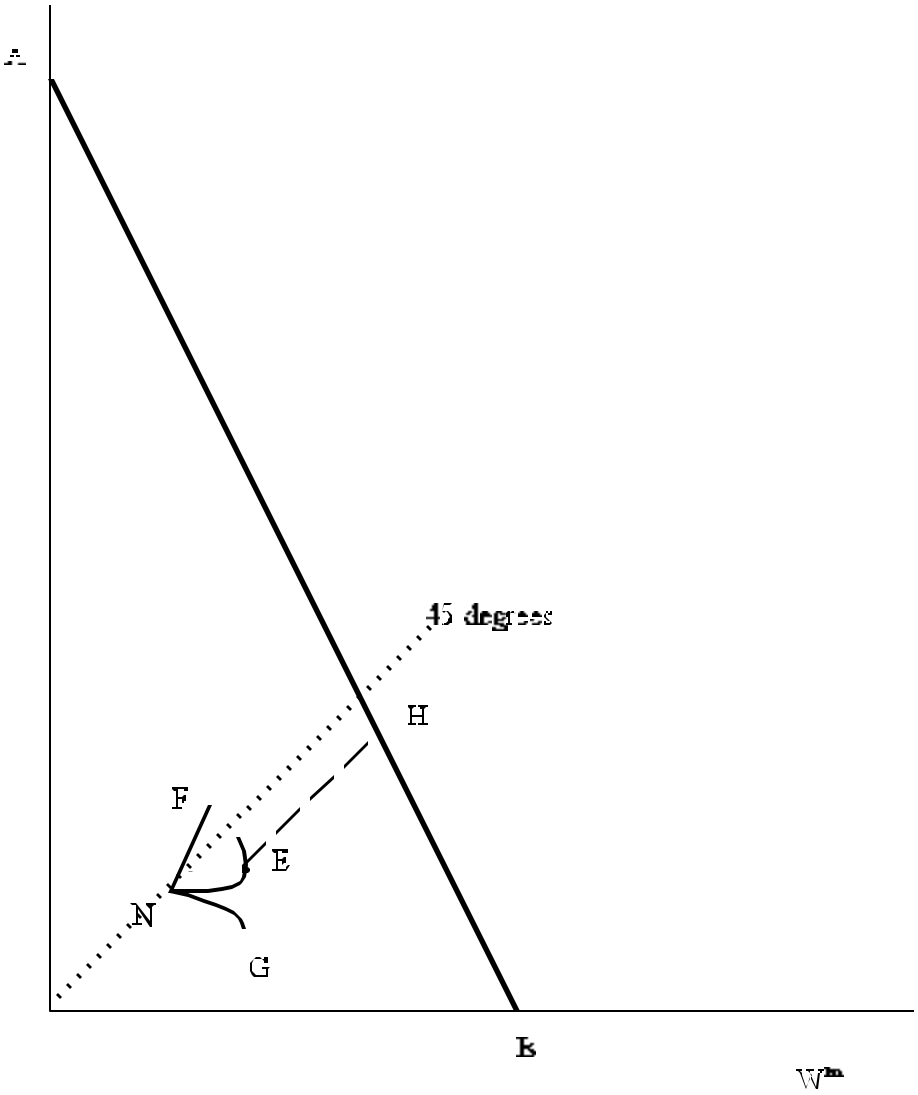

Figure 2 Accession Process Bargaining Problem

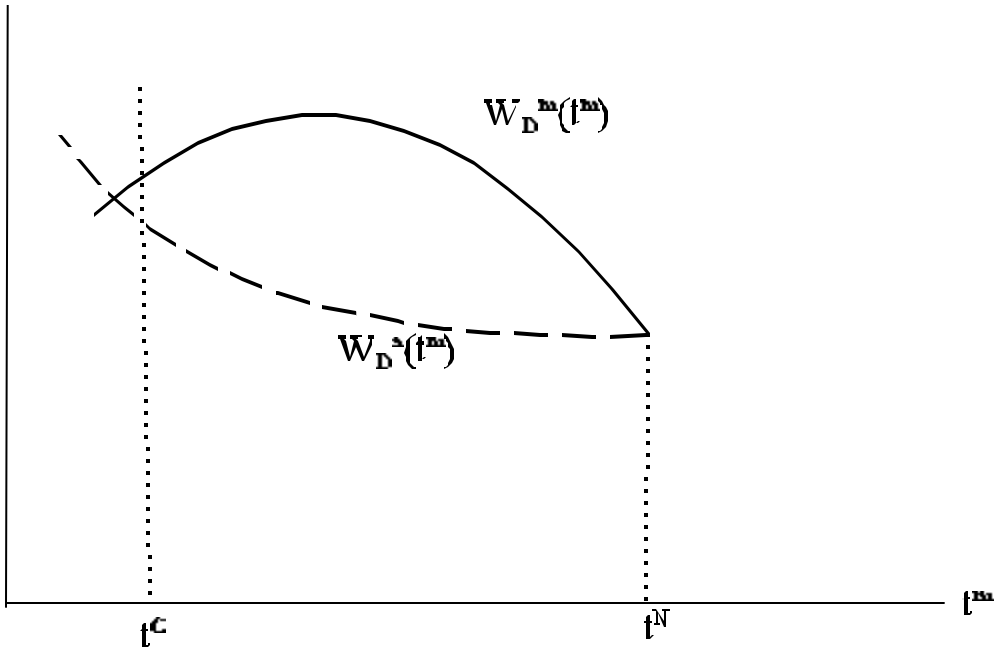

Figure 3a Threat Point Payoffs with $c > c^*(t^m)$ in the Competing Supplier Model

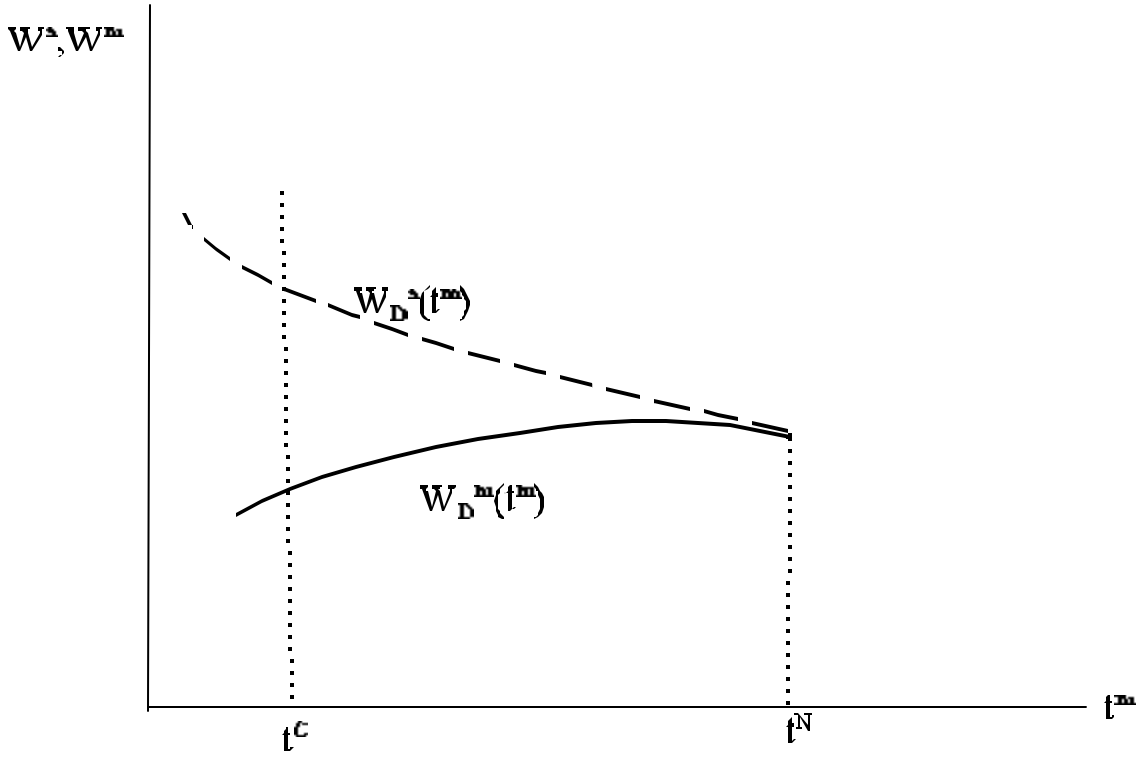

Figure 3b Threat Point Payoffs with $c < c^*(t^m)$ in the Competing Supplier Model

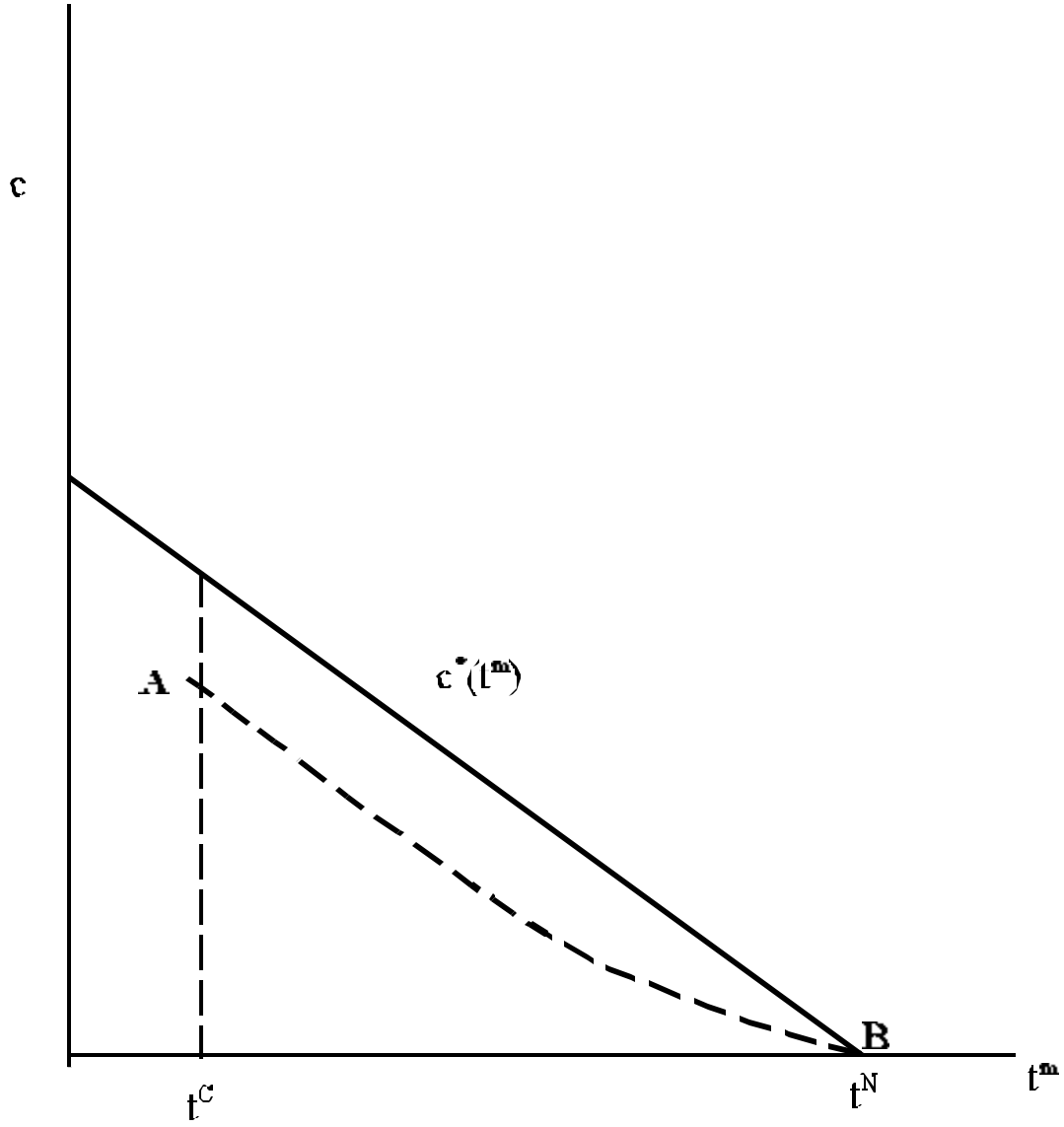

Figure 4 No Arbitrage Binding for $c < c^*(t^m)$ in the Competing Supplier Model

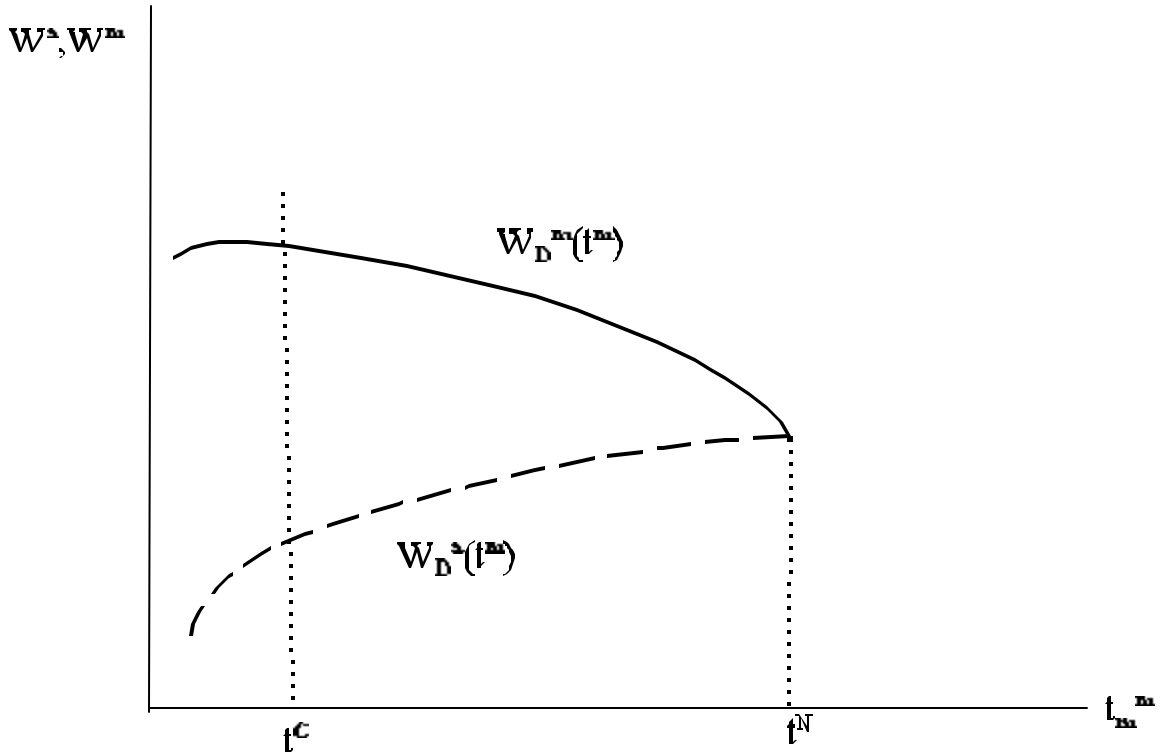

Figure 5 Threat Point Payoffs in the Principal Supplier Model

Appendix

Proof of Lemma 1: Substituting (1) into (2) and differentiating yields

$$\frac{\partial W^i}{\partial t_{ij}} = \frac{7t_{ik} - 11t_{ij} + x + (3\alpha - 4)y - c}{9}$$

$$\frac{\partial W^i}{\partial t_{jk}} = -\frac{2M_{jk}}{3} < 0, \qquad \frac{\partial W^i}{\partial t_{ji}} = \frac{M_{jk}}{3} > 0 \tag{A.1}$$

The results of Lemma 1 follow from these derivatives, where x - y - c > 0 is assumed to ensure positive trade volumes at free trade.

Proof of Lemma 2: Consider the choice of t_{13} for country 1 with $t_{12} = t^m$. We first show that 1 will never choose $t_{13} < t^m - c$. For values of t_{13} in this region, country 1 imports from the non-member only. Solving the market-clearing conditions in this case yields $P_1^1 = \left(3A - (2x+y) + 2t_{13} + 3c\right)/3$ and $M_{13} = M_{13} = \left(2(x-y) - 2t_{13} - 3c\right)/3$. Substituting these values in (2) and differentiating yields

$$\frac{\partial W^1}{\partial t_{13}} = \frac{1}{9}\left[2x + (6\alpha - 8)y - 3c - 8t_{13}\right] \qquad \text{for } t_{13} < t^m - c \tag{A.2}$$

It can be seen from (A.2) that W^1 is concave in t_{13} for $t_{13} < t^m - c$. Also, $t^m < t^N$ is sufficient for (A.2) to be positive on $[0, t^m - c)$. At $t_{13} = t^m - c$, 2 is indifferent between exporting to 1 and 3, so any non-negative import values such that $M_{12} + M_{13} = [2(x - y) - 2t^m - c]/3$ are possible. Since imports from 2 yield higher tariff revenue per unit these import levels are not welfare equivalent, and the highest welfare level is attained where $M_{13} = 0$. Under our assumption that imports come from the highest revenue source when suppliers are indifferent, the welfare in this region takes an upward jump as illustrated by point A in Figure A.1.

A similar argument can be used to rule out an optimum for $t_{13} > t^m + c$. At $t_{13} = t^m$, country 3 suppliers are indifferent between selling to 1 or 2 and imports can take on any values such that $M_{12} + M_{13} = [2(x - y) - 2t^m - 3c]/3$. Since imports from 3 have a higher tariff at this point, the highest welfare occurs where $M_{12} = 0$. For any $t_{13} > t^m - c$, we have $M_{12} = [2(x - y) - 2t^m - 3c]/3$ and $M_{13} = 0$. Therefore, welfare takes a downward jump at this point as illustrated by point **B** in Figure A.1.

For $t_{13} \in [t^m - c, t^m + c]$, $\partial W^1/\partial t_{13}$ is given by (A.1). Welfare is concave in t_{13} in this region, with (A.1) positive when evaluated at $t_{13} = t^m$ *for* $t^m < t^N$. Therefore, the optimal discriminatory tariff

must be contained in $(t^m, t^m + c]$. If the solution is interior, its value is $t_{13} = [x + (3\alpha-4) - c + 7t^m]/11$. If this value exceeds $t^m + c$, then W^1 is maximized at $t_{13} = t^m + c$, which yields (7). ||

Proof of Lemma 3: From the definition of W_D^m, we have,

$$\frac{dW_D^m}{dt^m} = \frac{\partial W^1}{\partial t_{12}} + \frac{\partial W^1}{\partial t_{21}} + \left(\frac{\partial W^1}{\partial t_{13}} + \frac{\partial W^1}{\partial t_{23}}\right)\frac{dt}{dt^m} \tag{A.3}$$

The expressions for dW_D^m/dt^m follows from substitution from (A.1) and (7) for the respective cases. A similar argument yields dW_D^a/dt^m.

Proof of Proposition 1: (b) For $c > c^*(t^C)$, the arbitrage constraint is not binding. It follows from Lemma 2a and the symmetry of the countries that $H(t^m,c) = W_D^m(t^m,c) - W_D^a(t^m,c)$ is concave in t^m, with $H(t^N,c) = 0$ and $\partial H(t^N,c)/\partial t^m < 0$. Evaluating the expression at t^C yields $H(t^C,c) = (c - x + b\alpha y)^2/3872 > 0$. Therefore, we must have $H(t^m,c) > 0$ for all $t^m \in [t^C, t^N)$ if $c > c^*(t^C)$. It then follows from (6) that $V^m(t^m) > W^W(t^m,t^C)/3$.

(c) For $c < c^*(t^m)$, we have from Lemma 2b that $\partial H(t^m,c)/\partial t^m = (x + (2\alpha-3)y - 3t^m - 4c)/3$. Evaluating at $c = 0$ yields $\partial H(t^N,c)/\partial t^m = (x - \alpha y)/3 > 0$. Since $H(t^m,c)$ is strictly concave in t^m on $[0,t^N]$ and $H(t^N,0) = 0$, it follows that $H(t^m,0) < 0$ on $[0,t^N)$ with $c = 0$. From (6), we have $V^m(t^m) < W^W(t^m,t^C)/3$ with $c = 0$. 2

$H(t^m,c)$ will also continuous and strictly concave in c for $c < c^*(t^m)$, since $\partial H(t^m,c)/\partial c = (37x + (27\alpha-64) - 64t^m - 165c)/48$. We have established that $H(t^m,0) < 0$ in the proof of (b) and $H(t^m,c^*(t^m)) > 0$ for $t^m \in [t^C,t^N)$ from the proof of (a). Therefore, there will be a unique value $c \in [0, c^*(t^m)]$ at which $H(t^m,c) = 0$ for $t^m \in [t^C,t^N)$, which is illustrated by the locus AB in Figure 2.

Proof of Lemma 4: Differentiating (10) yields

$$(a)\quad \frac{\partial W^1}{\partial t_2^1} = \frac{-8t_2^1 + t_2^3 + x + (6\alpha - 7)y}{9} \qquad (b)\quad \frac{\partial W^1}{\partial t_1^2} = \frac{t_1^2 + t_1^3 - 2(x-y)}{9}$$

$$(c)\quad \frac{\partial W^1}{\partial t_2^3} = \frac{t_2^1 + t_2^3 + x - (3\alpha - 2)y}{9} \tag{A.4}$$

(a) yields part (a) of the Lemma and can be solved to yield the optimal tariff formula in (11). (b) will be

negative for non-prohibitive tariffs, which establishes part (b) of the lemma. (c) will be positive iff $t_1^3+t_1^2 \geq x+(2-3\alpha)y$. Under our assumption that x > "y, $t_1^2+t_1^3 > 2(\alpha-1)y$ is sufficient for (c) to be positive, establishing part (c) of the lemma.2

Proof of Lemma 5: From the definition of W_D^m and the envelope theorem we have,

$$\frac{dW_D^m}{dt_m^m} = \frac{\partial W^1}{\partial t_2^1} + \frac{\partial W^1}{\partial t_1^2} + \left(\frac{\partial W^1}{\partial t_1^3} + \frac{\partial W^1}{\partial t_2^3}\right)\frac{d\tilde{t}}{dt_m^m} \qquad \text{(A.5)}$$

Substituting into (A.5) from (A.4) and using $t_2^1 = t_1^2 = t_m^m$, $t_3^1 = t_3^2 = t^N$, and $t_1^3 = t_2^3 = \tilde{t}(t_m^m)$ yields part (a) of the Lemma. A similar argument applied to W_D^a yields (b).

Analysis of the Asymmetric Country Case: Competing Supplier Model

We will assume that the sectoral payoff functions are as in (2), where adjustments have been made for relative country size,

$$W^i(t_{12},t_{13},t_{21},t_{23},t_{31},t_{32}) = \lambda^i\left(\sum_{j=1}^{3} \frac{1}{2}(A-P_j^i)^2 + \sum_{j\neq i} P_j^i x + \alpha P_i^i y\right) + \sum_{j\neq i} t_{ij}M_{ij} + x_0 \qquad \text{(A.6)}$$

The tariffs that maximize world welfare will be t^C = ("-1)y, as in the case with symmetric countries. The difference in country size will have an impact on the tariffs imposed in the Nash equilibrium when there is no trade agreement between countries 1 and 2. It can be shown that the Nash equilibrium tariffs for the representative large country, t^{mN}, and the small country, t^{aN}, are given by

$$t^{mN} = \frac{\lambda(x-\alpha)+[\alpha(2\lambda+1)-(3\lambda+1)]y}{1+3\lambda} > t^{aN} = \frac{x-\alpha+[\alpha(2\lambda+1)-2(\lambda+1)]y}{2(1+\lambda)} \qquad \text{(A.7)}$$

With this formulation of country size the large countries will choose the same tariff (i.e. t^{mN}) on imports from the other large country as on the small country. As in the previous case, x > "y + c is required to ensure that trade volume is positive at the Nash equilibrium. The Nash tariff of the member countries will be higher than that of the acceding countries because of their greater size, which gives them greater market power. Note that as 8 6 4, the market power of the acceding countries shrinks to 0 and t^{aN} 6 t^C.

Since countries 1 and 2 are of the same size, we will assume that in the event of an agreement between 1 and 2 they will choose the same tariff $t^m = t_{12} = t_{21}$ on trade with each other. The optimal tariff to impose on trade with the non-member country will be

$$\tilde{t}(t^m,\lambda) = \min \left[\frac{(5\lambda + 2)t^m + \lambda(x - y - c) + (\alpha - 1)(2\lambda + 1)y}{8\lambda + 3},\ t^m + c \right] \qquad \text{(A.8)}$$

The first term in brackets is the optimal discriminatory tariff imposed by a member country against the non-member, and will be increasing in θ for $t^m \# t^N$ because the member countries have greater market power against the non-members when they are relatively larger. The second term is the bound imposed by the arbitrage condition. Using (A.6), we can define payoffs under the agreement, $W^j(t^m,t^a,\lambda)$, and in the absence of an agreement, $W_D^j(t^m)$, for $j = m, a$.

Proposition 4b is proven by showing that $H(t^m,c,\lambda) = W_D^m(t^m,c,\lambda) - W_D^a(t^m,c,\lambda) + W_D^m(t^{mN},c,\lambda) - W_D^a(t^{mN},c,\lambda)$ is concave in t^m, with $H(t^{mN},c,\theta) = 0$ and $\partial H(t^{mN},c,\lambda)/\partial t^m < 0$ and $H(t^C,c,\theta) > 0$ when the arbitrage constraint is not binding. Proposition 4b follows from the fact that $H(t^m,0,\theta)$ is strictly concave in t^m on $[0,t^{mN}]$ and $H(t^{mN},0,\theta) = 0$. The proof parallels that of Proposition 1. Proposition 5b is proven by showing that $G(t^m,c,\lambda) = W_D^m(t^m,c,\lambda) - \lambda W_D^a(t^m,c,\lambda) + W_D^m(t^{mN},c,\lambda) - \lambda W_D^a(t^{mN},c,\lambda)$ is concave in t^m, with $H(t^{mN},c,\theta) = 0$ and $\partial H(t^N,c,\lambda)/\partial t^m < 0$ when the arbitrage constraint is not binding. However, it follows that $H(t^{mN},c,\theta)$ will be negative for θ exceeding 1.37. Proposition 5b follows from the fact that $G(t^m,0,\theta)$ is strictly concave in t^m on $[0,t^{mN}]$ and $H(t^{mN},0,\theta) = 0$.

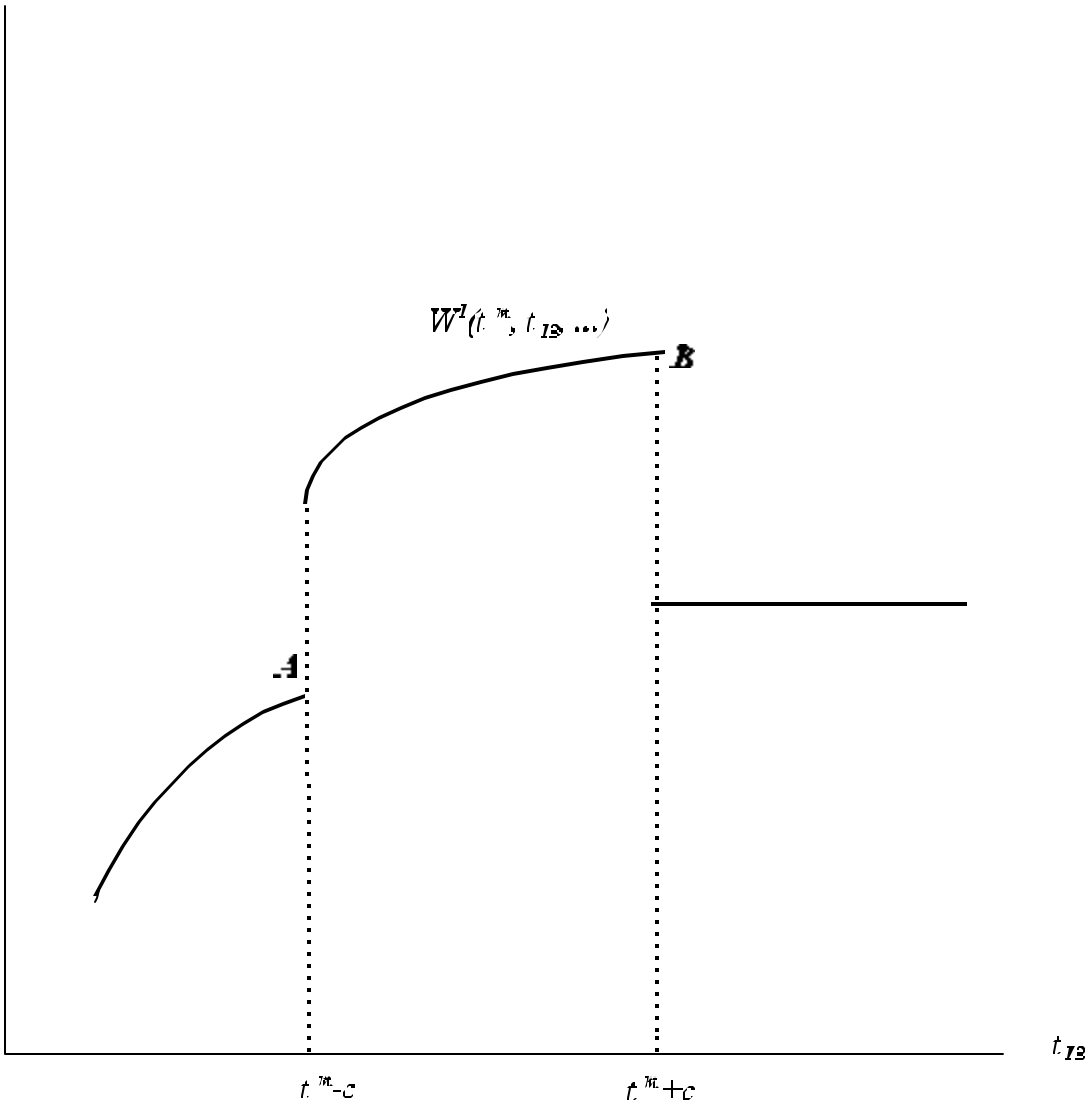

Figure A.1