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MULTILATERALISM AND THE ENDOGENOUS FORMATION OF PTAS

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Abstract: This paper examines the interaction between preferential trade agreements (PTAs) and multilateral tariff reduction in a model of imperfect competition. A growing literature finds that the formation of PTAs alters the incentives for and the sustainability of multilateral tariff reduction. We show that the causation is not one-sided -- multilateral tariff reduction also affects the formation of PTAs. Specifically, tariff reduction enhances the incentives to form a PTA and increases the likelihood that it is self-enforcing. Thus, each round of multilateral tariff reduction should lead to a new wave of PTAs. This may help to explain the current trend towards regionalism.

Keywords: imperfect competition, regionalism, and trade

1 Introduction

Since the second world war the overall tariff level has fallen dramatically. The average manufacturing ad valorem tariff level fell from approximately 40 percent in 1948 to about 3 percent in 1998. At the same time, the number of preferential trading agreements (PTAs) has increased significantly. The number of regional agreements approved under the GATT/WTO increased from just one in 1949 to more than 100 today (Figure 1).[1] This leads one to wonder whether there is a relationship between the declining tariff level and the proliferation of PTAs.

While a growing literature has addressed the impact of PTAs on optimal tariffs and multilateral tariff reduction,[2] the opposing question has not been addressed. This paper seeks to fill this gap by looking at the effect of multilateral trade liberalization on the formation of PTAs.[3] We explore how multilateral tariff reduction affects the incentive to join a PTA and the associated self-enforcement mechanism. A surprising conclusion is that as the multilateral tariff level falls, the forces pulling

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[1]There are three types of preferential trade agreements permitted by the WTO: (i) customs unions and free trade agreements sanctioned under article XXIV, (ii) agreements between developing countries formed under the Enabling Clause that allow partial preferential treatment, and (iii) Generalized Systems of Preferences arrangements that allow developed countries to grant preferential treatment to developing countries. (See Bhagwati and Panagariya (1996a) for a full accounting of how PTAs, established under the GATT, were created.) The focus of this paper is on PTAs sanctioned under Article XXIV or the Enabling Clause, both of which involve reciprocal tariff reductions.

[2]See for example, Bagwell and Staiger (1997a, 1997b), Bond and Syropoulos (1996a, 1996b), Bhagwati (1993), Bhagwati and Panagariya (1996a, 1996b), Grossman and Helpman (1995), Kennan and Riezman (1990), Krugman (1992), Krishna (1998), Levy (1997), and Richardson (1993), Yi (1996).

[3]Recent independent work by Ethier (1998) addresses the relationship between multilateralism and the formation of PTAs in a small country - large country model. He finds that a reform-minded small country can more easily achieve reform after linking up with a large country because the regional agreement gives the small country a marginal advantage over other small countries in attracting foreign direct investment. When tariffs are low, the value of foreign investment is greater, making small countries more eager to sign PTAs–even if they are required to make most of the concessions.

countries away from free trade and into bilateral agreements strengthen.

We explore the relationship between multilateral tariff reduction and PTAs, using the oligopolistic model of trade. Three countries import and export a single imperfectly competitive good.[4] Each country has a positive optimal tariff, but the resulting trade war equilibrium is worse for all nations. Since everyone would benefit from tariff reduction, we examine the incentive to reduce tariffs preferentially and multilaterally. In the process, we identify the various effects that come into play, depending on which type of reduction is implemented.

We find that the welfare gain from joining a PTA is greater than the gain from a move to free trade when tariffs are low; while, the reverse is true when tariffs are high. The logic comes from the effect of tariff reduction on competition, profits, and tariff revenue. Lowering tariffs enhances competition, which leads to greater output, moving the economy closer to the efficient outcome. At high world tariff levels, this *efficiency effect* is large and multilateral tariff reduction, which has a greater effect on competition than preferential reduction, is better. However, lowering tariffs also means smaller profits and less tariff revenue. At overall low tariff levels, although the efficiency effect still leads to incentives for tariff reduction, preferential reduction is less costly – profits and tariff revenue fall by less. Preferential agreements effectively allow members to divert part of the profit loss that results from lower tariffs, to the third country where output contracts. This *redistributive effect* makes preferential reductions more beneficial than multilateral initiatives at low tariff levels.

Next, we examine whether bilateral agreements are enforceable. We use the standard repeated

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[4]The background setup is similar to Krishna (1998), however, he assumes the government cares only producer surplus. He explores a country's incentive to join a PTA and whether external tariff reduction is feasible, given that a PTA is formed .

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game framework to explore the criteria for self-enforcing bilateral tariff reductions.[5] An agreement is enforceable if the present value of the gain from complying with the tariff reduction forever, outweighs the gain from unilaterally installing the optimal tariff for one period and then entering the punishment phase. Punishment consists of the former PTA members imposing optimal tariffs on each other. As is always the case in this type of game, the extent of cooperation is increasing in the countries' discount rates.

We find that the feasibility of a PTA is dependent on the tariff level. As tariffs fall, a PTA is more likely to be sustainable–that is, the cutoff discount rate necessary to support the PTA is increasing in the tariff level. This follows directly from above. A PTA is most beneficial when external tariffs are low, implying the incentive to comply is high. Hence, bilateral cooperation is facilitated by multilateral cooperation and multilateral tariff reduction can make a bilateral agreement that was initially infeasible, feasible.

In addition, we show that the discount rate needed to enforce either a customs union or a free trade agreement from the optimal tariff equilibrium is higher than the discount rate needed to achieve multilateral free trade. Thus, if free trade is not feasible neither is a bilateral agreement, given countries set tariffs optimally. But if countries can cooperate on partial tariff reduction, a PTA may become feasible as the result of the tariff reduction.

Lastly, we extend the model to consider alternative enforcement strategies and to allow for a larger number of countries. WTO members face constraints that may make the standard self-enforcing mechanism infeasible because preferential tariff regimes, apart from PTAs, are ruled out. Therefore, under GATT rules, deviation and punishment may be more accurately represented as reverting to the most favored nation (i.e. the pre-PTA) tariff level. To make the model compatible

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[5]This approach is consistent with trade policy implementation. For example, the GATT/WTO provides for coordinated retaliation in a multilateral setting. In bilateral disputes, the United States uses section 301 to threaten retaliation when faced with unfair trade restrictions abroad.

with GATT rules, we generalize the model to allow for status quo deviation and punishment, incomplete tariff reduction, and a large number of countries. We show that the main result—that PTAs are more likely to be self-enforcing as tariffs fall—is robust to these alternatives.

While this simple framework is useful to illustrate the different impacts of multilateral and bilateral liberalization, it should be underlined that the model is highly specialized and the results should be interpreted with some caution. In general, PTAs and multilateral tariff reduction affect more than one sector, and the impacts on the exporting sector and the import-competing sector are quite different. A general equilibrium model, which takes account of these effects, might lead to different conclusions. Still, to the extent that PTAs are associated with significant intraindustry trade and imperfect competition, this model may help to explain the recent rise in regionalism.

Certainly the general phenomena of falling tariffs and an increasing number of PTAs are evident in the world; in addition, we can look to particular cases for consistency with the model. One example is the Common Market of the South (Mercosur); Mercosur is made up of four countries that attempted to form a union many years ago–a union which was apparently not self-enforcing. The Latin American Free Trade Area (LAFTA), established in 1961, was a failure, governments refused to enact the proposed tariff reductions and the agreement eventually collapsed. In 1991, four of the original seven members of the LAFTA formed Mercosur. This time around, the tariff reduction deadlines have in general been met and the union appears to be sustainable. Another former LAFTA member that has recently joined a PTA, which so far appears to be self-enforcing, is Mexico. Mexico joined the United States and Canada in forming NAFTA in 1994. The intuition which this paper provides for the success of the new regionalism is that PTAs are easier to support and more beneficial to the member nations in the moderate tariff climate today than they were in the high tariff climate of the 1960s.

This paper is divided into four sections. Section 2 describes the static model and examines

optimal tariffs. Section 3 develops the dynamic model and defines the conditions under which tariff reductions are beneficial and enforceable. Section 4 generalizes the model to allow for alternative enforcement strategies and a large number of countries in the rest of the world. Section 5 concludes.

2 Static Model

In this section, we examine optimal tariffs in a three country oligopolistic model. There is one good which is produced by a single profit maximizing firm in each country and segmented markets lead to trade in this good (as in Brander and Krugman (1983) and Brander and Spencer (1984)). There are three countries X, Y, and Z. We assume that the inverse demand function, $P^i(Q)$, in each country is linear. Specifically,

$$P^i(Q) = 1 - aQ^i \text{ and } Q^i = x^i + y^i + z^i, \tag{1}$$

where a is a constant, Q^i is the total quantity consumed in country i, and x^i is the quantity produced by the firm in X for market i, and similarly for y^i and z^i. Competition is Cournot. Profits to the firm from country X, in country i, π^i, are

$$\pi^i = x^i P^i(Q^i) - cx^i - t_x^i x^i, \tag{2}$$

where, c is a constant cost of production, and t_j^i is the tariff that the firm from country j faces in market i ($t_x^x = 0$).

The government's welfare function, W, in country X, is the sum of consumer surplus, producer surplus, and tariff revenue.

$$W = U(Q) - P^x Q + \sum_{i=x,y,z} (x^i P^i - cx^i - t_x^i x^i) + t_y^x y^x + t_z^x z^x. \tag{3}$$

In equation (3), $U(Q)$ is the consumer utility from that quantity. Solving for profit maximizing

quantities in each market and plugging into equation (3), we have

$$W = \frac{\left(3(1-c) - t_y^x - t_z^x\right)^2}{32a} + \sum_{i=x,y,z} \frac{\left(1 - c + \sum_{j=y,z} t_j^i - 3t_x^i\right)^2}{16a} + t_y\left(\frac{1 - c + t_z^x - 3t_y^x}{4a}\right) + t_z\left(\frac{1 - c + t_y^x - 3t_z^x}{4a}\right),$$

(4)

where the first term is consumer surplus, the second term is producer surplus, and the last two terms are tariff revenue.

2.1 Optimal Tariffs

A welfare maximizing government will implement a positive tariff.[6] If there are no PTAs then the government maximizes welfare, equation (4), over t_y^x and t_z^x, taking other countries' tariffs as given. With symmetric countries, the tariff on Y will be equivalent to the tariff on Z, resulting in an optimal tariff of

$$t^* = \frac{3(1-c)}{10}.$$

(5)

Note that, in this model, the optimal tariff in one country is not a function of the tariffs implemented abroad.

Alternatively, if one tariff is set exogenously—as in the case of a PTA—then by the theory of second best, the optimal tariff on the other country will change. The optimal tariff that country X places on goods imported from country Y is

$$t_y^x = \frac{3(1-c) + 11t_z^x}{21}.$$

(6)

Equation (6) shows that the optimal tariff on one trading partner is increasing in its tariff on the other trading partner. The intuition is that when X lowers the tariff on goods from Z, imports from Y fall, which in turn lowers both the tax base and consumer surplus. By slightly reducing the tariff on Y, exports from Y expand, alleviating these effects. In a different kind of model,

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[6]We rule out export subsidies by assumption.

with competing exporters and perfect competition, Bagwell and Staiger (1997a) reach the same conclusion and call this the "complementarity effect" of tariff reduction.

Countries in a customs union will choose the tariff that maximizes their joint welfare over their external tariff. If X and Y form a union they will maximize welfare, equation (3), over t_z^x and t_z^y, simultaneously. Solving, we have

$$t^{cu} = \frac{5(1-c)}{19},\tag{7}$$

where t^{cu} is the optimal tariff that a customs union chooses.

In a free trade area, each country in the region optimizes over its own welfare with respect to the tariff on the outsider. The optimal tariff chosen by a free trade area, t^{fta}, containing X and Y is

$$t^{fta} = \frac{3(1-c)}{21}.\tag{8}$$

Because of the complementarity effect of tariff reduction, a country in a free trade area has a lower external tariff than an individual country. With three symmetric countries, a customs union has a lower tariff than an individual country and a greater tariff than an FTA. The optimal tariff in a customs union is greater than the optimal tariff in a free trade area because a customs union internalizes the positive effect of the tariff, on each member's profits, in its partner country. That is, a greater external tariff shifts market share and profits, within the common market, to the member countries.[7]

If the third country were larger or there were more than three countries and hence more firms in the rest of the world, then the optimal tariff in an FTA will still remain below that of an individual country because of the complementarity effect. However, because of the internalization effect, the optimal tariff in a customs union can rise above that of an individual country.[8] The intuition is

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[7]Similarly, Kennan and Riezman (1990) and Bagwell and Staiger (1997a) also find that FTAs have lower optimal tariffs than customs unions.

[8]If there are n firms in country Z, then the optimal tariff that an individual country imposes is $\frac{3(1-c)}{9+n}$, a CU is

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that with more firms in the rest of the world, the gain from preferential treatment is greater.

While setting the optimal tariff is the strictly dominant strategy for each country in the stage game, if each country does so everyone is worse off. The next section builds a dynamic model which allows us to determine when free trade and/or PTAs are sustainable.

3 Dynamic model

We use the repeated game framework as a mechanism to support bilateral tariff reduction. In this section, we evaluate the sustainability of PTAs which move the participating countries to free trade (though we relax this assumption in the next section). Because the focus is on the formation of a PTA, we take the initial tariff level as given and assume tariffs are symmetric for simplicity.[9] The PTA must be mutually self-enforcing, where bilateral tariff elimination is enforced by a threat that participating countries will impose optimal tariffs on each other, forever, in the event of a deviation. Thus, if two countries form a PTA, it must be the case that the gains to them from committing to zero bilateral tariffs are greater than the gains from a one shot deviation and then entering the punishment phase.

$\frac{5(1-c)}{18+n}$, and an FTA is $\frac{3(1-c)}{18+3n}$. Krishna (1998) finds the same result for a CU, as the number of firms in the rest of the world expands, a PTA is more likely to lead to a higher tariff level.

[9]If tariffs are not symmetric, lowering tariffs reciprocally still makes PTAs more easily enforced, but the solutions are less transparent. Additional considerations come into play, for example, the assymetry of union formation implies certain countries can more easily support the agreement and/or have more to gain. Since these are not the focus of this paper, we consider only a symmetric tariff structure.

3.1 Incentive constraint

In this section we examine the incentive constraint a country faces with respect to participating in a PTA. If a country is better-off in a PTA then it must be the case that

$$W^{PTA}(0,t,0,t,t,t) \geq W(t,t,t,t,t,t), \tag{9}$$

where $W(t_y^x, t_z^x, t_x^y, t_z^y, t_x^z, t_y^z)$ is the welfare in country X, facing tariffs t_j^i (recall t_j^i is the tariff, in country i, on goods from country j), defined in equation (4). Equation (9) says that welfare in a PTA is greater than the welfare at the present tariff level. From equations (4) and (9), the welfare gain from moving to bilateral free trade is

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\begin{aligned}
W^{PTA} - W &= t\frac{(6(1-c)-3t)}{32a} + t\frac{2(1-c)-3t}{8a} - t\frac{(1-c)-t}{4a} \\
&= \frac{t(6(1-c)-7t)}{32a}
\end{aligned}
\tag{10}
$$

The first term on the right hand side of equation (10) is the change in consumer surplus, the second term is the change in profits, and the last term is the loss in tariff revenue. Hence, welfare in a PTA is greater than the welfare at the present tariff level, provided

$$t \leq \frac{6}{7}(1-c), \tag{11}$$

which holds for all for all t not greater than the optimal tariff.[10] Thus, for a moderate tariff level, a country is always better off in a PTA.

Proposition 1 *For all symmetric positive tariff levels less than or equal to the optimal tariff, a country is always better-off joining a PTA.*

At what symmetric tariff level does a PTA maximize welfare? Maximizing welfare with respect to the external tariff level, yields the following first order condition

$$\frac{\partial W^{PTA}}{\partial t | t_y^x = t_x^y = 0} = \frac{(1-c)-11t}{16a} = 0. \tag{12}$$

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[10]The optimal individual tariff is $\frac{3(1-c)}{10}$, so t will always be lower than $\frac{6(1-c)}{7}$.

Thus, at an overall tariff level of $t = (1 - c)/11$ a region maximizes welfare. This implies that members will not desire free trade since PTA welfare is maximized at a positive overall tariff level. Moreover, there exists a positive tariff level at which the gain from joining a PTA is greater than the gain from moving to free trade.

For example, Figure 2 shows the welfare of a country in a bilateral agreement (the left hand side of equation (9)) and of an individual country (the right hand side of equation (9)), given the prevailing tariff level (with $c = 0.1$, and $a = 1$). Welfare is always greater for a country in a PTA than for an individual country, given the tariff level, t, and welfare at a low positive tariff level is greater than free trade welfare.

Proposition 2 *There exists a positive overall tariff level at which the welfare of a country in a PTA is greater than its welfare at free trade.*[11]

The intuition follows from the effect of joining a PTA on profits, tariff revenue, and consumer surplus. Figure 3 shows the effect on the home market, and by symmetry the partner's market, as a result of forming a PTA. In the figure, the subscript *zero* represents the outcome with multilateral symmetric tariffs and the subscript *one* represents the outcome under bilateral free trade. The net gain, equation (10), can be decomposed into three parts using the symmetry between the member countries. The first is the added welfare in the home market because Z's exports are cheaper (area A); the second is the gain in profits abroad, which is not associated with a decline in tariff revenue, as a result of increased output by PTA members relative to the non-member (area C); and the third is the efficiency gain (areas B and D).

The gain is not only an efficiency gain, as is the case with a move to free trade. There is also a redistributive gain, which results from getting goods produced in Z at a lower price and

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[11]The non-member country is, however, worse-off.

shifting consumption towards goods produced in X and Y. At a low tariff level, the redistributive and efficiency gains from joining a PTA outweigh the gain from multilaterally eliminating tariffs.[12] Countries will thus prefer membership in a PTA to free trade.

3.2 Enforcement: standard case

Two countries can form a PTA provided they can commit to a bilateral tariff of zero. Starting from any point below the optimal tariff level, in order for a bilateral agreement between country X and country Y to be sustainable, the following condition must hold in country X[13]

$$W(t^n, t, 0, t, t, t) + \sum_{\tau=1}^{\infty} W(t^n, t, t^n, t, t, t)\delta^\tau \leq \sum_{\tau=0}^{\infty} W(0, t, 0, t, t, t)\delta^\tau, \tag{13}$$

where t^n is the optimal tariff on Y given the tariff level, t, defined in equation (6), τ is the time period, and δ is the discount factor, where $0 < \delta < 1$. The first term on the left hand side is the one period gain to country X from deviating and installing its optimal tariff, given that the partner country complies. The second term is the discounted present value of the punishment phase. The right hand side is the gain from cooperating. We assume the prevailing tariff level between the non-member and the member countries is maintained in the event of a deviation. Plugging equations (4) and (6) into (13) and solving, yields

$$\delta \geq \frac{7(3(1-c) + 11t)}{6(3t + 11(1-c))}. \tag{14}$$

Equation (14) defines the minimum discount rate necessary, given the tariff level t, for country X to commit to a PTA. By symmetry, the same condition must hold in country Y.

The cutoff discount rate, δ, is increasing in t.[14] Figure 4 plots equation (14) (for $c = 0.1$, $a = 1$, and t less than or equal to the optimal tariff). It shows the cutoff discount rate that is

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[12]This will be true provided the price elasticity of demand is declining in quantity.

[13]We explore the enforceability constraint at the optimal tariff equilibrium in section 3.3.

[14]Specifically $\frac{d\delta}{dt} = \frac{392(1-c)}{3(3t+11(1-c))^2}$.

required, at each tariff level, for the partner countries to be able to enforce a bilateral free trade agreement. Because the cutoff discount rate declines when the tariff level falls, a bilateral agreement can become feasible as a result of multilateral tariff reduction.

Proposition 3 *As tariffs fall, bilateral agreements become easier to enforce. Multilateral tariff reduction can make a bilateral agreement that was infeasible before the reduction, feasible.*

PTAs become easier to enforce when tariffs are low because tariffs influence the welfare from cooperation, the gain from a one shot deviation, and the welfare in the punishment equilibrium. At low tariff levels, the benefit from participating in a PTA is high and therefore the incentive to comply is also greater at low tariff levels than at high tariff levels. Welfare from deviating from the PTA is increasing in the tariff level because the expansion in domestic profits and tariff revenue, which results from imposing the optimal tariff on Y, is greater when the tariff on Z is large. This also makes complying easier at low tariff levels. Putting these two together, the gain from deviating less the gain from the cooperating is monotonically increasing in the tariff level, which makes complying easier as the tariff level falls. The punishment, however, is less severe when external tariffs are low, making it more difficult to enforce a PTA. The intuition is that the complementarity effect of tariffs moderates the feasible tariff threat when external tariffs are low. Still, as tariffs fall, the effect on the incentive to comply and the effect on the incentive to deviate outweigh the punishment effect, ensuring that the cutoff discount rate is declining in the tariff level.

3.3 Enforceability of a customs union or a free trade area at the Nash

Next, we solve for the cutoff discount rate starting from optimal tariff equilibrium. The gain from cooperating is slightly different in this case since countries in a customs union or a free trade area do not have the same optimal tariff as individual countries. Starting from trade war, the condition

for a customs union to be feasible is

$$W(t^n,t^n,0,t^{cu},t^n,t^n)+ \sum_{\tau=1}^{\infty} W(t^n,t^n,t^n,t^n,t^n,t^n)\delta^{\tau} \leq \sum_{\tau=0}^{\infty} W(0,t^{cu},0,t^{cu},t^n,t^n)\delta^{\tau}. \qquad (15)$$

The first term on the left hand side is the gain from deviating for one period and charging the Nash tariff to both of the other countries (since there is no agreement with the third country), while the partner country complies. The second term is the punishment phase. The right hand side is the gain from complying and charging the optimal customs union external tariff to the non-member and no tariff to the partner. Plugging t^{cu}, t^n, and equation (4) into equation (15) and solving, we find that in order to achieve a customs union in one step from the Nash, it must be the case that: $\delta \geq \frac{1890}{3239} = 0.58$.

The same approach can be used to solve for the cutoff discount rate needed in order for a free trade area to be feasible. The comparable condition is

$$W(t^n,t^n,0,t^{ft},t^n,t^n)+ \sum_{\tau=1}^{\infty} W(t^n,t^n,t^n,t^n,t^n,t^n)\delta^{\tau} \leq \sum_{\tau=0}^{\infty} W(0,t^{ft},0,t^{ft},t^n,t^n)\delta^{\tau}. \qquad (16)$$

Plugging t^{ft}, t^n, and equation (4) into equation (16), it reduces to: $\delta \geq \frac{70}{117} = 0.60$.

A customs union is easier to enforce than a free trade agreement. This is a result of the difference in external tariffs. The gain from complying with zero bilateral tariffs is higher under the customs union optimal tariff than under the free trade area optimal tariff, since a customs union internalizes the positive effect on partner country profits.

3.4 Multilateral free trade

In this section, we examine the desirability and enforceability of achieving free trade. Free trade is desirable if it leads to an expansion in welfare.

$$W^{FT}(0,0,0,0,0,0) \geq W(t,t,t,t,t,t). \qquad (17)$$

From equation (4), the gain in welfare from moving to free trade, W^{FT}, given the tariff level is t, is

$$W^{FT} - W = \frac{1 - c + t}{8a} > 0. \tag{18}$$

Hence, there are gains from moving to free trade for all positive symmetric tariffs. The gain in welfare is purely an efficiency gain (the shaded area in Figure 5). As tariffs fall, we get closer to the efficient outcome, implying that the welfare gain from the move to free trade is smaller at low tariff levels.

Multilateral free trade is sustainable only if the following condition holds

$$W(t^n, t^n, 0, 0, 0, 0) + \sum_{\tau=1}^{\infty} W(t^n, t^n, t^n, t^n, t^n, t^n)\delta^{\tau} \leq \sum_{\tau=0}^{\infty} W(0, 0, 0, 0, 0, 0)\delta^{\tau}. \tag{19}$$

The first term on the left hand side of (19) is the welfare from deviating for one period, the second term is the discounted welfare during the Nash punishment phase, and the right hand side represents the present discounted value of complying with free trade forever. Solving, condition (19) yields

$$\delta \geq \frac{15}{28} = 0.54.$$

If $\delta < 0.54$ free trade cannot be achieved. The discount rate needed to support free trade is not dependent on the given tariff level, t, implying tariff reduction has no effect on the ability to achieve free trade.

The discount rate needed to enforce either a customs union or a free trade agreement from the optimal tariff equilibrium is higher than the discount rate needed to achieve multilateral free trade. Hence, if free trade is not feasible neither is a bilateral agreement, given countries set tariffs optimally. However, if countries can cooperate on partial tariff reduction, a PTA may become feasible as the result of the tariff reduction.

4   Extensions

In this section, we examine the results under strategies of tariff reduction that are compatible with GATT rules. We allow for status quo punishment, incomplete tariff reduction, and for more countries in the rest of the world. We find that the results are robust to these additions.

4.1   Status-quo punishment and partial liberalization

WTO restraints do not permit a country to return to the Nash in order to retaliate, all a country can do is apply its external tariff. In addition, institutional constraints may prevent the country that deviates from choosing the optimal tariff, instead it will likely install the outside tariff. Therefore, a deviation from the PTA may be more realistically modelled as maintaining the pre-PTA tariff level, i.e. refusing to enact the proposed tariff reductions, while the punishment regime would involve only a return to the status quo. In this case, the condition for cooperation to be feasible is altered because the gains from deviation and punishment are changed. The gains from deviation are reduced, making cooperation easier than the standard case; but, the severity of the punishment regime is also reduced, making cooperation more difficult. Thus, it is not clear whether PTA formation will be facilitated or harmed by these constraints.

In addition, PTAs formed under the enabling clause of the GATT allow for large partial—as opposed to complete—liberalization. This will reduce the gains from cooperation because preferential treatment is less intense. Allowing for status-quo deviation and punishment, and incomplete preferential liberalization, the agreement is sustainable provided the following condition is satisfied

$$W(t,t,(1-x)t,t,t,t)+ \sum_{\tau=1}^{\infty} W(t,t,t,t,t,t)\delta^{\tau} \leq \sum_{\tau=0}^{\infty} W(1-x)t,t,(1-x)t,t,t,t)\delta^{\tau}, \qquad (20)$$

where x is the tariff reduction factor. Solving yields

$$\delta \geq \frac{6(1-c) - 20t + 21xt}{-24t + 18xt + 12(1-c)}. \tag{21}$$

Equation (21) is decreasing in t provided $x > 2/3$. In particular, with complete liberalization, $x = 1$ equation (21) becomes

$$\delta \geq \frac{6(1-c) + t}{12(1-c) - 6t}. \tag{22}$$

From equation (21) and (22), the PTA becomes easier to enforce as the tariff level falls, provided tariffs are reduced by at least 67 percent. The punishment is less severe when tariffs are low. The gain from deviating is lower and the gain from committing is independent of the trigger strategy and is in general greater when tariffs are low. The latter two dominate and commitment becomes more likely as tariffs fall.

Proposition 4 *Under status quo deviation and punishment, a PTA becomes easier to enforce as tariffs fall. Moreover, provided the tariff reduction exceeds 67 percent, PTAs are more easily enforced as tariffs decline.*

4.2   More than three countries

As the number of countries in the rest of the world increases, the beneficial effects of joining a PTA will change. Indeed, we have seen that the customs union tariff can exceed the individual country tariff if the number of firms outside the union is large. In this section, we show that even if the number of countries is large, the cutoff discount rate needed to enforce a bilateral agreement is increasing in the tariff level. For simplicity, we assume that the external tariff level is uniform at t, that there are $n + 2$ countries each with one firm, and that there are no other PTAs in the world. We also assume punishment and deviation are associated with installing the multilateral tariff level.

With uniform tariff level, t, across countries, welfare in country X is

$$W(t) = \frac{((2+n)(1-c)-(n+1)t)^2}{2a\,(n+3)^2} + \frac{(1-c+(n+1)t)^2}{(n+3)^2\,a} + (n+1)\frac{(1-c-2t)^2}{(n+3)^2\,a} + (n+1)t\frac{1-c-2t}{(n+3)\,a}.$$

(23)

The first term in equation (23) is consumer surplus in the home market, the second term is profits at home, the third term is profits in non-member countries, and the final term is tariff revenue.

Under a bilateral agreement, holding other external tariffs constant at t, welfare in country X is

$$W^{bil}(t) = \frac{((2+n)(1-c)-nt)^2}{2a\,(n+3)^2} + \frac{2\,(1-c+nt)^2}{(n+3)^2\,a} + n\frac{(1-c-2t)^2}{(n+3)^2\,a} + nt\frac{1-c-3t}{(n+3)\,a}.$$

(24)

The first term in equation (24) is consumer surplus in the home market, the second term is profits in the bloc countries, the third term is profits in non-member countries, and the final term is tariff revenue.

Welfare if country X deviates from a bilateral agreement is

$$W^{cheat}(t) = \frac{((2+n)(1-c)-(n+1)t)^2}{2a\,(n+3)^2} + \frac{(1-c+(n+1)t)^2}{(n+3)^2\,a} + \frac{(1-c+nt)^2}{(n+3)^2\,a} +$$

$$n\frac{(1-c-2t)^2}{(n+3)^2\,a} + (n+1)t\frac{1-2t-c}{(n+3)\,a}.$$

(25)

The first term in equation (25) is consumer surplus in the home market, the second term is profits at home, the third term is profits in the other bloc country, the fourth term in profits in non-member countries, and the final term is tariff revenue.

The union is sustainable provided

$$W^{cheat}(t) + \sum_{\tau=1}^{\infty} W(t)\delta^{\tau} \leq \sum_{\tau=0}^{\infty} W^{bil}(t)\delta^{\tau},$$

Solving, yields

$$\delta \geq \frac{6(1-c)+2n^2t+8nt-9t}{8(1-c)+2n^2t-8t+4n(1-c)}.$$

For all n greater than or equal to one (3 or more countries), the cutoff discount rate needed to enforce the union is still increasing in the tariff level ($\frac{d\delta}{dt} > 0$).

Proposition 5 *With many symmetric countries and symmetric external tariffs, a bilateral agreement is easier to enforce as the tariff level falls.*

The intuition is similar to the previous case. The severity of the punishment and the gain from deviation decline as the tariff level falls. The gain from cooperation initially rises as tariffs fall from the optimum. The impact of the tariff level on deviation and cooperation outweigh the effect on the punishment regime, and the agreement is easier to enforce as tariffs fall. One additional benefit, in this case, is that preferential access is granted over more firms, yielding a larger incentive effect than when there is only one country outside the region.[15]

5 Conclusion

While the conventional wisdom is that the recent proliferation of PTAs is in part a response to the failure of the GATT, this model suggests the opposite. That is, many of the current partnerships may actually be a result of the success of the GATT in lowering tariffs. According to this model, the decline in tariffs over the last 40 years has increased both the incentive to join a PTA and the likelihood that the agreement is sustainable. We show that at low tariff levels, market share gains from regional agreements can dominate the loss in competition to such an extent that they are preferred by member countries to free trade. Moreover, since the gain from complying with a PTA is greater at a low tariff level, difficulties in enforcing PTAs ease as tariffs fall. As a result, every round of multilateral tariff reductions should be met with an expansion in the number of PTAs.

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[15]This is analogous to Krishna's (1998) result that when the rest of the world is large, there is more trade diversion, and producer's support for bilateral liberalization is great.

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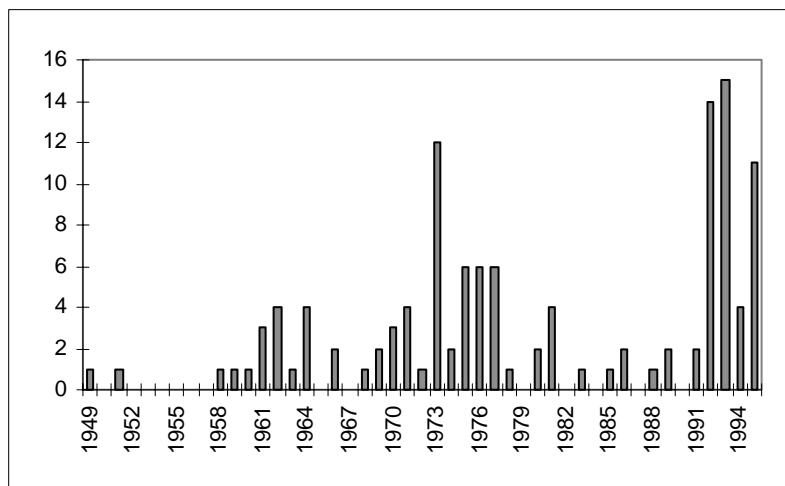
Figure 1: Fig. 1. PTAs approved under Article XXIV or the Enabling Clause of the GATT. Source: Bhagwati and Panagariya (1996).
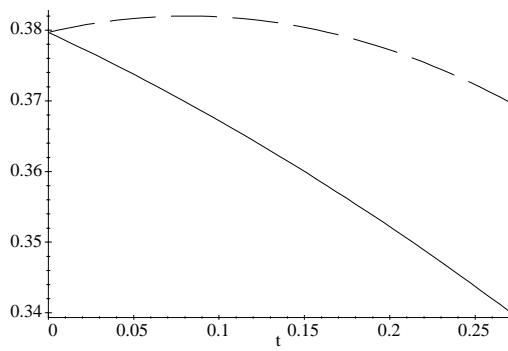
Fig. 2. Welfare in a PTA vs. individual country welfare at multilateral tariff level t. (a=1, c=0.1, - - - is welfare in a PTA, — is welfare of an individual country)
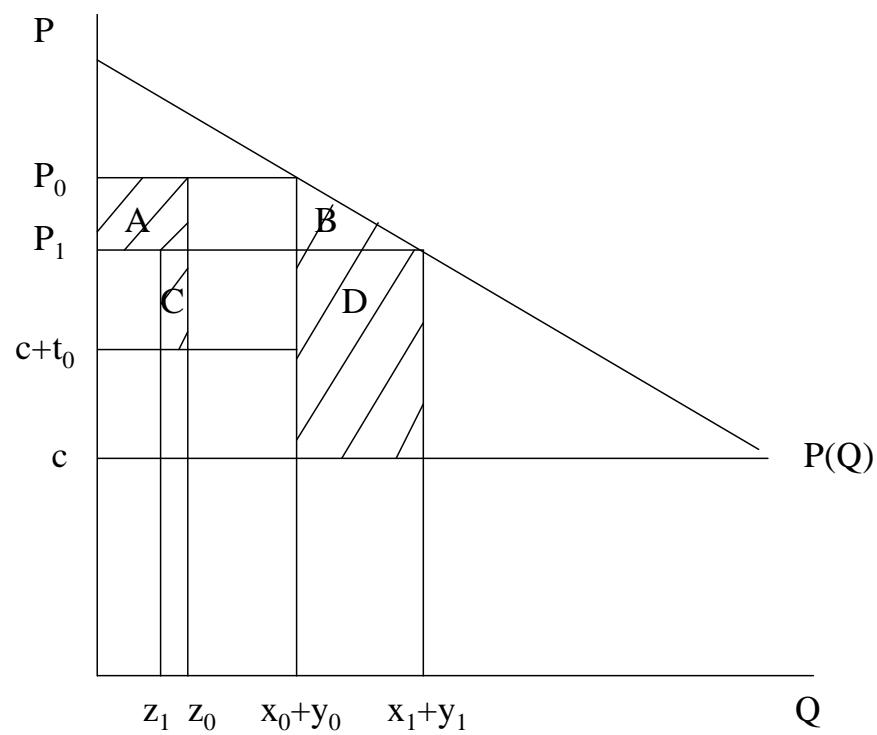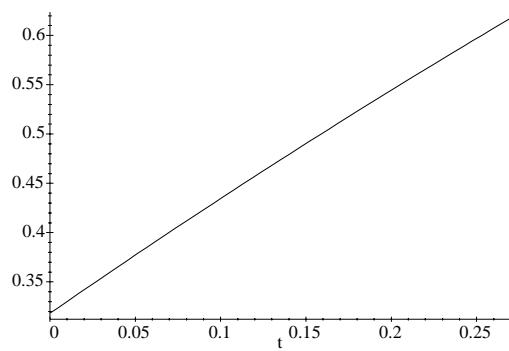
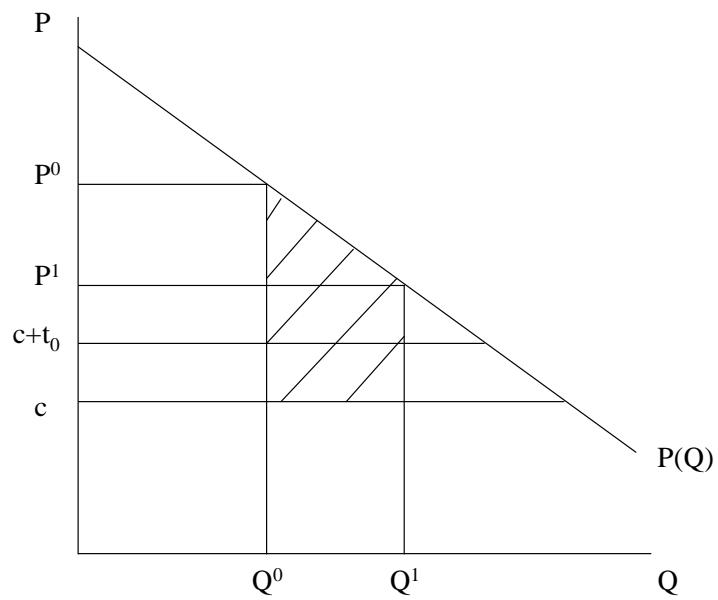Fig. 3. Preferential Trade Agreement

Fig. 4. Tariff reduction and discount rates $(c = 0.1)$

Figure 2: Fig. 5. Multilateral tariff reduction