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TARIFF PROTECTION AND TRADE AGREEMENTS

Abstract

This paper studies the optimal tariff rates on goods imported from the rest of the world when a commercial club accepts a new partner. It shows that when a new member is accepted into the club, members of a free trade agreement have incentives to reduce tariffs on the rest of the world's goods. However, when the trade agreement is a custom union, the union may have incentives to increase the common external tariff. This happens when the industry of the Custom Union is small compared to the world industry.

Resumen

Este documento estudia las tasas óptimas en los aranceles de bienes importados del resto del mundo cuando un club comercial acepta un nuevo socio. Esto muestra que cuando un nuevo miembro es aceptado para formar parte del club, los miembros del tratado de libre comercio tienen incentivos para reducir los aranceles en los bienes del resto del mundo. Sin embargo, cuando el tratado de comercio es una unión aduanera, la unión puede tener incentivos para incrementar el arancel externo común. Esto sucede cuando la industria de la Unión Aduanera es pequeña comparada con la industria mundial.

Introducción

The formation of the European Union (EU) and the North American Free Trade Agreement (NAFTA) is incomplete from several points of view. One of them is the process of acceptance of new countries as members of these Commercial Clubs (CC). Poland, Hungary, and other east European countries have applied to be members of the EU and Chile is bargaining to be a member of the NAFTA. An important reason, among many others, of this desire to belong to a CC is that non-member countries may face a greater difficulty to export to "a closer CC". This is so because trade agreements are by nature discriminators: lower tariff and non-tariff barriers are enjoyed only by the partner nations of the trade agreement, while non-member nations still face trade barriers. But, do commercial clubs actually have incentives to be closer to the rest of the world when they accept a new member? The objective of this paper is to answer this question. Specifically, we study how tariff policy to non-member country changes when a commercial club accepts a new member.

We show that, in the context of a homogeneous-product Cournot Oligopoly, a member of a Free Trade Agreement (FTA)[1] has incentives to reduce tariff on goods from non-member countries when a new member is accepted in the agreement. However, when the trade agreement is a Custom Union (CU)[2], the Union may have incentives to increase common external tariff. This happens when the industry of the CU is small compared to the world industry.

These results are related to Richardson (1993), who argues that a reason why most trade agreements do not contemplate common external tariffs may be that member countries can partially avoid the cost of trade diversion[3] by reducing their external tariffs, while in a CU this autonomy is lost. Medrano (1998) extend this result under the assumption of imperfect competition and shows that in a CU the cost of trade deviation can also be reduced. However, these works contemplate just two countries bargaining a trade agreement.

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[1] An FTA is formed by removing tariffs on trade among member nations and giving members autonomy in setting their tariffs on trade with non-member countries.

[2] A CU removes tariffs on trade among member nations and applies a common tariff structure to trade with non-members.

[3] Trade diversion arises because identical goods traded inside member countries face different tariffs, depending on whether their country of origin is a member or not of the trade agreement. A complementary definition is as follow: trade diversion arises when imports increase from a less efficient source. See Richarson (1993), El-Agraa (1989) and Romero (1991).

With several countries, the acceptance of a new member diverts trade due to the reduction of sales of goods from non-member countries. Then, as in Richardson (1993) and Medrano (1998), the incentive to reduce tariff on goods from non-member countries arises to mitigate the negative effect of trade diversion. However, a CU contemplates all member countries' firms, so the protectionist incentive[4] in a CU is greater than in a FTA and this incentive is greater the lesser the industry of the CU is.

The paper is organized as follows: Section 2 introduces the basic model. Section 3 develops the optimal trade policy in a CU. Section 4 develops the FTA case, and section 5 shows some concluding remarks.

The Model

We call a "commercial club" any kind of trade agreements among several countries. There are two types: Custom Unions (CU) and Free Trade Agreements (FTA). Let M be the set of all countries and let C be the set of countries belonging to the commercial club. Let m be the number of countries in C. The industry in question is an oligopoly producing a homogeneous good. In country $i \in M$ there are n_i firms. Country residents own firms. The number of firms in the commercial club is $n = n(m) = \sum_{i \in C} n_i$ and the total number of firms is $N = \sum_{i \in M} n_i$. The product or good is produced from a numeraire. The production technology shows constant returns to scale. All firms have the same unitary cost of production, c. The market of the good represents just a small part of the whole economy, so changes in this market do no affect other good prices and the income effects can be neglected. There are no initial endowments of the consumption good; thus, the firms must produce it. Initial endowments of numeraire belong to the representative consumer of each country.[5]

Under the assumption of partial equilibrium, we can develop a cuasi-linear model with two goods: the consumption good and the numeraire. The representative consumer of country $i \in C$ has the utility function:

$$u_i(z_i, y_i) = v_i(z_i) + y_i \qquad (1)$$

where z_i denotes the consumption good, y_i represents the numeraire and $v_i(\bullet)$ is an increasing function. The budget constraint is given by $p_i z_i + y_i \leq \omega_i + Y_i$, where p_i is the price of consumption good, ω_i is the value of initial endowments of numeraire and Y_i

[4] Brander and Spencer (1984) study the protectionist incentive trade policy. They show that tariff protection can shift some of pure profits (coming from imperfect competition) from foreign to domestic firms and, in addition, tariff can transfer foreign rents to domestic (CU) treasure in the form of tariff revenue.

[5] For a discussion of partial equilibrium models see Mas-Colell, Whinston and Green (1995, chap. 10).

represents other sources of wealth. The FOC (First Order Condition), derived from the consumer utility maximization problem, is given by $p_i = v_i'(z_i)$ which also represents inverse demand of the consumption good. Demand is linear, so, $p_i' = -\lambda_i$ where λ_i is a positive constant. Note that the greater λ_i the smaller the demand will be.

We focus on the member country's market and ignore the market of the rest of the world[6]. Firms in a non-member country face a tariff rate t_i for their exports to country $i \in C$. Due to the assumption that the unitary cost of production is equal for all firms, there are just two kinds of firms: firms that belong to member countries and firms that belong to non-member countries. Profits of each kind of firm coming from sales in member countries are, respectively:

$$\Pi = \sum_{i \in C} \Pi_i = \sum_{i \in C} (p_i - c) x_i \qquad (2)$$

$$\Pi^* = \sum_{i \in C} \Pi_i^* = \sum_{i \in C} (p_i - c - t_i) x_i^* \qquad (3)$$

where Π_i and Π_i^* are profits coming from sales in country $i \in C$, x_i and x_i^* denote quantities of the good produced to sell in country $i \in C$. Competition concept is Cournot.

Since the consumer is the owner of the firms, and he/she receives tariff revenue[7], the Y_i value; other sources of wealth, is given by:

$$Y_i = n_i \Pi + R_i \qquad (4)$$

where R_i is the tariff revenue. From (1), (4) and the budget constraint, the country i welfare is given, safe of a constant term, by:

$$W_i = v_i(z_i) - p_i z_i + n_i \Pi + R_i \qquad (5)$$

That is, the sum of net consumer surplus, firm profits and tariffs revenues. First we analyze the CU case. Later we analyze the FTA case.

Custom Unions.

When the club is a CU the tariff t_i is common and we assume that is chosen to maximize the total welfare of member countries. Let t be the common tariff rate. We also assume that the market of the member countries is integrated. This implies that the price is the same in all member countries. Let p be the common price and $p' = -\lambda$, where $1/\lambda = \sum_{i \in C} 1/\lambda_i$. Note that $\lambda = \lambda(m)$. Profits (2) and (3) become:

$$\Pi = (p - c)x \qquad (6)$$

$$\Pi^* = (p - c - t)x^* \qquad (7)$$

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[6] We are assuming that the commercial club market and the rest of the world market are independent.

[7] In a CU all member countries share total tariff revenue according to some transferring criteria. In an FTA tariff revenue is not shared.

where $x = \sum_{i \in C} x_i$ and $x^* = \sum_{i \in C} x_i^*$. Tariff revenue from imports to the CU is given by:

$$R = (N - n)tx^* \tag{8}$$

The welfare of the union is given summing up the welfare of member countries:

$$W = \sum_{i \in C} v_i(z_i) - pz + n\prod + (N-n)tx^*$$

(9)

where $z = \sum_{i \in C} z_i = nx + (N-n)x^*$. Let $t^*=t(m)$ be the optimal tariff coming from the maximization of (9). An implicit expression for $t(m)$ is shown in the next lemma.

Lemma 1: *The optimal value of $t(m)$ is given by:*

$$t(m) = (2n(m)+1)\lambda(m)x^*(t(m),m)$$

(10)

Proof: See Appendix.

Expression (10) indicates that the optimal tariff rate is positive[8]. The optimal change of t, due to the acceptance of a new member in the commercial club, can be approached computing the derivative of t with respect to m: $t'(m)$. We take into account that a new member increases both: the union market size, $\lambda'(m)$, and the number of firms into the union, $n'(m)$. In the linear demand case we assume that the increase of the demand implies a flatter slope. Previous to obtain $t'(m)$, we compute the partial derivatives of x and x* with respect to m:

Lemma 2: *Let $\lambda'(m)=-\alpha$, $\alpha>0$, be the increase of the CU market size due to the acceptance of a new member (the change in the slope of the demand curves), and let $n'(m)=r$ be the number of firms in the new country. Then, the changes in x, x* and z for an increase in m are given by:*

$$x_m^* = \left\{\frac{\alpha}{\lambda} - \frac{(2n+1)r}{N+1}\right\}x^*$$

(11)

$$x_m = \left\{\frac{2(n+1)\alpha}{\lambda} - \frac{(2n+1)r}{N+1}\right\}x^*$$

(12)

$$z_m = \left(\alpha z + \frac{rt}{N+1}\right)/\lambda$$

(13)

[8] See Brander and Spencer(1984) for a similar result.

Proof: See Appendix.

Note that the sign of z_m is positive. This means that the acceptance of a new member increases total output. However, the sign of x_m* and x_m are ambiguous and would be positive if the size of the new member market, α, is big enough with compared to its industry size and the industry size of CU. The change in t due to a change in m is given in the next proposition.

Proposition 1: *The optimal change in t due to the acceptance of a new member in the Custom Union is given by:*

$$t'(m) = \lambda kx^* r\left(1 - \frac{4n(n+1)}{2N+1}\right)$$

(14)

where k is a positive constant.
Proof: See Appendix

Proposition 1 indicates that when the number of firms in the CU is small compared to the total number of firms, the CU increases the tariff rate on goods imported from non-member countries. In other case, the tariff is reduced. We will explain this result below. First we analyze the FTA case.

Free Trade Agreement

When the club is a FTA, each member chooses its own tariff rate to maximize its own welfare without taking into account the welfare of its partners. We assume that the markets of the member countries are segmented. This assumption together with constant marginal cost implies that equilibrium in market i is independent of the equilibrium of market j, i,j$\in$C, and the profits of country i's firms coming from sales in other countries are not affected by their government tariff policy. (See Dixit, 1984, Brander and Spencer 1984). The tariff revenue is given by $R_i=(N-n)t_ix_i^*$. The welfare, safe of a constant term, is given by:

$$W_i = v_i(z_i) - p_i z_i + n_i \prod_i + (N-n)t_i x_i^*$$

(15)

The next lemma shows an expression for the optimal tariff coming from the maximization of (15):

Lemma 3: *The optimal value of $t_i(m)$ is given by:*

$$t_i(m) = \frac{(2n_i+1)\lambda_i x_i^*(t_i(m),m)}{2(n(m)-n_i)+1}$$

Proof: See Appendix.

Differentiating implicitly t_i with respect to m approaches the optimal change in t_i due to the acceptance of a new member in the FTA. In this case, the change of market size, and profits of the new member firms are not taken into account by the country i. The next proposition shows the result:

Proposition 2: *The acceptance of a new member in a FTA gives the incentives to member countries to reduce tariff on goods from the rest of the world, that is $t_i'<0$.*

Proof: See Appendix

This result indicates that when a new country is accepted as a member of a FTA, each member country has incentives to reduce tariff on goods from third countries, even if there are not any trade agreements with them. The intuition of propositions 1 and 2 is as follow; The acceptance of a new member triggers two effects on member country welfare. First, a trade creation effect because of the increase of sales of new member firms, and second, a trade diversion effect because of the reduction of sales from non-member countries. The incentive to reduce the tariff rate arises to mitigate the negative effect of trade diversion. However, a CU contemplates firms from all member countries and a greater market size, then the protectionist incentive in a CU is greater than in a FTA. That is, a greater tariff shifts some of pure profits from foreign to member countries firms. In addition, tariff can transfer foreign rents to CU treasure in the form of tariff revenue. These gains are greater the greater the non-member country industry is.

Conclusions

This paper studies the optimal changes of tariff rates on goods imported from the rest of the world when a commercial club accepts a new partner. It considers both: free trade agreements and custom unions. In the context of a homogeneous-product Cournot Oligopoly, it shows that a member of a free trade agreement has incentives to reduce tariff on goods coming from non-member countries when a new member is accepted in the agreement. However, when the trade agreement is a custom union, the union may have incentives to increase the common external tariff. This results are related to Richardson (1993), who argues that a reason why most trade agreements do not contemplate common external tariffs may be that member countries can partially avoid the cost of trade diversion by reducing their external tariffs, while in a CU this autonomy is lost. Medrano (1998) extends this result under the assumption of imperfect competition and shows that in a CU the cost of trade deviation can also be reduced. However, these works contemplate just two countries bargaining a trade agreement.

Appendix

Proof of lemma 1: The FOC coming from profit maximization of (6) and (7) are given, respectively, by:

$$p-\lambda x=c \qquad A1$$

$$p-\lambda x^{*}=c+t \qquad A2$$

The total output is given by:

$$z=nx+(N-n)x^{*} \qquad A3$$

Summing A1 and A2 for all firms and using A3 becomes:

$$Np-\lambda z=Nc+(N-n)t \qquad A4$$

Differentiating A4 with respect to t and solving for the derivative of z with respect to t we get:

$$z_t=-\frac{(N-n)}{(N+1)\lambda} \qquad \text{A5}$$

Differentiating A1 and using A5 we obtain:

$$x_t=\frac{(N-n)}{(N+1)\lambda} \qquad \text{A6}$$

In a similar way, differentiating A2 and usingA5, we get:

$$x_t^{*}=-\frac{(n+1)}{(N+1)\lambda} \qquad \text{A7}$$

The FOC coming from the maximization of Welfare given by (9) is:

$$W_t=\frac{N-n}{N+1}\left[nx+(n+1)x^{*}-\frac{(n+1)t}{\lambda}\right]=0 \qquad \text{A8}$$

The second order conditions is:

$$W_{tt}=-\frac{N-n}{(N+1)^2\lambda}\left[2(n+1)^2+(N-n)\right]<0$$

Then, the solution of A8 is a maximum.

Substracting A1 from A2:

$$\lambda(x-x^{*})=t \qquad A9$$

From A8 and A9:

$$x=2(n+1)x^{*}$$

A10

Then

$$t=(2n+1)\lambda x^{*}$$

A11

Proof of lemma 2:

Let $p=b-\lambda z$ be the inverse demand and $\lambda'(m)=-\alpha$ the increase of the market size for the acceptance of a new member. Then

$$\frac{dp}{dm} = -\lambda z_m + \alpha z$$

A12

Differentiating A4 with respect to m and solving for z_m we obtain:

$$z_m = \frac{\alpha z}{\lambda} + \frac{rt}{(N+1)\lambda}$$

A13

From the differentiation of A1 with respect to m and using A12 and $\lambda'(m) = -\alpha$, then

$$-\lambda z_m + \alpha z - \lambda x_m + \alpha x = 0$$

A14

From A13 and A14,

$$x_m = \frac{\alpha x}{\lambda} - \frac{rt}{\lambda(N+1)}$$

A15

In a similar way, form the differentiation of A2 with respect to m and using A13 we get:

$$x_m^* = \frac{\alpha x^*}{\lambda} - \frac{rt}{\lambda(N+1)}$$

A16

Substituting t from A11 into A13, A15 and A16 and solving we get the expressions (11), (12) and (13).

Proof of Proposition 1:

The differentiate of (10) is given by:

$$t'(m) = (2n+1)(\lambda \frac{dx^*}{dm} + \lambda' x^*) + 2\lambda x^* n'(m)$$

A17

An expression for $\frac{dx^*}{dm}$ is given by:

$$\frac{dx^*}{dm} = x_t^* t'(m) + x_m^*$$

From A7 and (11) we get:

$$\frac{dx^*}{dm} = -\frac{n+1}{(N+1)\lambda} t' + \left\{ \frac{\alpha}{\lambda} - \frac{(2n+1)r}{N+1} \right\} x^*$$

A18

Substituting A18, $\lambda'(m) = -\alpha$ and $n'(m) = r$ into A17 and solving for t', then

$$t'(m) = k\lambda r x^* \left(1 - \frac{4n(n+1)}{2N+1} \right)$$

A19

where $k = \dfrac{2N+1}{N+1+(2n+1)(n+1)}$.

Proof of Lemma 3:

We focus on profits coming from sales in the market of country $i \in C$. Profits of a member firm are given by:

$$\Pi_i = (p_i - c)x_i$$

And profits of a non-member firm are:

$$\Pi_i^* = (p_i - c - t_i)x_i^*$$

FOC from profit maximization are, respectively:

$$p_i - \lambda_i x_i = c$$

A20

$$p_i - \lambda_i x_i^* = c + t_i^*$$

A21

Total sales in market $i \in C$ are:

$$z_i = nx_i + (N-n)x_i\,*$$

A22

Differentiating with respect to t_i.

$$z_{it} = nx_{it} + (N-n)x_{it}\,*$$

A23

Differentiating FOC respect to t_i,

$$-\lambda_i z_{it} - \lambda_i x_{it} = 0$$

A24

$$-\lambda_i z_{it} - \lambda_i x_{it}* = 1$$

A25

Solving system A23, A24 and A25 we obtain:

$$z_{it} = -\frac{N-n}{(N+1)\lambda_i}, \qquad x_{it} = \frac{N-n}{(N+1)\lambda_i} \qquad x_{it}* = -\frac{n+1}{(N+1)\lambda_i}$$

A26

FOC from Welfare maximization (15) are:

$$(2n_i - n)x_i + (n+1)x_i * - t_i(n+1)/\lambda_i = 0$$

A27

From A20 and A21 we have

$$t_i = \lambda_i(x_i - x_i*)$$

A28

From A27 and A28 we get (16).

Proof of Proposition 2

In this case, country i does not take into account the change in market size due to the acceptance of a new member. Then, we let $\alpha = 0$ in A15 and A16 to obtain:

$$x_{im} = x_{im}^* = -\frac{rt_i}{\lambda_i (N+1)}$$

A29

From implicit function theorem we have that $t_i' = -\frac{W_{tm}}{W_{tt}}$, then, $Sign(t_i'(m)) = Sign(W_{tm})$. Computing W_{tm} and using A29, we get:

$$W_{tm} = -\frac{rt_i}{\lambda_i}\left\{2 + \frac{2n_i + 1}{N+1}\right\} < 0$$

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