TARIFF PROTECTION AND TRADE AGREEMENTS

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Resumen: El presente artículo analiza los cambios en los aranceles óptimos, sobre bienes importados del resto del mundo, cuando un club comercial acepta a un nuevo miembro. Muestra que cuando el club comercial es un Tratado de Libre Comercio, la aceptación de un nuevo socio da incentivos a los países miembros a reducir sus aranceles sobre bienes procedentes del resto del mundo. Sin embargo, cuando se trata de una Unión Aduanera, la unión puede tener incentivos a incrementar el arancel externo común. Esto ocurre cuando la industria de la unión es pequeña en relación con la industria de los países que no son miembros de la misma.

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, the other 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.

1. Introduction

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 Euro-

pean countries have applied to be members of the EU and Chile is bargaining to be a member of the NAFTA. An important reason for this desire to belong to a CC is that non-member countries may face a greater difficulty when exporting to "a closer CC". This is because trade agreements are by nature discriminators: lower tariff and non-tariff barriers are enjoyed only by the partner nations of the trade agreement. But, how does the entry of a new member affect the optimal tariff on imports from non-members? The objective of this paper is to answer this question.

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 oligopolistic 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 negotiating a trade agreement.

Just as in the case of two countries, with several countries, the acceptance of a new member may divert 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 tariffs on goods from non-member countries arises to mitigate the negative effect of trade diversion. However, a CU contemplates all member countries' firms,

[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 Richardson (1993), El-Agraa (1989) and Romero (1991).

so the protectionist incentive[4] in a CU is greater than in a FTA and this incentive is greater the lesser the oligopolistic industry of the CU.

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

2. The Model

We call a "commercial club" any kind of trade agreement among several countries. There are two basic 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. We examine the effects on one industry, an oligopoly producing a homogeneous good. In country $i \in M$ there are n_i firms. The firms are owned by residents of the country in which they are located. 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 not 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:

$$u_i(z_i, y_i) = v_i(z_i) + y_i \tag{1}$$

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

[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 the domestic may, CU treasury in the form of increased tariff reVenue.

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

$p_i z_i + y_i \leq \omega_i + Y_i$, where p_i is the price of consumption good, ω_i is the value of initial endowments of numeraire and Y_i 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:

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

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

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 of the budget contraint, is given by:

$$Y_i = n_i \Pi + R_i \tag{4}$$

where R_i is the tariff revenue. From (1), (4) and the budget constraint, the country i welfare less initial endowments is given, by:

$$W_i = v_i(z_i) - p_i z_i + n_i \Pi + R_i \tag{5}$$

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

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.

3. Custom Unions

When the club is a CU, the tariff t_i applied to imports of the consumption good 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:

$$\prod = (p - c)x \tag{6}$$

$$\prod^* = (p - c - t)x^* \tag{7}$$

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:

$$W = \sum_{i \in C} v_i(z_i) - pz + n\prod + (N - n)tx^* \tag{9}$$

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:*

$$t(m) = (2n(m) + 1)\lambda(m)x^*(t(m), m) \tag{10}$$

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 in the union, $n'(m)$. In the linear demand case we assume that the increase in demand implies a flatter slope. Before obtaining $t'(m)$, we compute the partial derivatives of x and x^* with respect to m:

LEMMA 2. *Let* $\lambda'(m) = -\alpha$, $\alpha > 0$, *be the increase in the size of the* CU *market 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 *caused by this increase in* m *are given by:*

$$x_m^* = \left\{\frac{\alpha}{\lambda} - \frac{(2n+1)r}{N+1}\right\} x^* \tag{11}$$

$$x_m = \left\{\frac{2(n+1)\alpha}{\lambda} - \frac{(2n+1)r}{N+1}\right\} x^* \tag{12}$$

$$z_m = \left(\alpha z + \frac{rt}{N+1}\right) / \lambda \tag{13}$$

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 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:*

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

$$t'(m) = \lambda kx^* r\left(1 - \frac{4n(n+1)}{2N+1}\right) \tag{14}$$

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 the opposite case, the tariff is reduced. We will explain this result below. First we analyze the FTA case.

4. 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 independent of each other. This assumption, together with the assumption of constant marginal cost implies that equilibrium in market i is independent of the equilibrium of market j; where $i, j \in C$, 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 $R_i = (N-n)t_i x_i^*$. The welfare, less initial endowments, is given by:

$$W_i = v_i(z_i) - p_i z_i + n_i \prod_i + (N-n)t_i x_i^* \tag{15}$$

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:*

$$t_i(m) = \frac{(2n_i+1)\lambda_i x_i^*(t_i(m), m)}{2(n(m)-n_i)+1} \tag{16}$$

PROOF. See Appendix.

Differentiating t_i implicitly with respect to m approximates the optimal change in t_i due to the acceptance of a new member in the FTA. In this case, the change in market size, and in the 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 provides the incentives to member countries to reduce the 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 they have no trade agreements with them. The intuition of propositions 1 and 2 is as follows: the acceptance of a new member triggers two effects on the welfare of member countries. First, a trade creation effect because of the increase of sales of the new member's firms, and second, a trade diversion effect because of the reduction in sales from non-member countries. By reducing the tariff rate the negative effect of trade diversion can be somewhat mitigated. However, since 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 more of the pure profits from foreign to member countries' firms. In addition, a tariff can transfer foreign rents to CU treasuries in the form of increased revenues. These gains are greater the greater the size of the non-member country industry.

5. Conclusions

This paper studies the optimal changes in 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 its tariff on goods coming from non-member countries when a new member is accepted in the agreement. However, when the trade agreement is a cus-

tom union, the union may have incentives to increase the common external tariff depending on the size of the new member. These results are related to Richardson (1993), who argues that one 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 negotiating a trade agreement.

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Appendix

PROOF OF LEMMA 1. The FOC coming from profit maximization of (6) and (7) are given, respectively, by:

$$p - \lambda x = c \qquad \text{A1}$$

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

Total output is given by:

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

Solving for x and x^* in A1 and A2 and substituting into A3, we have:

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

Differentiating A4 with respect to t and solving for z_t we get:

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

Differentiating A1 with respect to t and substituting A5 we obtain:

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

In a similar way, differentiating A2 with respect to t and substituting A5, we get:

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

The FOC for welfare maximization 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 condition is:

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

Thus, the solution to A8 is a maximum. Substracting A1 from A2:

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

Solving for λ in A9 and substituting into A8:

$$x = 2(n + 1)x^* \qquad \text{A10}$$

Similarly, solving for x in A8 and substituting in A9:

$$t = (2n + 1)\lambda x^* \qquad \text{A11}$$

■

PROOF OF LEMMA 2. Let $p = b - \lambda z$ be the inverse demand and $\lambda'(m) = -\alpha$ the increase of the market size following the acceptance of a new member. Then

$$\frac{dp}{dm} = -\lambda z_m + \alpha z \qquad \text{A12}$$

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

$$z_m = \frac{\alpha z}{\lambda} + \frac{rt}{(N+1)\lambda} \qquad \text{A13}$$

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

$$-\lambda z_m + \alpha z - \lambda x_m + \alpha x = 0 \qquad \text{A14}$$

Substituting A13 into A14 and solving for x_m,

$$x_m = \frac{\alpha x}{\lambda} - \frac{rt}{\lambda(N+1)} \qquad \text{A15}$$

In a similar way, by differentiating A2 with respect to m and substituting A13 we get:

$$x_m^* = \frac{\alpha x^*}{\lambda} - \frac{rt}{\lambda(N+1)} \qquad \text{A16}$$

Substituting A11 into A13, A15 and A16 and solving for x_m^*, x_m, and z_m, respectively, we get the expressions (11), (12) and (13). ■

PROOF OF PROPOSITION 1. The differentiate of (10) is given by:

$$t'(m) = (2n+1)(\lambda \frac{dx^*}{dm} + \lambda' x^*) + 2\lambda x^* n'(m) \qquad \text{A17}$$

Solving for $\frac{dx^*}{dm}$ we obtain:

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

Substituting A7 and (11) into the above equation we get:

$$\frac{dx^*}{dm} = -\frac{n+1}{(N+1)\lambda} t' + \left\{ \frac{\alpha}{\lambda} - \frac{(2n+1)r}{N+1} \right\} x^* \qquad \text{A18}$$

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

$$t'(m) = k\lambda r x^* \left(1 - \frac{4n(n+1)}{2N+1} \right) \qquad \text{A19}$$

where

$$k = \frac{2N+1}{N+1+(2n+1)(n+1)}$$

PROOF OF LEMMA 3. We focus on profits coming from sales in 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 for profit maximization are, respectively:

$$p_i - \lambda_i x_i = c \qquad \text{A20}$$

$$p_i - \lambda_i x_i^* = c + t_i^* \qquad \text{A21}$$

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

$$z_i = nx_i + (N-n)x_i^* \qquad \text{A22}$$

Differentiating with respect to t_i,

$$z_{it} = nx_{it} + (N-n)x_{it}^{*} \qquad \text{A23}$$

Differentiating the FOCS (A20 and A21) respect to t_i

$$-\lambda_i z_{it} - \lambda_i x_{it} = 0 \qquad \text{A24}$$

$$-\lambda_i z_{it} - \lambda_i x_{it}{}^{*} = 1 \qquad \text{A25}$$

Solving the system of equations A23, A24 and A25 we obtain:

$$z_{it} = -\frac{N-n}{(N+1)\lambda_i}, \quad x_{it} = \frac{N-n}{(N+1)\lambda_i}, \quad x_{it}{}^{*} = -\frac{n+1}{(N+1)\lambda_i} \qquad \text{A26}$$

The FOC for welfare maximization (15) is:

$$(2n_i - n)x_i + (n+1)x_i{}^{*} - t_i(n+1)/\lambda_i = 0 \qquad \text{A27}$$

From A20 and A21 we have

$$t_i = \lambda_i(x_i - x_i{}^{*}) \qquad \text{A28}$$

Finally, solving for x_i in A28 and substituting into A27 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:

$$x_{im} = x_{im}{}^{*} = -\frac{rt_i}{\lambda_i(N+1)} \qquad \text{A29}$$

From the implicit function theorem we know that $t_i' = -\frac{W_{tm}}{W_{tt}}$, then we know that the sign of $t_i'(m)$ is equal to the sign of W_{tm}. Computing W_{tm} and substituting A29, we get:

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