Regional Blocs and Foreign Direct Investment[*]

Shabtai Donnenfeld
York University

March 23, 1998

Abstract

This paper examines the impact of the emergence of regional blocs (customs unions) on the patterns of inter-bloc and intra- bloc trade when firms have the option to engage in direct investment (FDI). The consequences of bloc formation for exogenously given external tariffs is examined first. When two regional blocs co-exist and firms have the option to engage in FDI, all inter-bloc trade may cease - *complete trade diversion* that is replaced by inter-bloc FDI - *investment creation.* In such an event the volume of world trade declines but this is more than offset by the increase in world output due to direct investment. Hence, total world output is the same as under free trade. Second, I investigate the optimal tariff that a trading bloc levies on imports from nonmember countries. The equilibrium tariffs resulting from a non cooperative game played by the trading blocs is restricted by the option to circumvent the tariff via two-way direct investment. Small set-up cost associated with FDI leads to low tariffs and the outcome is almost free trade. Moderate set-up cost restrain the regional blocs from mutually harming one another through an escalation in the tariff war. Finally, the formation of two regional blocs enhances the welfare of all countries.

JEL Classification Numbers: F02, F12, F21.

[*]Donnenfeld: York University – Department of Economics, 4700 Keele Street, North York, ONT. M3J 1P3   Canada.   Phone (416) 736-2100 ext. 22407   Fax (416) 736-5987   e-mail donnenfd@yorku.ca

1. INTRODUCTION

Recent proliferation of regional trading blocs, NAFTA, Mercosur (South America), LAIA (Latin America), ASEAN (South East Asia), etc. awakened and renewed the interest in the economics of integration which was initiated by Viner (1950). Studies by Kemp and Wan (1976), Kenan and Riezman (1990), YI (1996) and Bond and Syropolous (1997) focus on the impact of trading blocs formation on the patterns of trade, resource allocation and welfare when countries only trade in goods. The emergence of free trade areas also generate incentives for non-member countries to penetrate the trading blocs common markets by establishing new plants and serve them with goods produced within, i.e., via foreign direct investment (FDI). This incentive is stronger the higher the tariffs imposed on imports from non-member countries are.

For example, due to participation in the European Union, Spain and Portugal benefitted significantly from inflow of foreign direct investment. In contrast, European countries that are not members of the EU (Sweden, Switzerland, Austria, Finland and Norway) experienced the opposite trend of flows of foreign direct investment. In another example, in anticipation of the enactment of NAFTA, multinational firms from Japan, Germany, Sweden etc., undertook large scale direct investment in Canada, U.S. and Mexico. These facts indicate that the creation of regional blocs induce significant changes in the patterns of trade and investment.

In this paper I present a framework within which I focus on the impact of regional blocs formation on the patterns of trade and foreign direct investment (FDI). First I examine the consequences of bloc formation given that the common external tariffs are fixed. When two regional blocs co-exist and the option to engage in FDI is present, I find that all inter-bloc trade may cease - *complete trade diversion* and is supplanted by inter-bloc FDI - *investment creation.* In such an event the volume of world trade declines but this is more than offset by the increase in world output due to direct investment. Furthermore, total world output is the same as under free trade. The option to undertake direct investment in other trading blocs renders the barriers to inter-bloc trade redundant.

Next I turn to examine the trading bloc optimal external tariff. I find that the non-bloc firms' option to circumvent the tariff via direct investment limits the

regional bloc effectiveness in levying tariffs. In fact, the optimal tariff is lower and is set at the level that prevents FDI by non-bloc members. When two regional blocs co-exist and international tariff cooperation is not feasible, each bloc has the incentive to levy a tariff on imports from the other bloc. It turns out that the option to circumvent the tariff via two-way direct investment has a significant impact on the outcome of a tariff war in which the two trading blocs may engage, when coordination among tariff setting authorities is not feasible.[1] Focusing on the equilibrium tariffs resulting from a non cooperative game played by the trading blocs, I find that when the set-up cost associated with direct investment are small, the option to engage in FDI creates a tight constraint, and consequently the tariffs tend to zero - the outcome is almost free trade. Moderate set-up cost restrain the regional blocs from mutually harming one another through an escalation in the tariff war that could take place if the option to engage in FDI was absent.

Our conclusions regarding the welfare effects resulting from the formation of regional blocs differ significantly from those reached by Krugman (1991), Bhagwati and Panagariya (1996), Winters (1996) and others. Krugman, for example, argued that as the number of trading blocs decreases, and the world becomes more integrated, two effects come into play: (i) trade diversion - less trade takes place across trading blocs and (ii) each bloc raises the tariff on imports from nonmember countries relative to what they were prior to integration. The combination of these effects leads to a reduction in economic welfare of all countries.

The difference between our conclusion and Krugman's stems from the presence of new channels through which the interacting trading blocs are affected. This is captured by the firms "threat" to penetrate the other bloc common market by undertaking direct investment and thus circumvent the barriers to inter-bloc trade. In a recent survey of the issues involved in the comparison between multilateralism and regionalism Ethier (1997) also argues, although for quite different reasons, that the emergence of regional trading blocs (regional arrangements in his terminology) is beneficial. This is so since not integrated less developed countries will enter in regional arrangements that result in reforms and liberalized trade, in order to attract direct investment from developed countries.

---

[1]The formation of trading blocs can have an effect on the extent to which bilateral or multilateral tariff cooperation can be reached. This issue is not addressed this paper. See Bagwell and Staiger (1997) who analyze the effects of free-trade agreements on multilateral tariff cooperation.

In the next section the basic framework is presented. Sections 3 and 4 focus on partial integration, a single trading bloc has been formed while the rest of the world remains not integrated. Section 5 examines the case where two trading blocs co-exist. I state the conditions which are conducive to two-way direct investment. In the following section I examine the welfare effects resulting from the formation of two trading blocs and highlight the important role played by the firms' option to engage in FDI. Within the context of a tariff game played by the trading blocs, the equilibrium tariffs are derived and characterized. I contrast these tariffs with those that would have been chosen if the option to engage in direct investment was not present. Concluding remarks are presented in the final section of the paper.

2. THE FRAMEWORK

There are n countries, and each has a single firm. Each firm is producing a good that is sold in its domestic market and also in $n-1$ foreign markets either by exporting or by setting up a plant and service the host country consumers with goods produced in this plant, *FDI*. If firm i engages in exports, is subject to a specific tariff t. If firm i builds a plant in the host country it incurs a set up cost F. The size of each country's market is captured by parameter A^j which appears in the demand function $D = A^j P(X^j)$ where X^j are the total sales in country j.

Initially there is no economic integration among any subset of countries. In the non-integrated world firm i located in country i is facing potential competition from $n-1$ foreign firms. The non integrated scenario will not be examined in this paper. It just serves us as a starting point for the analysis that follows. Suppose that m countries, where $m < n$ form a regional bloc. The nature of integration depends on whether it takes the form of a free trade area – each country can set its own tariff on imports from non-member countries, or a custom union – all member countries set a common tariff on imports from non-member countries.

In this paper we shall consider the case of a custom union – common external tariffs. After the regional bloc has been formed firms of bloc member states are exempted from tariffs when they export to each other. However, their exports to non-member countries are subject to a tariff. The formation of a regional bloc creates an expanded common market which has implications for the behavior of

each of the n firms, i.e., whether they engage in exports or in FDI. After the emergence of a regional bloc, non-member firms have the incentive to penetrate the regional bloc by building a plant in one of the member countries, incur just once a set up cost F and produce output that will be sold in all member countries markets.[2] The elimination of trade barriers on intra-bloc trade leads to increased competition among all firms that are active in the common market. Furthermore, bloc member firms compete on equal footing against each other whereas $n - m$ non-bloc member firms are adversely affected since they are subjected to tariffs, which create a competitive disadvantage while competing against the former firms. The combination of these effects leads to erosion in profits and may dissuade non-member firms from investing in a plant and incur the set up costs. A member state firm, which initially exported to countries that now belong to the regional bloc, will be less likely to switch from exports to FDI. The reason is quite simple; since member firms now are exempted from tariffs, their option to export becomes even more profitable than FDI. Furthermore, the reduction in profitability due to intense competition discussed earlier reinforces the advantage to export to other member countries.

In general, countries may differ in several important respects; size, tariff rates, consumer's preferences for goods etc. Firms also may differ in their cost of production, set up cost of building new plants and cost of transportation. Hence, several cases can arise: (i) The symmetric case: All countries and firms are identical (equal market size, equal tariffs, identical marginal cost and set up cost, and zero cost of transportation). (ii) The asymmetric case: countries may differ in the tariff levels and firms differ in their cost of production. In this paper we investigate the symmetric case only.[3]

---

[2]The assumption that marginal cost is constant implies that there is no advantage in establishing more than one plant. If marginal cost were rising firms may have the incentive to build several plants to serve the regional bloc countries.

[3]Recently, several authors have extended Krugman's model by incorporating various kinds of asymmetries such as differences in country size, cost of transportation, and tariffs. Asymmetries however, entail complexities and thus analytical results are difficult if not impossible to obtain. See Frankel and Wei (1996) and Spilimbergo and Stein (1998) for simulation analysis of trading blocs formation in the presence of asymmetries.

3. The formation of a regional bloc:

A subset of $m < n$ countries form a regional bloc, $\mathcal{A}$. Two possibilities arise for the non-bloc members firms:

• *Exports scenario*: each of these firms continue to export to countries that now belong to bloc $\mathcal{A}$.

• *FDI scenario*: build one plant within the borders of the common market and service the entire market with goods produced in this plant.

Exports scenario: Firms $m \in \mathcal{A}$ are exempted from tariffs on intra-bloc trade, but are subject to a tariff (as in the pre-common market era) when they export to the remaining $n - m$ countries. The total profits of a member state firm $k = 1, 2..., m$ are:

$$
\begin{aligned}
\pi_k &= x_k^k P\left(x_k^k + (m-1)x_k^i + (n-m)x_f^k\right) + (m-1)x_k^i P\left(x_k^i + (m-1)x_i^i + (n-m)x_f^i\right) \\
&+ (n-m)x_k^f P\left(x_k^f + (m-1)x_i^f + (n-m)x_j^f\right) - t(n-m)x_k^f \\
&- c_k[x_k^k + (m-1)x_k^i + (n-m)x_k^j]
\end{aligned} \tag{1}
$$

The total profits of a non-bloc member firm $f = m+1, ..., n$ are:

$$
\begin{aligned}
\pi_f &= x_f^f P\left(x_f^f + mx_i^f + (n-m-1)x_j^f\right) + mx_f^i P\left(x_f^i + mx_k^i + (n-m-1)x_j^i\right) \\
&+ (n-m-1)x_f^j P\left(x_f^j + x_j^j + mx_i^j + (n-m-2)x_f^j\right) \\
&- tmx_f^i - c_f[x_f^f + (n-m-1)x_f^j + mx_f^i]
\end{aligned} \tag{2}
$$

where x_k^i, x_k^j are the quantities that a member firm k exports to countries i and j respectively and x_f^i, x_f^j are the quantity that a nonmember firm f exports to countries i and j, respectively.[4]

Foreign direct investment: After incurring a set up cost F a non bloc member firm sets up a plant in the common market and serves all member countries with

---

[4]Throughout the paper subscripts (superscript) i and k denote the identity of bloc member firms (countries) while f and j identify the non bloc member firms (countries), interchangeably.

goods produced in this plant. In this case firm's f total profits are:

$$\begin{aligned}
\pi_f &= x_f^f P\left(x_f^f + mx_i^f + (n-m-1)x_j^f\right) \\
&+ mx_f^i P\left(x_f^i + x_i^i + (m-1)x_k^i + (n-m-1)x_j^i\right) \\
&+ (n-m-1)x_f^j P\left(x_f^j + x_j^j + (n-m-2)x_J^j + mx_i^j\right) \\
&- c_f x_f^f - (c_f+t)(n-m-1)x_f^j - mc_f^i x_f^i - F
\end{aligned} \tag{3}$$

Firms that belong to the regional bloc are assumed to engage only in exports to non bloc member countries. This is because any single country country is too small to sustain FDI.[5] The profits of a bloc member firm k in the FDI scenario are:

$$\begin{aligned}
\pi_k &= x_k^k P\left(x_k^k + (m-1)x_i^k + (n-m)x_j^k\right) \\
&+ (m-1)x_k^i P\left(x_k^i + (m-1)x_i^i + (n-m-1)x_j^i\right) \\
&+ (n-m)x_k^j P\left(x_k^j + (m-1)x_i^j + (n-m-1)x_f^j\right) \\
&- c_i[x_k^k + (m-1)x_k^i] - (n-m)[c+t]x_k^j
\end{aligned} \tag{4}$$

4. Equilibrium Analysis

To be able to provide a complete characterization of the equilibrium outcome we assume a linear demand function, $P = A - X$, where P is the price and X denotes the total quantity sold in a market. After the regional bloc has formed the external tariff on imports from nonmember countries is preserved whereas the tariff on imports from member states is abolished. Hence, partial integration emerges where m national markets integrate and $n - m$ countries remain not integrated. Due to the symmetry assumption, identical countries and identical firms, the equilibrium values are the same in each member state market, $i \in \mathcal{A}$. In addition, due to the assumption that marginal cost of production are constant, levying tariffs imports from nonmember states, leads to segmented markets; the

---

[5]The conditions that lead to exports only are presented in the next section.

common market $\mathcal{A}$ and the nonmember national markets are segmented. This simplifies the analysis greatly since it suffices to examine in detail the equilibrium in a representative national market i only.

I assume that firms simultaneously choose the mode of entry in a market, via exports or FDI, and also simultaneously select output.[6]

First, I consider the case where the tariff on imports from nonmember countries is exogenous. Later, in section 6 I will examine the case where tariffs are endogenously determined in a game played by the regional blocs trade policy authorities.

Equilibrium of the exports game: Assuming that tariffs are exogenous and since the common market and the non bloc countries' markets are segmented, the analysis focuses on the competition among firms within the regional bloc $\mathcal{A}$ only. Firm's j profit maximization problem in the Cournot exports game in common market $\mathcal{A}$ is

$$\max_{x_j^i} \pi_j^{\mathcal{A}} = m x_j^i [A - x_j^i - m x_k^i - (n - m - 1)x_j^i] - m[c + t]x_j^i.$$

Similarly, the profit maximization problem of a bloc member firm k, is

$$\max_{x_k^i} \pi_i^{\mathcal{A}} = m x_k^i [A - x_i^i - (m - 1)x_k^i - (n - m)x_f^i] - c[x_i^i + (m - 1)x_k^i]$$

The equilibrium values of the exports game are

$$
\begin{array}{rclcrcl}
\hat{x}_k^i & = & \dfrac{A - c + t(n - m)}{n + 1} & \qquad & \hat{P}^i & = & \dfrac{(A + nc) + t(n - m)}{n + 1} \\[2ex]
\hat{x}_j^i & = & \dfrac{A - c - t(m + 1)}{n + 1} & \qquad & \hat{X}^i & = & \dfrac{n(A - c) - t(n - m)}{n + 1} \\[2ex]
\hat{\pi}_k^i & = & \left[\dfrac{(A - c) + t(n - m)}{n + 1}\right]^2 & \qquad & \hat{\pi}_j^i & = & \left[\dfrac{(A - c) - t(m + 1)}{n + 1}\right]^2
\end{array}
\qquad (5)
$$

---

[6]The alternative to simultaneous moves game would be a sequential game. This particular sequence of moves is adopted by Donnenfeld and Weber (1996) who focus on strategic aspects in a game of entry deterrence. They examine a domestic oligopoly which is facing potential competition from a foreign firm in the former firms home market. If I were to adopt the sequential moves paradigm the main conclusions that I reach in this paper would be similar. However, the analysis would become more complex.

for $i = 1, 2, ..., m$ and $j = m + 1, ..., n$. It is obvious that $\hat{\pi}_k^i > \hat{\pi}_j^i$ because member firms enjoy a competitive advantage relative to nonmember firms. This advantage is due to external tariff imposed on imports from non bloc member countries.

Equilibrium of the FDI game: If the formation of regional bloc $\mathcal{A}$ induces the non- bloc firms to establish a plant within the regional bloc, all firms compete on equal footing since tariffs are circumvented and the cost of production are assumed to be identical across firms.

Bloc member and non-bloc firms profit maximization problem respectively, is

$$\max_{x_i^{\mathcal{A}}} \pi_i^{\mathcal{A}} = m \left[x_i^i [A - (x_i^i - (m-1)x_k^i - (n-m)x_f^i)] - cx_i^i \right]$$

$$\max_{x_f^i} \pi_j^i = m \left[x_j^i [A - x_j^i + mx_k^i + (n - m - 1)x_f^i] - cx_j^i \right] - F$$

The equilibrium values of the Cournot game with FDI are:

$$
\begin{aligned}
\tilde{x}_k^i &= \tilde{x}_j^i = \frac{A - c}{n + 1} & \tilde{X}^i &= \frac{n(A - c)}{n + 1} \\
\tilde{P}^i &= \frac{A + cn}{n + 1} & \tilde{\pi}_k^i &= \tilde{\pi}_j^i = \frac{(A - c)^2}{(n + 1)^2}
\end{aligned}
\tag{6}
$$

So far we derived the equilibrium values in the two scenarios, exports and the FDI contingent games. Assuming that tariff, set up cost and the size of the market are such that both options are viable, the equilibrium outcome of the overall game depends on the interplay between t, A, and F.

Proposition 1. *Let the range of tariffs and set-up cost be such that $t \leq \frac{(A-c)}{m+1}$ and $F \leq \frac{m(A-c)^2}{(n+1)^2}$. Non bloc member firms will (a) export to common market $\mathcal{A}$ if $t \leq \tilde{t}$ and (b) will engage in FDI if $t > \tilde{t}$.*

Proof: Each firm $f = (m+1), ..., n$ will be indifferent between exports and FDI if $m\tilde{\pi}_j^i - F = m\hat{\pi}_j^i$. After using the expressions for $\tilde{\pi}_j^i$ and $\hat{\pi}_j^i$ stated in (5) and (6) we get

$$\Omega_j^{\mathcal{A}}(t; A, m) = F \tag{7}$$

where $\Omega_j^{\mathcal{A}}(t; A, m) = m\tilde{\pi}_j^i - m\hat{\pi}_j^i = \frac{2mt(m+1)(A-c) - mt^2(m+1)^2}{(n+1)^2}$. Solving equation (7) for t we get

$$\tilde{t} = \frac{A - c}{m + 1} - \frac{\alpha}{m(m + 1)} \tag{8}$$

where $\alpha = [m^2(A - c)^2 - m(n + 1)^2 F]^{1/2} \geq 0$. Note that α is non-negative since the condition that ensures the viability of FDI requires that $\frac{m(A-c)^2}{(n+1)^2} \geq F$.

When $t \leq \tilde{t} \rightarrow \Omega_j^{\mathcal{A}}(t; A, m) \leq F$. Thus, a non-bloc member firm optimal strategy is to export $\hat{x}_j^i$ and each bloc member firm's best response is to produce $\hat{x}_k^i$. If $t > \tilde{t} \rightarrow \Omega_j^{\mathcal{A}}(t; A, m) > F$ and firm's j optimal strategy is FDI. In this event firm j output is $\tilde{x}_j^i$ and each member firm best response is to produce $\tilde{x}_k^i$. $\square$

The analysis above presumes that bloc member firms do not find it viable to establish a plant in any non bloc country. This is because firm's i gross profits from FDI in country j do not cover the set up cost F. That is $\pi_i^j = (A-c)^2/(n+1)^2 < F$.

To highlight the impact of the set-up cost on the range of tariffs that support either export or FDI in the common market, we compare two levels of fixed cost, $F_0 < F_1$.

Proposition 2. *The larger the set up cost the higher is the critical tariff $\tilde{t}$ and thus the narrower is the range of tariffs that are conducive to FDI.*

In Figure 1 we depict the critical tariff rates $\tilde{t}_0(m, F_0) < \tilde{t}_1(m, F_1)$ that delineate the range of tariffs that are conducive to exports from those which lead to FDI.

We turn now to examine the consequences of an expansion of the common market resulting from: (a) an increase in the size of the national economies while keeping the number of bloc members fixed; and (b) an enlargement of the common market resulting from new members joining the regional bloc.

Proposition 3. *(a) Given that the number of bloc members is kept fixed, an increase in their economies leads to FDI for a wider range of tariffs. (b) As new countries join the regional bloc, the enlargement of the common market renders exports rather than FDI to be the more likely outcome.*

Proof of Propositions 2-3: Differentiating $\tilde{t}(A, m, F)$ with respect to each argument yields: $\frac{\partial \tilde{t}(F, \cdot)}{\partial F} > 0$, $\frac{\partial \tilde{t}(A, \cdot)}{\partial A} < 0$ and $\frac{\partial \tilde{t}(m, \cdot)}{\partial m} > 0$. A sufficient condition for the last inequality to hold is $\frac{m(A-c)^2}{(n+1)^2} \geq F$.[7] $\square$

---

[7] This condition is satisfied since it reflects the viability of FDI stated in proposition 1.

The intuitive explanation for the results stated in Propositions 2-3 is as follows: higher set up cost enhances the profitability of exports relative to FDI by outside firms. This stems from the fact that bloc member firms take a more aggressive stand in their competition with outside firms, that is reflected through larger levels of output. This in turn makes it more difficult for outside firms to recoup the fixed cost associated with FDI.

A pure increase in the size of the common market enhances the profitability of both exports and FDI. A larger market however, makes it easier for outside firms to recoup the fixed cost and thus FDI becomes the relatively more profitable mode of serving the common market.

The expansion of the common market resulting from new countries joining the regional bloc has mixed effects on the profitability of FDI. On one hand new national markets can be served now with output produced in the plant built behind the tariff wall; this enhances the profitability of FDI. On the other hand, new member countries endow their firms with the same competitive advantage the original members have and thus results in more intense competition among bloc member firms. This in turn reduces the nonmember firms prospective profits from FDI. Since the negative effect on profits due to increased competition dominates, exports become the more likely outcome, for a wider range of tariffs. This is portrayed in Figure 2, where the curve $\Omega_j^{\mathcal{A}}(m_0)$ lies above the curve $\Omega_j^{\mathcal{A}}(m_1)$ and thus the critical tariff $\tilde{t}_1(m_1) > \tilde{t}_0(m_0)$ for $m_1 > m_0$.

5. TWO REGIONAL BLOCS

I turn now to examine the consequences of the emergence of a second trading bloc. The mechanism which leads to the formation of two regional blocs is not explicitly dealt with since it would require an analysis of endogenous bloc formation which is an issue that will be tackled in future work. Suppose that two blocs were to form: bloc $\mathcal{A}$ includes countries $i = 1, 2..., m$ and bloc $\mathcal{B}$ encompasses countries $j = m+1, ..., n$. Firms in bloc $\mathcal{A}$ may now engage in FDI by building a plant in the common market of bloc $\mathcal{B}$. This will happen if the profits from direct investment exceed the profits from exports to $n - m$ countries in bloc $\mathcal{B}$. That is,

$$\Omega_i^{\mathcal{B}}(\tilde{t}^{\mathcal{B}}) \geq F \tag{9}$$

where $\Omega_i^{\mathcal{B}} = \frac{2t(n-m)(n-m+1)(A-c)-t^2(n-m)(n-m+1)^2}{(n+1)^2}$. The properties of the function $\Omega_i^{\mathcal{B}}(t, n-m)$ and $\Omega_j^{\mathcal{A}}(t, m)$ are presented in the appendix.

Foreign direct investment in bloc $\mathcal{B}$ will take place if the external tariff by bloc $\mathcal{B}$ is high enough; that is $t \geq \tilde{t}^{\mathcal{B}}$. Otherwise, bloc $\mathcal{A}$ firms will refrain from direct investment and will continue to export to countries in bloc $\mathcal{B}$. The critical tariff where the switch from exports to FDI occurs is found by solving (9) for $t^{\mathcal{B}}$. Hence,

$$\tilde{t}^{\mathcal{B}} = \frac{A-c}{n-m+1} - \frac{\beta}{(n-m)(n-m+1)} \tag{10}$$

where $\beta = [(n-m)^2(A-c)^2 - (n-m)(n+1)^2 F]^{\frac{1}{2}}$.

Two-way FDI: When two trading blocs co-exist and each bloc levies a tariff on imports from outside the bloc, a new possibility arises; firms from one bloc may undertake direct investment in the other trading bloc. Combining (7) and (8) with (9) and (10) enables us to state the following:

Proposition 4. *If the tariff levied by each trading bloc on imports from countries outside its bloc exceeds their respective critical tariffs, i.e., $t^{\mathcal{A}} > \tilde{t}^{\mathcal{A}}$ and $t^{\mathcal{B}} > \tilde{t}^{\mathcal{B}}$, then inter-bloc trade is replaced by two-way direct investment.*

The emergence of two blocs in effect integrates national markets in two large trading blocs. If regional integration invites FDI from non bloc countries the outcome is equivalent to a fully integrated world economy. That is, the combined output of the two regional blocs is equal to the world output that would have been produced if all countries were to form a single bloc. Put differently, if the conditions are such that the world is divided into two regional blocs, the barriers to inter-bloc trade become redundant, since firms from one trading bloc penetrate the other bloc common market via FDI. The switch from exports to FDI entails an outcome which is equivalent to world wide free trade. This result is reminiscent of the conclusion reached by Mundell (1957) where he showed that trade in goods and international capital mobility are perfect substitutes. Mundell obtained this result within a framework of perfect competition and constant returns to scale. Our result is derived from a model of imperfect competition and economies of scale (due to fixed cost). Hence, the notion that free trade in goods and international capital mobility are perfect substitutes seems to be quite general. This conclusion

however, is based on the presumption that tariffs in both trading blocs are fixed. In the next section I will investigate whether two-way direct investment arises when tariffs are endogenously determined.

From the firms' perspective, the impact of two-way FDI on profits are mixed: on one hand engaging in FDI yields higher profits from foreign markets when compared to profits attained through exports. On the other hand profits from domestic sales decline since the formation of regional blocs gives other bloc member firms unhindered access to its domestic market. Furthermore, firms that are outside the regional bloc (they belong to the second bloc) increase their sales in this country's market, since they also switch from exports to FDI. This intensifies competition in each country's domestic market and thus lowers profits.

The formation of two regional blocs does not necessarily lead to two way FDI. Whether two-way FDI occurs hinges on two factors; difference in tariffs rates levied by each trading bloc and the extent to which the regional blocs differ in size. Thus, we have

Proposition 5. *The more similar in size the trading blocs are the more likely that two way FDI will occur.*

Proof: Assume the set-up cost is F_0 and suppose that $m < n - m$. Then $\tilde{t}^{\mathcal{B}}(n-m, F_0) > \tilde{t}^{\mathcal{A}}(m, F_0)$. This is a corollary of Proposition 3. If the trading blocs actual tariffs lie in the overlapping range $[\tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}}]$ then two-way direct investment will be observed. However, if differences in set up cost or difference in tariffs are large enough, then the range of tariffs that are conducive to direct investment in both trading blocs becomes narrower and thus two-way FDI will not occur. □

Figure 3 portrays the case where the tariff which triggers a switch from exports to FDI in regional bloc $\mathcal{B}$ is higher than in bloc $\mathcal{A}$, $\tilde{t}^{\mathcal{B}} > \tilde{t}^{\mathcal{A}}$. At first glance, this appears to be a counter-intuitive result; that is, FDI is more likely to be undertaken in the smaller regional bloc. The explanation for this is: competition among firms is more intense in the trading bloc that contains a larger number of countries bloc $\mathcal{B}$, and thus bloc $\mathcal{A}$ firms are less likely to recover the set-up cost. Hence, it takes a higher tariff to trigger direct investment in the larger trading bloc.

6. WELFARE ANALYSIS:

In the preceding sections it was assumed that tariffs are fixed. In this section we provide answers to the following question: how are the regional blocs external tariffs chosen ? To get an answer we proceed in two steps: first we analyze the optimal tariff for the case where a single trading bloc exists. Second, the case were two trading blocs co-exist is examined. The regional blocs tariff setting authorities simultaneously choose the tariff levied on imports from the other trading bloc.

To derive the optimal tariff we need to define a bloc member national welfare for two scenarios: (a) the formation of a trading bloc induces non-bloc members to engage in direct investment and (b) FDI does not materialize and firms from one trading bloc export to countries in the other bloc.

6.1. The regional bloc optimal tariff

(a) FDI in Regional Bloc $\mathcal{A}$: The national welfare of a country in regional bloc $\mathcal{A}$ is based on the sum of domestic consumers surplus and total profits from domestic sales and exports to other bloc members.

$$W_k^{\mathcal{A}} = \int_0^{\tilde{X}} P(z)dz - \tilde{X}^k P(\tilde{X}^k) + m\tilde{\pi}_k^i$$

After substituting in the welfare function the equilibrium values derived in section 4 we get

$$\tilde{W}_k^{\mathcal{A}} = \frac{(2m + n^2)(A - c)^2}{2(n + 1)^2} \tag{11}$$

Hence, the bloc's aggregate welfare is $\tilde{W}^{\mathcal{A}} = m\tilde{W}_k^{\mathcal{A}}$.

(b) Exports to Regional Bloc $\mathcal{A}$: The national welfare of a bloc member in the exports scenario consists of: domestic consumers' surplus, firm's i profits from domestic sales, exports to other bloc members and tariff revenues collected by the national government. Profits from exports by a bloc member firm to non bloc countries have not been included in the welfare function since it has no consequences for the analysis that we pursue here.[8] It turns out that there is no interdependence between the customs union tariff and the tariff set by non bloc

---

[8]This statement is elaborated and clarified in the next section.

member countries. [9]

When the customs union policy makers contemplate what tariff to impose on imports from the rest of the world they take into account the impact of the tariff on the game played by bloc member and non bloc member firms in each member state market. That is, the tariff's impact on the entire customs union is taken into account. The procedure used to derive the equilibrium tariff involves two steps. First, we derive the unrestricted optimal tariff; by doing that we ignore that a high enough tariff may trigger FDI in the common market. Second, we check whether the nonmember firms' option to engage in FDI is a constraint that binds the optimal tariff.

The customs union optimal tariff is obtained from the following maximization problem,

$$\max_t W^{\mathcal{A}}(t; m) = \max_t \left[m W_i^{\mathcal{A}}(t, m) \right]$$

Due to the assumption that bloc members are identical, the above maximization problem leads to the same solution as when the objective is to maximize the national welfare of a representative member. That is,

$$
\begin{aligned}
\max_t W_i^{\mathcal{A}}(t) \;=\;& U_i \left(\hat{x}_i^i(t) + (m-1)\hat{x}_k^i(t) + (n-m)\hat{x}_f^i \right) \\
& - \; [\hat{x}_i^i(t) + (m-1)\hat{x}_k^i(t) + (n-m)\hat{x}_j^i(t)]\hat{P}(\hat{x}_i^i(t) \\
& + \; (m-1)\hat{x}_k^i(t) + (n-m)\hat{x}_f^i(t)) + \hat{\pi}_i^i(t) + (m-1)\hat{\pi}_i^k(t)
\end{aligned}
\tag{12}
$$

The first order condition of national welfare maximization with respect to tariff is

$$
\begin{aligned}
\frac{\partial \hat{W}_i^{\mathcal{A}}(t)}{\partial t} \;=\;& \hat{U}'(\cdot)\frac{\partial \hat{X}^i}{\partial t} - \hat{P}(\cdot)\frac{\partial \hat{X}^i}{\partial t} - \hat{X}^i P'(\cdot)\frac{\partial \hat{X}^i}{\partial t} \\
& + \; \frac{\partial \hat{\pi}_i^i}{\partial t} + (m-1)\frac{\partial \hat{\pi}_k^i}{\partial t} + (n-m)\hat{x}_f^i + t(n-m)\frac{\partial \hat{x}_f^i}{\partial t} = 0
\end{aligned}
\tag{13}
$$

where $\hat{X}^i = m\hat{x}_k^i + (n-m)\hat{x}_f^i$. Substituting in (13) the equilibrium values of the

---

[9]Customs union optimal tariff on imports from a non member country was also examined by Gatsios and Karp (1994). They focus on the advantage of delegating the power to set the common external tariff to a member state that will take a more aggressive stand in the tariff game between customs union (two partners) and a third country. Delegation of power entails a strategic advantage since it enables the union to commit to a higher tariff.

exports game derived in section 4 and solving for the optimal tariff we get,

$$\hat{t}(m) = \frac{(m+n)(A-c)}{2m^2 + 3m + n + 2} \tag{14}$$

As expected, the regional bloc optimal tariff is positive and depends on m. Furthermore, the optimal tariff is decreasing in m. An enlargement of the regional bloc entails a lower common external tariff. Intuitively, the profit shifting motive for levying tariffs on imports from non bloc members, which also generate tariff revenues that are collected by bloc member governments becomes less important than the loss in consumers' surplus as the regional bloc gets larger. Furthermore, as the bloc expands fewer countries remain outside the regional bloc and thus the incentive to manipulate the tariff to extract rents from the remaining non bloc firms is reduced.

We turn now to check whether the customs union optimal tariff is affected by the non bloc firms option to engage in direct investment. If the optimal tariff were to be levied when the FDI option is present, non bloc firms will be enticed to circumvent the tariff by building a plant in the common market since $\hat{t}(m) > \tilde{t}(m, F)$. This will happen if the number of countries in the trading bloc is not too large, i.e., $m \leq n - 3$.[10] Thus we have

Result: *The non bloc member firms option to engage in FDI restricts the customs union optimal tariff. The highest level the optimal tariff can be set at is $\tilde{t}^A(m, F) < \hat{t}(m)$.*

The extent to which the constraint on the optimal tariff is binding depends on the number of the trading bloc members, m and the size of the set-up cost, F. Intuitively, when m is decreasing the unrestricted optimal tariff will tend to increase due to profit shifting motive discussed in Proposition 3. In addition to that the critical tariff that triggers the switch from exports to FDI is decreasing, due to the fact that lesser competition within the common market invites direct investment. The combination of these two effects entail a tighter constraint on the optimal tariff.

It is worthwhile to highlight the difference between the standard customs union

---

[10]To show this we make use of (8) and (14) and get $\hat{t}(m) - \tilde{t}(m) = \frac{m(n-m-2)-2}{(m+1)(2m^2+3m+n+2)} + \frac{\alpha}{m(m+1)}$. This expression is positive if $n \geq (m+2) + \frac{2}{m}$. This inequality holds for any $m \leq n - 3$.

optimal tariff, where the nonmember firms' option to undertake direct investment in the common market is not considered, and case where this option is present. In the later case there is a potential threat captured by the *tariff jumping* option, which has a significant impact on the trade-offs that come into effect while the customs union optimal policy is formulated. [11]

The regional bloc governing authority can, by selecting the appropriate policy, influence the overall equilibrium outcome in the direction it desires - either exports or FDI in the common market. It turns out that levying the tariff $\tilde{t}$, which preempts FDI, entails a higher level of national welfare than when FDI is accommodated if the trading bloc is not too large. We thus have,

Proposition 6. *The regional bloc optimal policy is to induce the exports equilibrium. (a) When $m \leq \frac{3n-10}{2}$ this equilibrium is supported by the restricted tariff and (b) when $m \geq \frac{3n-10}{2}$ the unrestricted optimal tariff also produces the exports equilibrium.*

Proof: (a) To ensure this outcome the tariff is set at $\tilde{t}^{\mathcal{A}}(m, F)$, where $\tilde{t}^{\mathcal{A}}(m, F) \leq \hat{t}^{\mathcal{A}}(m)$. In such an event, $\hat{W}(\tilde{t}^{\mathcal{A}}, F) > \tilde{W}^{\mathcal{A}}(m, F)$ if $m < \frac{3n-10}{2}$. See appendix for details. (b) When $m \geq \frac{3n-10}{2}$ the option to engage in direct investment does not pose an effective threat and thus the optimal tariff becomes feasible.   □

The explanation for the customs union preference for exports rather than FDI is the following: the restricted optimal tariff balances several trade-offs: it endows the bloc member firms with a competitive advantage relative to non bloc firms and thus enhances their profits. However, too high a tariff would be undesirable because it invites foreign entry via FDI. This in turn enhances the member countries consumers' surplus but it has a deleterious effect on the member firms' profits. At the optimum, the balance of these effects requires setting the tariff at the level $\tilde{t}$.

Even though the nonmember firms' option to engage in FDI restricts the optimal tariff, the restriction is relaxed as the number of countries in the trading bloc is increasing. This is a corollary of Proposition 3 and has the following explanation. A larger trading bloc entails two opposing effects: on one hand it increases the size of the common market and thus makes it easier for non bloc member

---

[11]See Kemp and Wan (1976) and YI (1996) and Bagwell and Staiger (1997) who examine the customs union optimal tariff for the case where the FDI option does not exist.

firms to recoup the fixed cost associated with FDI. Concomitantly, having more member countries also means that a larger number of firms enjoy free of tariffs access to bloc members national markets. This leads to stiffer competition which lowers profits and thus reduces the non bloc member firms' incentive to engage in FDI. The latter effect dominates and thus the tightness of the constraint on the optimal tariff is relaxed as the trading bloc encompasses more countries.

6.2. Tariff equilibrium with two regional blocs:

The formation of two trading blocs creates incentives for firms in each bloc to engage in direct investment in the other bloc common market. In view of this, each trading bloc will impose a tariff on imports from the other trading bloc in order to influence the outcome of the game played by member firms which compete with outside the bloc firms in its own common market. Consequently, the tariff setting authorities in the two trading blocs may engage in a tariff war. This is precisely the issue investigated by Krugman (1991) for the case where firms only export to other trading blocs. Krugman concluded that the fewer trading blocs there are (save the case of a single trading bloc) the higher is the equilibrium tariff. This in turn entails large losses in welfare due to extensive diversion of trade with outside the bloc firms.

We turn now to examine how the equilibrium tariffs are determined when two trading blocs co-exist. I extend Krugman's framework and enrich the analysis by incorporating FDI as an additional way to penetrate a foreign market. When direct investment is an alternative to exports, there are strong implications for the equilibrium tariffs. The prevailing pessimistic view is: the formation of regional trading blocs will lead to an escalation in the tariff war and thus severely reduce trade between blocs. It turns out the "threat" to invade the other bloc's common market has a significant impact and thus the tariff war outcome is far less damaging.

To show this we formulate a two stage game. In each stage players make decisions simultaneously. In the first stage, the central authority in each trading bloc is choosing a tariff.[12] In the second stage nonmember firms choose between

---

[12]The existence of central authority that sets the common external tariff should not be taken

exports and FDI, and also select the output associated with the option that was chosen, whereas bloc member firms decide how much to sell in their domestic market and how much to export to other member countries.[13]

We redefine the national welfare of a member in each bloc by also incorporating profits from exports to the other trading bloc countries. The national welfare of a member country $i \in \mathcal{A}$ is

$$W_i^{\mathcal{A}}(t^{\mathcal{A}}, m) = U_i(\hat{X}^i) - \hat{X}P(\hat{X}^i) + m\hat{\pi}_i^k + (n-m)\hat{\pi}_i^j + \hat{t}^{\mathcal{A}}(n-m)\hat{x}_j^i$$

where $\hat{\pi}_i^j = [\hat{P}(\hat{X}^j) - c - t^{\mathcal{B}}]\hat{x}_i^j$ and $t^{\mathcal{A}}$, $t^{\mathcal{B}}$ are the common external tariff that blocs $\mathcal{A}$ and $\mathcal{B}$ levy on imports from each other.

In a similar fashion, the national welfare of a member state $j \in \mathcal{B}$ is

$$\hat{W}_j^{\mathcal{B}}(t^{\mathcal{B}}, n-m) = U_j(\hat{X}^j) - \hat{X}^j P(\hat{X}^j) + (n-m)\hat{\pi}_j^f + m\hat{\pi}_j^i + \hat{t}^{\mathcal{B}}m\hat{x}_i^j$$

where $\hat{\pi}_j^i = [\hat{P}(\hat{X}^i) - c - t^{\mathcal{A}}]\hat{x}_j^i$. The tariff that bloc $\mathcal{A}$ and $\mathcal{B}$ will end up choosing is determined by the equilibrium of the tariff game. In this game each regional bloc chooses the tariff that maximizes the bloc's welfare, which is equivalent to maximizing the national welfare of a representative member country, while assuming that the rival trading bloc keeps its tariff constant. However, the tariff is constrained by the FDI option available to non bloc member firms. Specifically,

$$\max_{t^{\mathcal{A}}} W_i^{\mathcal{A}}(t^{\mathcal{A}}, t^{\mathcal{B}}) \qquad s.t. \qquad t^{\mathcal{A}} \leq \tilde{t}^{\mathcal{A}},$$

$$\max_{t^{\mathcal{B}}} W_j^{\mathcal{B}}(t^{\mathcal{A}}, t^{\mathcal{B}}) \qquad s.t \qquad t^{\mathcal{B}} \leq \tilde{t}^{\mathcal{B}}.$$

literally. Typically, a committee member countries' representatives formulate the customs union trade policy. The basic assumption in this model is that all countries are identical. Hence, potential disagreement among committee members cannot arise since what is good for one member is also good for all other members. Thus, the hypothesis regarding the commons union objective that we use in deriving the optimal tariff is well justified.

[13]For a review of studies that investigate tariff games in a bilateral setting see Brander (1995) and for multilateral tariff setting see Bagwell and Staiger (1993). In these studies the option to engage in FDI is not considered.

The first order conditions of welfare maximization are

$$\frac{\partial W_i^{\mathcal{A}}}{\partial t^{\mathcal{A}}} = -\hat{X}^i(t^{\mathcal{A}})\hat{P}'(t^{\mathcal{A}}) + (n-m)\hat{x}_j^i(t^{\mathcal{A}}) + t^{\mathcal{A}}(n-m)\hat{x}_j'^i(t^{\mathcal{A}}) \geq 0 \qquad (15)$$

$$\frac{\partial W_i^{\mathcal{B}}}{\partial t^{\mathcal{B}}} = -\hat{X}^j(t^{\mathcal{B}})\hat{P}'(t^{\mathcal{B}}) + m\hat{x}_i^j(t^{\mathcal{B}}) + t^{\mathcal{B}}m\hat{x}_i'^j(t^{\mathcal{B}}) \geq 0 \qquad (16)$$

From (15) and (16) we obtain bloc $\mathcal{A}$ and $\mathcal{B}$ best response functions $BR^{\mathcal{A}}(m, F)$ and $BR^{\mathcal{B}}(n-m, F)$, respectively. Hence, a trading bloc best response is independent of the tariff that the other bloc levies. Thus, the regional blocs dominant strategy is to set the tariff at $\tilde{t}^{\mathcal{A}}$ and $\tilde{t}^{\mathcal{B}}$, respectively. This is the critical tariff that prevents nonmember firms from undertaking direct investment. The best response functions, $BR^{\mathcal{A}}(\cdot)$ and $BR^{\mathcal{B}}(\cdot)$ are depicted in Figure 4. Let $\{ \tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}} \}$ denote the equilibrium tariffs, where

$$\tilde{t}^{\mathcal{A}} = \frac{A-c}{m+1} - \frac{\alpha^{\mathcal{A}}}{m(m+1)} \qquad (17)$$

$$\tilde{t}^{\mathcal{B}} = \frac{A-c}{n-m+1} - \frac{\alpha^{\mathcal{B}}}{(n-m)(n-m+1)}. \qquad (18)$$

The special feature that a trading bloc best response is independent of the strategy chosen by the rival tariff setting authority is due to one crucial assumption: segmented markets. That is, competition among firms in one common market is not affected by rivalry in the other common market. In our model markets are segmented because: firms play one shot game and have constant marginal cost. Hence, the potential linkage between markets is broken. Consequently, when the bloc's trade authority chooses the tariff it can ignore its counterpart strategy.[14]

The prediction coming out of from the analysis of the tariff game is: the equilibrium outcome entails inter-bloc trade and thus two-way direct investment is preempted by mutual imposition of the restricted tariffs, $\tilde{t}^{\mathcal{A}}$ and $\tilde{t}^{\mathcal{B}}$. The equilibrium tariffs $\{\tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}} \}$ imply that

$$\hat{W}^{\mathcal{A}}(\tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}}) > \hat{W}^{\mathcal{A}}(\hat{t}^{\mathcal{A}}, \hat{t}^{\mathcal{B}}) \qquad and \qquad \hat{W}^{\mathcal{B}}(\tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}}) > \hat{W}^{\mathcal{A}}(\hat{t}^{\mathcal{A}}, \hat{t}^{\mathcal{B}}).$$

---

[14]The independence of strategies is common to many models of trade policy under oligopolistic competition. See Brander (1995) and Staiger (1995) for extensive reviews of this literature.

We thus have

Proposition 7. *The mutual "threat" of invading each others common market via direct investment leads to tariffs that are lower than when the FDI option is absent. Furthermore, both regional blocs welfare is higher than would have been if countries were to remain not integrated.*

The equilibrium tariffs presented in (17) and (18) encompass Mundell's (1957) and Krugman's (1991) results as special cases.

• When the set-up cost $F = 0$, the constrained optimal tariff is $\tilde{t} = 0$.[15] Hence, due to easy entry conditions FDI cannot be prevented. In such an event the presence of FDI preempts the tariff setting authorities from starting a tariff war. This outcome is equivalent to free trade despite that the world is fragmented into regional blocs. This is analogous to the conclusion reached by Mundell (1957) which was described in section 5.

• When the set-up cost is prohibitively high, $F > \Omega_i^{\mathcal{B}}(\tilde{t}^{\mathcal{B}}, n - m)$ and $F > \Omega_j^{\mathcal{A}}(\tilde{t}^{\mathcal{A}}, m)$, rivalry between the trading blocs tariff setting authorities is unhindered and thus the equilibrium tariffs are $\hat{t}^{\mathcal{A}}(m)$ and $\hat{t}^{\mathcal{B}}(n-m)$. Since these tariffs are high, all countries end up with significant losses in national welfare. This is analogous to the result obtained by Krugman (1991).

• When the set-up cost are moderate, as assumed in the analysis presented in section 3, the adverse effects of rivalry between the regional blocs trade authorities cannot be completely prevented; they are however, contained.

In Figure 4 we portray the case of two trading blocs that are equal in size, i.e., $m = n - m$. The equilibrium tariffs, in the restricted and the unrestricted equilibrium, are depicted by the points where the trading blocs best response functions intersect, *re* and *ue* respectively. When the FDI option is present tariffs are lower than when this option does not exist; $\tilde{t}^{\mathcal{A}} = \tilde{t}^{\mathcal{B}} < \hat{t}^{\mathcal{A}} = \hat{t}^{\mathcal{B}}$.[16] Both equilibria are innefficient and inferior to free trade, as depicted by the constant welfare contours. That is $W^s(0,0) > W^s(\tilde{t}^{\mathcal{A}}, \tilde{t}^{\mathcal{B}}) > W^s(\hat{t}^{\mathcal{A}}, \hat{t}^{\mathcal{B}})$ where $s = \mathcal{A}, \mathcal{B}$.

This result does not depend on the assumption that the trading blocs have equal size; the only necessary condition is that the trading blocs should not differ

---

[15]This is easy to verify; inspection of (8) reveals that when $F = 0$, $\alpha = \frac{m}{A-c} \rightarrow \tilde{t} = 0$.

[16]For the case of equal size trading blocs, the restricted optimal tariffs are strictly lower than the unrestricted optimal tariffs for $n \geq 8$; otherwise the mutual threat to engage in direct investment will not be effective.

in size too much. If they were significantly different in size, the option to engage in FDI would not present an effective threat for both trading blocs. The larger bloc only would be constrained while it levies a tariff on imports from the smaller trading bloc.

The general conclusion that emerges from the analysis above is: after the transition from a non integrated world to a world consisting of two regional blocs, the national welfare of each bloc member country will rise. This conclusion differs from Krugman (1991); he argues that a move from a non integrated world towards a world in which several regional blocs co-exist, has a detrimental impact on the constituent countries' welfare.

7. Concluding Remarks:

This paper highlighted the role played by the option to penetrate foreign markets via FDI in determining the consequences of regional blocs formation on inter-bloc and intra-bloc trade. We found that the option to engage in direct investment restrains the regional blocs from mutually harming one another through an escalation in the tariff war that is due to non cooperation or lack of coordination between tariff setting authorities. I have shown that when the *threat* of invading each others common market is present, the impact of regional blocs formation is beneficial and the national welfare of all countries is enhanced.

The conclusions reached in this paper should be viewed with caution. To validate their robustness some simplifying assumptions need to be dispensed with. For example the underlying symmetric structure - identical firms and identical countries - although useful in simplifying the analysis, may be responsible for some of the results. In a more general setting the formation of trading blocs may affect the welfare of blocs $\mathcal{A}$ and $\mathcal{B}$ in different ways. Differences in the size of countries and the number of member states in each trading bloc may result in disparate regional blocs with the consequence that the welfare of some but not all trading blocs may be enhanced. The normative conclusions reached in this paper is that in a world consisting of two symmetric trading blocs inflows of direct investment will not and should not occur. However, the fact is that FDI is indeed observed. At the positive level, the results stated in proposition 2, indeed suggest that if the trading blocs differ in size, and the tariffs are in the appropriate range,

one way or two-way FDI will take place. Hence, by incorporating asymmetries in countries' size and the size of the trading blocs, the predictions coming out of the normative analysis will allow for FDI to be observed.[17]

A significant extension of the framework developed in this paper will involve endogenizing the formation of trading blocs. This will enable us to address the issue whether the formation of trading blocs diminishes or enhances the likelihood of a global movement towards free trade, when the option to engage in FDI is incorporated in the analysis. This requires the use of a theory of coalition formation. So far there has been little work done in this area, except YI (1996) and Bloch (1997). YI for example, uses the open membership approach to examine the conditions that ensure a stable configuration of trading blocs. Although as a first step his attempt is commendable, one needs to seek a more plausible mechanism that leads to bloc formation. Finding such a mechanism is on the agenda for future work.

---

[17]As indicated in the introduction, the actual inflows of direct investment in NAFTA, that consists of only three member states of unequal size, is far more significant than the FDI in the EU that contains a larger number of countries that are less disparate in size.

Appendix

a. *The properties of the function* $\Omega_j^{\mathcal{A}}(t)$: $\quad \Omega_j^{\mathcal{A}}(0; m) = 0, \quad \Omega_j'^{\mathcal{A}}(0; m) > 0, \quad$ and
$\Omega_j'^{\mathcal{A}}(t; m) = \frac{2m(m+1)(A-c) - 2mt(m+1)^2}{(n+1)^2}$.

The function $\Omega_j^{\mathcal{B}}(t; m)$ reaches a maximum at $\bar{t} = \frac{A-c}{m+1}$. Any $t > \bar{t}$ will violate the non negativity condition for profits from exports to regional bloc $\mathcal{A}$. The critical level of tariff which renders firm j indifferent between exports and FDI is determined by $\Omega_j^{\mathcal{A}}(t, m) = F_0$

$$\tilde{t} = \frac{m(A-c) \pm \sqrt{2m(A-c)^2 - 4m(n+1)^2 F}}{m(m+1)} \tag{A.1}$$

The function $\Omega_i^{\mathcal{B}}(t, n-m)$ has properties that are similar to $\Omega_j^{\mathcal{A}}(t, m)$.

$$\Omega_i'^{\mathcal{B}}(t) = \frac{2(n-m)(n-m+1)[t^{\mathcal{B}}(A-c) - 2t^{\mathcal{B}}(n-m)(n-m+1)^2]}{(n+1)^2}$$

The function $\Omega_i^{\mathcal{B}}(t)$ reaches a maximum at $\quad \bar{t}^{\mathcal{B}} = \frac{A-c}{n-m+1}$.

b. *Proof of Proposition 6:* To establish that national welfare is higher when the tariff is set at the critical level $\tilde{t}$ we first compute the equilibrium national welfare in the exports game.

$$\hat{W}_i^{\mathcal{A}}(\tilde{t}, m) = \frac{(n^2 + 2m)(A-c)^2 + 2\tilde{t}(n-m)(n+m)(A-c) - \tilde{t}^2(n-m)(2m^2 + 3m + n + 2)}{2(n+1)^2} \tag{A.2}$$

Substituting the expression in (8) for $\tilde{t}$ in (A2) and making use of (11) we get

$$
\begin{aligned}
\hat{W}_i^{\mathcal{A}}(\tilde{t}, m) - \tilde{W}_i^{\mathcal{A}}(m; F) \quad = \quad & \frac{m(n-m)(3n - 2m - 10(A-c)^2}{(m+1)^2} + \\
& \frac{2\alpha(n-m)(2m^2 + 3m + n + 2)(A-c)}{m(m+1)^2} + \\
& \frac{(n-m)(n+1)^2(2m^2 + 3m + n + 2)F}{m(m+1)^2} > 0 \tag{A.3}
\end{aligned}
$$

For the above inequality to hold it is sufficient that $m \le \frac{3n-10}{2}$.

References

Bagwell, K and Staiger, R.W. (1997), "Multilateral Tariff Cooperation During the Formation of Customs Unions", *International Economic Review*, 38: 291-320.

Bloch, F. (1997), "Noncooperative Models of Coalition Formation in Games with Spillovers", Working Paper, Group HEC, Jouy-en Josa, France.

Bhagwati, J.N. and Panagariya, A. (1996) "Preferential Trading Areas and Multilateralism: Strangers, Friends of Foes ?", in Bhagwati and Panagariya eds., Free Trade Areas or Free Trade ? The Economics of Preferential Trading Agreements, AEI Press, Washington D.C.

Bond, E.W. and Syropoulos, C. (1996), "The Size of Trading Blocs: Market Power and World Welfare Effects", *Journal of International Economics*, forthcoming.

Donnenfeld, S. and Weber, S. (1995), "Exports versus Foreign Direct Investment", Working Paper, York University.

Ethier, W. J. (1997), "The International Commercial System" World", Frank Graham Memorial Lecture at Princeton University.

Frankel, J. A., Stein, E. and Wei, S.J. (1996), "Continental Trading Blocs: Are They Natural and Super-Natural ?", in Frankel ed., The Regionalism of the World Economy, University of Chicago Press.

Gatsios, K. and Karp, L., (1994), "Delegation Games in Customs Unions", *Review of Economic Studies*, 391-397.

Kemp, M.C. and Wan, H., Jr., (1976), "An Elementary Proposition Concerning the Formation of Customs Unions", *Journal of International Economics*, 6:95-97.

Kennan, J. and Riezman, R., (1990), "Optimal Tariff Equilibria and Customs Unions", *Canadian Journal of Economics*, 61: 301-317.

Krugman, P. (1991), "Is Bilateralism Bad ?", E. Helpman and A. Razin eds., International Trade and Trade Policy, MIT Press, Cambridge MA.

Mundell, R. (1957), "International Trade and Factor Mobility", *American Economic Review*, 47: 321-335.

Staiger, R.W. (1995), "International Rules and Institutions for Cooperative Trade Policy", in Handbook of International Economics, eds. G. Grossman and K. Rogoff, North Holland, NY.

Viner, J. (1950), The Customs Unions Issue, Carnegie Endowment for International Peace.

Winters, L. A. (1996), "Regionalism versus Multilateralism", Working Paper, The World Bank, Washington D.C.

YI, S-S., (1996), Endogenous Formation of Customs Unions under Imperfect Competition: Open Regionalism is Good", *Journal of International Economics*, 41: 153-177.