THE IMPACT OF REGIONALISM AND INVESTMENT ON MULTILATERAL FREE TRADE: A THREE-COUNTRY MODEL

by

DINH HOAI HUONG PHAN

(Under the Direction of Emanuel Ornelas)

ABSTRACT

The thesis includes the examination of a three-country model to demonstrate the effects of regionalism and investment on multilateral free trade, and the change in the governments´ attitute and behavior as a consequence of regionalism. Evaluating these effects the final conclusion can be drawn that FTAs obstruct an otherwise feasible multilateral free trade agreement, exactly because of their trade creating characteristic, in a way that the from the FTA excluded country benefits so much from the formation of the FTA, that its support to an MTA may be reversed. This analysis shows that an investment of a member country will lead to more trade creation, and consequently constitutes an even bigger “stumbling block” to global free trade.

INDEX WORDS: Regionalism, Investment, Multilateral free trade, Free trade area, FTA, MTA, Trade deflection, Trade diversion, Trade creation

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DEDICATION

In dedication to my parents.

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1. INTRODUCTION

In the context of the "first wave" of regionalism of the 1950s and 1960s, Viner (1950) showed that preferential trade agreements (PTAs) are not necessarily welfare improving. He ascribes this result to two forces, known as "trade creation" and "trade diversion". Since then, it has been controversial whether PTAs have been rather "stumbling blocks" or "stepping stones" towards multilateralism, like Bhagwati (1991) pointed out. Authors like McLaren (2002) and Levy (1997) argue that regionalism would lead to trade diversion, which was caused by inefficient investments that are made in anticipation of regional trade blocs. Once those investments were done, regionalism became a real alternative, such that regionalism was "insidious" (McLaren, 2002). While others like Richardson (1993) and Ornelas (2003) identify motivations for why members of free trade agreements reduced their external tariffs, generating pure trade creation.

In light of the recent revival of regionalism and increasing number of notifications at the WTO/ GATT, which Bhagwati (1992) describes as the "Second Regionalism", raises the question about trade diversion again. But the politically- and economically-changed circumstances which has resurrected regionalism, puts a new complexion on old issues as much as it raises several new issues, requiring a new analysis.

In the following analysis, a simplified model consisting of three countries will be examined to show what kind of impact regionalism in cooperation with investments have on multilateral free trade. The questions of interest might be, if such investments are profitable

and what kind of consequences they might bring for the participants of a preferential trade agreement as well as for the exluded countries. Who will be the losers and who will be the winners of such a decision and how does it change the stance and the action of the participants, one might ask. The analysis will be conducted from the point of view of each country, FTA member as well as non-member, and may lead to results, that may allow to draw new conclusions.

The remaining structure of the following analysis consists of seven further parts. The model to be examined will be introduced in Section 2, followed by the conditions under which an investment in a new production sector by one of the FTA members can be considered as profitable in Section 3. Section 4 and 5 analyze the effects of regionalism and investment on multilateral free trade, respectively. Section 6 includes the examination of the consequences that the formation of an FTA and investments have on the FTA partner country, followed by the benefits that arise in favor of the excluded non-member country, in Section 7. The entire analysis will be closed by a drawn conclusion in Section 8.

2. THE MODEL

We consider a simplified model of three countries, denoted by $j=X,Y,Z$, acting in markets i, $i=X,Y,Z$. These markets have an oligopolistic structure. Furthermore, we assume that there exist only one firm in each country producing one good different from the goods manufactured in the other two countries. Thus, neither of the goods k, $k=x,y,z$, can be substituted by another good in any way.

Each country has a comparative advantage in producing its own good, which means that country *X* has lower costs in producing good x than countries *Y* ot *Z* would have in producing

that good for a given level of output; the same is true for good *y* in country *Y* and good *z* in country *Z*.

In additon, labor is assumed to be the only input needed in the production process of all three goods, and to be available in the same amounts in each country, normalized to unity. The production process is assumed to have marginal costs that are constant at level *c*. The additional assumption of segmented markets allows that firm profits in any single market are independent of profits in other markets. Demands are assumed to be linear with $Q_{ki} = A_{ki} - P_{ki}$ with $A_{ki} > c_k^j$, where *k=x,y,z* marks the good *k* that is produced in country *j* sold on market $i = X, Y, Z$.

As Dixit (1984) we assume that firms do not incur any transportation costs in supplying the good abroad, but that such costs are prohibitive for any third party arbitrageurs. We assume that governments try to maximize a welfare function allowing them to place a higher weight on profits, as a way to incorporate more general political economy concerns, of the following form:

$$W_j = CS_j + TR_j + (1 + b_j)\Pi_j \qquad , j = X, Y, Z \qquad b_j \geq 0 \qquad (1)$$

where CS_j denotes the consumers´ surplus, TR_j the tariff revenue, Π_j the total aggregate profits of the domestic industry *j* across all markets covering investment costs and b_j a measure for how much the firm´s profits contribute to the country´s welfare.

Each government of country *j*, has as its policy instrument *only* specific tariffs t_{ki}^j that it can set against imports from each of the other countries *j*, $i \neq j$. These trade barriers provide a cost advantage to the domestic firm relative to the foreign firm in the local market, since they shift the effective marginal cost of the foreign firms from *c* to $c + t_{ki}^j$. The government

sets the level of tariffs in anticipation of the firm´s sales decision, which in turn depends on the tariff levels.

Under an FTA (free trade agreement), the participating governments eliminate the tariffs against each other and individually choose the external tariffs against the excluded countries. If we suppose countries X and Y to be the potential FTA partners, then the FTA implies $t_{yx}^{y} = t_{xy}^{x} = 0$.

Whereas in an MTA (multilateral free trade agreement) all tariffs are eliminated and no further policy is enacted.

In order to facilitate exposition the notation can be specified as follows; letting $i, j = X, Y, Z$ with $i \neq j$:

- $q_{ki}^{j}, {}_{F}q_{ki}^{j}, {}_{F}\hat{q}_{ki}^{j}, {}_{FI}q_{ki}^{j}, {}_{FI}\hat{q}_{ki}^{j}, {}_{M}q_{ki}^{j}$: the equilibrium volume of sales of good k of a firm from country j in market i, in the absence of trade agreements, under the FTA between X and Y and trade deflection, under the FTA without trade deflection, under the FTA taking investments of X and trade deflection into consideration, under the FTA without trade deflection taking investment into account, and multilateral free trade,respectively.
- $P_{ki}, P_{ki}^{F}, \hat{P}_{ki}^{F}, P_{ki}^{FI}, \hat{P}_{ki}^{FI}, P_{ki}^{M}$: the equilibrium price of the oligoplistic good k in market i, in the absence of trade agreements, under the FTA between X and Y and trade deflection, under the FTA without trade deflection, under the FTA taking investments of X and trade deflection into consideration, under the FTA without trade deflection taking investment into account, and multilateral free trade,respectively.
- $W_i, {}_{F}W_i, {}_{F}\hat{W}_i, {}_{FI}W_i, {}_{FI}\hat{W}_i, {}_{M}W_i, W_i^{*}$: government i´s equilibrium payoff in the absence of trade agreements, under the FTA between X and Y and trade deflection, under the FTA without trade deflection, under the FTA taking investments of X and trade

deflection into consideration, under the FTA without trade deflection taking investment into account, multilateral free trade and evaluated at the equilibrium tariff level,respectively.

- $Q_{ki}, {}_{F}\, Q_{ki}, {}_{F}\, \hat{Q}_{ki}, {}_{FI}\, Q_{ki}, {}_{FI}\, \hat{Q}_{ki}, {}_{M}\, Q_{ki}$: consumer´s surplus in the absence of trade agreements, under the FTA between *X* and *Y* and trade deflection, under the FTA without trade deflection, under the FTA taking investments of *X* and trade deflection into consideration, under the FTA without trade deflection taking investment into account, and multilateral free trade,respectively.
- i_k: the investment to produce good *k.*
- $t_{ki}^{j}, \hat{t}_{ki}^{j}, \tilde{t}_{ki}^{j}, t_{ki}^{j^*}$: tariff that is imposed against country *j* to export good *k* into market *i* in the absence of trade agreements*,* under consideration of an FTA without trade deflection, the lowered tariff by the FTA members that allows *Z* increased access to all markets and the equlibium tariff level, respectively.
- c_k^j: the marginal costs of producing good *k* in country *j.*

All variables are functions of tariffs; nevertheless this dependence is not made explicitly only to simplify notation.

Note, that after the formation of the FTA all prices on the unified FTA market, former markets X and Y, are identical, but that we keep the second subscript for the individual markets, only to make clear which market we consider. Thus,

- $P_{kx}^{F} = P_{ky}^{F}$
- $P_{kx}^{FI} = P_{ky}^{FI}$

3. CONDITIONS FOR PROFITABLE INVESTMENT

The analysis in this section will be conducted from the perspective of country *X*. Everything is analogous for *Y* and *Z* before the FTA, but different for all countries after the formation of the FTA between countries *X* and *Y*.

The government of country *X* is assumed to maximize the following Welfare function (Ornelas, 2003),

$$W_x = CS_x + TR_x + (1+b_x)\Pi_x \qquad , \qquad b_x \geq 0 \qquad (1).$$

The calculations of all terms in equation (1) are carried out in the Appendix (A1)-(A3).

After substituting (A1) – (A3) into equation (1), it has the following form

$$W_x = \frac{\sum_{k=x,y,z}(Q_{kx})^2}{2} + (t^y_{yx}q^y_{yx} + t^z_{zx}q^z_{zx}) + (1+b_x)\left[\sum_{i=y,z}(P_{xi} - c^x_x - t^x_{xi})q^x_{xi} + (P_{xx} - c^x_x)q^x_{xx} - i_x\right] \qquad (1').$$

Market segmentation ensures that domestic tariffs affect only the domestic market. We have $Q_{ki} = \sum_j q^j_{ki}(t^j_{ki})$, since there is only one country supplying all markets with its good initially, we get $Q_{ki} = q^j_{ki}(t^j_{ki})$, with $k=j$ depending on the tariff only imposed against $j=X,Y,Z$ producing $i=x,y,z$, respectively.

Now, let us suppose that a potential entrepreneur in country *X* considers an additional investment in sector *z*. This would alter the government´s welfare function in the following manner,

$$ {}_{I}W_x = \frac{\sum_{k=x,y,z}\left({}_{I}Q_{kx}\right)^2}{2} + \left(t^z_{zxI}q^z_{zx} + t^y_{yxI}q^y_{yx}\right) + \left(1+b_x\right)\left[\sum_{i=y,z}\left(P^I_{xi} - c^x_x - t^x_{xi}\right)_I q^x_{xi} + \sum_{k=x,z}\left(P^I_{kx} - c^x_k\right)_I q^x_{kx} - \sum_{k=x,z} i_k\right] \qquad (2). $$

The own production of good z leads to an reduction of tariff revenue from country Z plus the investment expenses, which in turn enables X to increase its profit by broadening its supply. But note that $c^x_z > c^z_z$ because of the comparative advantage. However, since country X initially only produced good x instead of x and z, it must be because it is not profitable to do so. Thus, $\left({}_{I}\Pi_x - \Pi_x\right) < 0$.

$$ {}_{I}\Pi_x - \Pi_x = \left(P^I_{zx} - c^x_z\right)_I q^x_{zx} - i_z \quad < 0 $$

$$ \left(P^I_{zx} - c^x_z\right)_I q^x_{zx} < i_z \qquad (3) $$

This implies that, since the investment in sector z for country X before the FTA is not profitable, it must be because the investment costs are higher than the possible gains from providing good z in its own market, which seems pretty reasonable.

If countries X and Y form an FTA, then all the tariffs between these two partners will be eliminated, which implies that $t^x_{xy} = t^y_{yx} = 0$. In contrast to a customs union (CU), the participating countries in an FTA keep the autonomy to set the tariffs against the outside country individually.

Taking this fact into consideration, each FTA member will set its level of tariffs dependent on the tariffs set by the other FTA member, so that the tariffs set by X against Z is a function of the tariffs set by country Y against Z, $t^z_{zx}\left(t^z_{zy}\right)$, and vice versa. This will not be made explicit, just to save in notation, but should be borne in mind.

In addition, all variables after the FTA are considered under the problem of "trade deflection", a problem that occurs under an FTA. Trade deflection means the entry of exports from an outside country into the integrated FTA market through the country with the lowest tariffs, trying to exploit the tariff difference between FTA members.

This represents a real problem in practice and need to be taken care of in setting up "rules of origin". The underlying idea is that imports from outside the FTA are supposed to pay the tariff of the country of final sale. The disadvantage is that its implementation and realization is very costly, imposing additional high costs on the member countries.

The government *X* is then maximizing the welfare function of the following form,

$$ {}_{F}W_{x} = \frac{\sum_{k=x,y,z} \left({}_{F}Q_{kx} \right)^{2}}{2} + \left(t^{z}_{zx\,F}\, q^{z}_{zx} \right) + \left(1 + b_{x} \right) \left[\left(P^{F}_{xz} - c^{x}_{x} - t^{x}_{xz} \right)_{F} q^{x}_{xz} + \sum_{i=x,y} \left(P^{F}_{xi} - c^{x}_{x} \right)_{F} q^{x}_{xi} - i_{x} \right] \qquad (4) $$

We make use of the identifier `*F*´ to mark the variables in (4) as evaluated at $t^{y}_{yx} = 0$ after the formation of the FTA. The elimination of the tariff t^{y}_{yx} reduces the tariff revenue for government *X*, since country *Y* gets free access to *X*´s market through the FTA, which also grants *X* free access to *Y*´s market such that it does not have to pay duty on its exports to *Y*. This in turn has an impact on the surplus of the consumers. This is because the effective marginal costs of firm *Y* are shifted downwards, from $c + t^{y}_{yx}$ to *c*, leading to an increased supply of good *y* at lower prices, or ${}_{F}q^{y}_{yx} > q^{y}_{yx}$ at $P^{F}_{yx} < P_{yx}$, and a growth in consumers surplus, such that ${}_{F}Q_{kx} > Q_{kx}$. At the same time $t^{x}_{xy} = 0$ allows firm *X* to produce at lower marginal costs so that it can receive higher profits for a given level of output.

Let country *X* consider to invest in sector *z* after the formation of the FTA between *X* and *Y*, to exhaust the relative "no-tariff" advantage, that *X* now has compared to *Z*. An

investment after the FTA would enable country *X* to supply not only its own market but also that of *Y* without paying any tariffs. The increased amount of good *z* produced may even allow firm *X* to receive higher benefits from economies of scale.

Thus, considering the investment in *z* after the FTA, we obtain the following welfare function for government *X*,

$$ {}_{FI}W_x = \frac{\sum_{k=x,y,z}\left({}_{FI}Q_{kx}\right)^2}{2} + \left(t^z_{zx\,FI}q^z_{zx}\right) + (1+b_x)\left[\left(P^{FI}_{xz} - c^x_x - t^x_{xz}\right)_{FI}q^x_{xz} + \sum_{i=x,y}\left(P^{FI}_{xi} - c^x_x\right)_{FI}q^x_{xi} + \sum_{i=x,y}\left(P^{FI}_{zi} - c^x_z\right)_{FI}q^x_{zi} - \sum_{k=x,z} i_k\right] \quad (5) $$

The variables additionally denoted by `*FI´*, make clear that they are evaluated in the case after the FTA, taking the investment of *X* into sector *z* and trade deflection into consideration. For the investment after the FTA to be profitable for country *X*, the following must be true $\left({}_{FI}\Pi_x - {}_F\Pi_x\right) > 0$.

$$ {}_{FI}\Pi_x - {}_F\Pi_x = \sum_{i=x,y}\left(P^{FI}_{zi} - c^x_z\right)_{FI} q^x_{zi} - i_z \quad > 0 $$

$$ \sum_{i=x,y}\left(P^{FI}_{zi} - c^x_z\right)_{FI} q^x_{zi} > i_z \quad (6) $$

This result implies that, for the investment to be profitable, the resulting gains from supplying good *z* in the expanded market due to the FTA must exceed the investment costs. Comparing equations (6) and (3), it is possible to set the limits whether an investment is lucrative.

$$ \left(P^I_{zx} - c^x_z\right)_I q^x_{zx} < i_z < \sum_{i=x,y}\left(P^{FI}_{zi} - c^x_z\right)_{FI} q^x_{zi} \quad (7) $$

RESULT 1

The formation of an FTA can make an investment in the from the FTA excluded production sector profitable. This is because the FTA grants its members preferential treatment by eliminating all tariffs between them and allowing increased access to the partner country´s market, that the excluded country does not have.

4. THE EFFECT OF REGIONALISM ON MULTILATERALISM

Recall the situation at the very first beginning, when there is no FTA and no additional investment, but the production of each country in its own sector.

Looking at the marginal effect of a change in the pre-FTA tariff against the imports from *Z* on W_x we differentiate (1´) with respect to t^z_{zx}, and recalling that $Q_{zx} = A_{zx} - P_{zx}$, we obtain,

$$\frac{dW_x}{dt^z_{zx}} = Q_{zx}\left(-\frac{dP_{zx}}{dt^z_{zx}}\right) + \left(q^z_{zx} + t^z_{zx}\frac{dq^z_{zx}}{dt^z_{zx}}\right),$$

or equivalently

$$\frac{dW_x}{dt^z_{zx}} = \left[q^z_{zx}\left(1 - \frac{dP_{zx}}{dt^z_{zx}}\right)\right] + \left[t^z_{zx}\frac{dq^z_{zx}}{dt^z_{zx}}\right]$$

$$= \left[\frac{1}{2}q^z_{zx}\right] + \left[-\frac{1}{2}t^z_{zx}\right] \qquad (8).$$

with $Q_{zx} = q^z_{zx}$, since Z is the only country that supplies good z.

The first term in square brackets in equation (8) denotes the change in *X´*s terms of trade *(tot)* and the second term the impact of a lower import volume on *X´*s tariff revenue *(trev).*

To see why $\frac{dP_{zx}}{dt^z_{zx}} = \frac{1}{2}$ and $\frac{dq^z_{zx}}{dt^z_{zx}} = -\frac{1}{2}$, look up (A4)-(A9) in the Appendix.

These results are causing the *tot* term to be positive and the *trev* term to be negative, unambiguously.

Here, the marginal effect of t^z_{zx} on W_x is assumed to decrease fast enough with t^z_{zx}, so that non-prohibitive tariff emerges in equilibrium. This is because we assume that the demand for good *z* in country *X* needs to be satisfied, which cannot be realized if prohibitive tariffs occur.

To make this more transparent we derive the marginal effect of a change in the post-FTA tariff against the imports from *Z* on W_x. Note that the FTA between countries *X* and *Y* implies that $t^y_{yx} = 0$ and that $t^z_{zx}\left(t^z_{zy}\right)$. Recall that the welfare function for *X* in this case is equation (4)

$$ {}_F W_x = \frac{\sum \left({}_F Q_{kx}\right)^2}{2} + \left(t^z_{zx}\, {}_F q^z_{zx}\right) + \left(1 + b_x\right)\left[\left(P^F_{xz} - c^x_x - t^x_{xz}\right)_F q^x_{xz} + \sum_{i=x,y}\left(P^F_{xi} - c^x_x\right)_F q^x_{xi} - i_x\right]. $$

Then we receive the following derivative where $t^z_{zx}\left(t^z_{zy}\right)$,

$$ \frac{d\,{}_F W_x}{dt^z_{zx}} = \left[{}_F q^z_{zx}\left(1 - \frac{dP^F_{zx}}{dt^z_{zx}}\right)\right] + \left[t^z_{zx}\,\frac{d\,{}_F q^z_{zx}}{dt^z_{zx}}\right] $$

$$= \left[\frac{1}{2}_F q^z_{zx} \right] + \left[-\frac{1}{2} t^z_{zx} \right] \qquad (9).$$

Note, that the derivatives on the right-hand side of (9) are identical to their counterparts in (8), denoting the terms of trade (*`tot$_F$ ´)* and the impact of a change in the import volume from Z on X´s tariff revenue *(`trev$_F$ ´),* respectively. Do not forget that *X´*s external tariffs depends on partner country *Y´*s tariff-setting.

It is really important to note, that as soon as an FTA is formed the danger of "trade deflection" arises. This is the redirection of imports from outside countries through the FTA member that has the lowest tariff, expoliting the tariff difference. The higher the difference in external tariffs between the member countries, the higher the potential loss in tariff revenue of the high-tariff country. Thus, the FTA members will set their external tariffs in dependence of the other member´s tariffs.

We are now examining the effect of trade deflection on country *X´*s welfare. In order to do this, we will compare *X´*s welfare after the formation of the FTA, taking trade deflection into account, to a situation without trade deflection, like the formation of a CU. With a CU, all members set commonly identical external tariffs, so that this problem of trade deflection cannot occur. One may ask, why not forming a CU rather than an FTA. A possible answer is, that the formation of an FTA allows its members more autonomy, furthermore a CU requires to review the tariff structures and to create new institutions for determining trade policy, since national tariffs must be harmonized at a level that is acceptable for all participants. This can be very time consuming and costly.

We assume that external tariff set in country *Y* is lower than the one set in country *X*, $\hat{t}^z_{zx} > t^z_{zy}$. Hence, country *Z* will export its goods though *Y* to *X´*s market, also known as trade

deflection, which causes *X´*s tariff revenue to decrease. This alters *X´*s welfare function in the following manner,

$$ {}_F W_x = \frac{\sum_{k=x,y,z} \left({}_F Q_{kx} \right)^2}{2} + (t^z_{zy\,F}\, q^z_{zx}) + (1+b_x)\left[\left(P^F_{xz} - c^x_x - t^x_{xz} \right)_F q^x_{xz} + \sum_{i=x,y} \left(P^F_{xi} - c^x_x \right)_F q^x_{xi} - i_x \right] \quad (10). $$

Note, that the tariff in the `$trev_F$´ term changed. The difference in external tariffs between the member countries causes the revenue for *X* to decrease.

Government *X´*s welfare function in (10) will be compared to the case of a customs union, a preferential trade agreement without the problem of trade deflection, where we make use of `^´ to distinguish the variables from the case of an FTA, corresponding to the function given by equation (4).

$$ {}_F \hat{W}_x = \frac{\sum_{k=x,y,z} \left({}_F \hat{Q}_{kx} \right)^2}{2} + (\hat{t}^z_{zx\,F}\, \hat{q}^z_{zx}) + (1+b_x)\left[\left(\hat{P}^F_{xz} - c^x_x - t^x_{xz} \right)_F \hat{q}^x_{xz} + \sum_{i=x,y} \left(\hat{P}^F_{xi} - c^x_x \right)_F \hat{q}^x_{xi} - i_x \right] \quad (11) $$

Note, that in the case of a CU the tariff set by *X* against *Z* is identical with the one set by *Y* against *Z*, $\hat{t}^z_{zx} = \hat{t}^z_{zy}$. Since these tariffs are set commonly, a dependence of one on the other is unnecessary.

Taking the difference between equation (10) and (11), gives us

$$ {}_F W_x - {}_F \hat{W}_x = \left[\frac{\sum_{k=x,y,z} \left({}_F Q_{kx} \right)^2}{2} - \frac{\sum_{k=x,y,z} \left({}_F \hat{Q}_{kx} \right)^2}{2} \right] + \left[t^z_{zy\,F}\, q^z_{zx} - \hat{t}^z_{zx\,F}\, \hat{q}^z_{zx} \right] $$

$$= \left[\frac{\sum_{k=x,y,z} \left({}_F Q_{kx} \right)^2}{2} - \frac{\sum_{k=x,y,z} \left({}_F \hat{Q}_{kx} \right)^2}{2} \right] + \left[\left(t_{zy}^z - \hat{t}_{zx}^z \right)_F q_{zx}^z \right] \qquad (12).$$

Note that $\frac{\sum_{k=x,y,z} \left({}_F Q_{kx} \right)^2}{2} > \frac{\sum_{k=x,y,z} \left({}_F \hat{Q}_{kx} \right)^2}{2}$, since $\hat{t}_{zx}^z > t_{zy}^z$. The lower trade barriers for imports from outside within the FTA caused by the tariff difference between the members relative to the CU increases the market access for cheaper products from outside which benefits the consumers in market *X*.

In order to mitigate the negative effect of trade deflection on country *X´*s tariff revenue, it will lower its tariffs just below the level of its FTA partner in order to capture tariff revenue which also increases consumers´ surplus.

RESULT 2

The FTA member country with the higher tariff against the outside country will cut its external tariff just below the level of its partner country with the lowest tariff level to capture tariff revenue and to increase consumers´ surplus.

In practice this can represent a real problem, that the participating countries in an FTA set themselves up for a "race to the bottom" by forming the FTA, in trying to undercut the other country´s tariff level while everyone is losing suffering from further loss in tariff revenue. This is a crucial advantage of the CU, with a unified level of external tariffs for the entire FTA the problem of "trade deflection" is prevented. Another option may be the

implementation of "rules of origin" that take care of imports from outside the FTA, that are supposed to pay the tariff of the country of final sale.

5. THE EFFECT OF INVESTMENT ON MULTILATERALISM

Now, we will take the possibility of country *X´*s investment into the production of *z* into consideration. Caused by the elimination of all tariffs on imports from country *X* to country *Y* and vice versa, country *X* considers an investment in sector *z* to produce good *z* itself and to sell it on markets *X* and *Y*. We will examine if the relative advantage by $t_{zx}^{x} = t_{zy}^{x} = 0$ towards country *Z* is sufficient to outweigh its comparative disadvantage in producing z and to increase country *X´*s welfare. The additional investment in sector *z* and the broadening of country *X´*s markets due to the FTA alters its Welfare function in the following manner,

$$ {}_{FI}W_x = \frac{\sum_{k=x,y,z}\left({}_{FI}Q_{kx}\right)^2}{2} + \left(t_{zx}^{z}\,{}_{FI}q_{zx}^{z}\right) + \left(1+b_x\right)\left[\left(P_{xz}^{FI} - c_x^x - t_{xz}^{x}\right)_{FI}q_{xz}^{x} + \sum_{i=x,y}\left(P_{xi}^{FI} - c_x^x\right)_{FI}q_{xi}^{x} + \sum_{i=x,y}\left(P_{zi}^{FI} - c_z^x\right)_{FI}q_{zi}^{x} - \sum_{k=x,z} i_k\right] $$

which is identical to equation (5). Note one very important change, that ${}_{FI}Q_{zx} = {}_{FI}q_{zx}^{x} + {}_{FI}q_{zx}^{z}$. Deriving the Welfare function above with respect to t_{zx}^{z} gives us

$$ \frac{d\,{}_{FI}W_x}{dt_{zx}^{z}} = \left[{}_{FI}Q_{zx}\left(-\frac{dP_{zx}^{FI}}{dt_{zx}^{z}}\right)\right] + \left[{}_{FI}q_{zx}^{z} + t_{zx}^{z}\frac{d\,{}_{FI}q_{zx}^{z}}{dt_{zx}^{z}}\right] + \left(1+b_x\right)\left[\sum_{i=x,y}\left({}_{FI}q_{zi}^{x}\frac{dP_{zi}^{FI}}{dt_{zx}^{z}} + \left(P_{zi}^{FI} - c_z^x\right)\frac{d\,{}_{FI}q_{zi}^{x}}{dt_{zx}^{z}}\right)\right] $$

$$ = \left[{}_{FI}q_{zx}^{z}\left(1 - \frac{dP_{zx}^{FI}}{dt_{zx}^{z}}\right) + {}_{FI}q_{zy}^{x}\frac{dP_{zy}^{FI}}{dt_{zx}^{z}}\right] + \left[t_{zx}^{z}\frac{d\,{}_{FI}q_{zx}^{z}}{dt_{zx}^{z}}\right] + \left(1+b_x\right)\left[\sum_{i=x,y}\left(P_{zi}^{FI} - c_z^x\right)\frac{d\,{}_{FI}q_{zi}^{x}}{dt_{zx}^{z}}\right] + b_x\left[\sum_{i=x,y}{}_{FI}q_{zi}^{x}\frac{dP_{zi}^{FI}}{dt_{zx}^{z}}\right] $$

$$= \left[\frac{1}{2} {}_{FI}q^{z}_{zx} + {}_{FI}q^{x}_{zy} \frac{dP^{FI}_{zy}}{dt^{z}_{zx}} \right] + \left[-\frac{1}{2} t^{z}_{zx} \right] + (1+b_x) \left[\sum_{i=x,y} \left(P^{FI}_{zi} - c^{x}_{z} \right) \frac{d_{FI} q^{x}_{zi}}{dt^{z}_{zx}} \right] + b_x \left[\sum_{i=x,y} {}_{FI}q^{x}_{zi} \frac{dP^{FI}_{zi}}{dt^{z}_{zx}} \right] \qquad (13)$$

The four square brackets in (13) correspond to the change in country *X´*s terms of trade (${}_{FI}tot$); the impact of a change in import volume on *X´*s tariff revenue (${}_{FI}trev$); the change in profits of *X´*s firm due to a different number of local sales (${}_{FI}str$); and the change in profits of *X´*s firm due to a higher local price (${}_{FI}distr$).

Using the results (A10)-(A18) in the Appendix, we see that the "${}_{FI}tot$" term turns out to be positive, the "${}_{FI}trev$" and the "${}_{FI}str$" term to be negative and the "${}_{FI}distr$" term to be positive. Based on this it is impossible to define the effect of t^{z}_{zx} on ${}_{FI}W_x$ unambiguously. In order to determine the total effect of a marginal change in t^{z}_{zx} on country *X´*s welfare one need to know which of these forces are sufficiently great to outweigh the counteracting forces, which means if the positive effect of the "${}_{FI}tot$" and the "${}_{FI}distr$" terms is large enough to dominate the negative effect of the "${}_{FI}trev$" and the "${}_{FI}str$" terms or not.

Since through the formation of the FTA the two markets *X* and *Y* merge to a unified market with common borders, the difference of external tariffs between the member countries represents a real problem because outside countries will try to enter the FTA market through the member with the lowest level of external tariffs to provide the entire market.

In order to minimize the consequences that are implied by this problem, each country will set its external tariffs depending on the tariffs set by its FTA partner with the lowest level, in order to capture tariff revenue. The interaction between the tariff setting behavior of the FTA members, measured by $\frac{dt^{j}_{ki}}{dt^{j}_{k\hat{i}}}$ and the real levels of sales, prices, costs and tariffs make it

difficult to determine the final effect of a marginal change in t_{zx}^{z} on $_{FI}W_x$, whether it is positive or negative.

As equation (11) shows the correlation between the two levels of external tariffs between markets i and $\hat{i}$ will be positive. In order to capture tariff revenue Result 2 states that the FTA member with the higher external tariff will cut its tariffs just below the level of its partner country, which would be implied by "$_{FI}trev$" and "$_{FI}str$" outweighing "$_{FI}tot$" and the "$_{FI}distr$". If the partner country lowers this level, then the other member will be induced to further reduce its tariffs as well.

The same is true if one of the FTA members would increase their external tariffs. The partner country would also rise its tariffs but would still try to remain just below the ones of the other member in order to expand its tariff revenue, which would mean that "$_{FI}tot$" and the "$_{FI}distr$" outweigh "$_{FI}trev$" and "$_{FI}str$". Thus, the tariff setting behavior of both countries will always go in the same direction so that we can assume that there exist a positive correlation between the level of external tariffs set by the FTA member countries, with

$$\frac{dt_{ki}^{j}}{dt_{k\hat{i}}^{j}} > 0.$$

In which direction it will lead depends on the partner country´s behavior. In order to see how country *Y* will set its external tariffs in light of the FTA and the investment of *X*, we need to evaluate their impact on *Y´*s welfare which will be carried out in the following section 6. Depending on the tariff setting behavior between countries *X* and *Y*, government *X* has to decide if it will increase or decrease its level of tariffs, taking the consequences of the FTA and the investment into consideration.

RESULT 3

The investment and the FTA will induce its members to determine their external tariffs dependent on the ones set by their partner country. Based on their interaction the investing country will decide whether to increase or to decrease its external tariffs in order to maximize welfare.

Equation (7) showed that the investment after the FTA is profitable for country *X*, assuming that certain conditions are satisfied.

For reasons of completeness, let us have a look on government *X´*s welfare function after the formation of the MTA. Recall that the MTA requires that all tariffs between the countries are eliminated. We consider the Welfare function that government *X* is maximizing

$$ {}_{M}W_{x} = \frac{\sum_{k} \left({}_{M}Q_{kx} \right)^{2}}{2} + \left(1 + b_{x}\right) \left[\sum_{i=x,y,z} \left(P_{xi}^{M} - c_{x}^{x} \right)_{M} q_{xi}^{x} - i_{x} \right] \qquad (14) $$

where ${}_{M}Q_{kx} > {}_{F}Q_{kx} > Q_{kx}$, since consumers gain from the elimination of tariffs.

In the case of multilateral free trade there will be no need for investments in other sectors than its own. Not only would have country *Z* the comparative advantage in producing the own good *z* but also the advantage from the elimination of all tariffs between the countries. This is the reason why the tariff revenue term drops out in the equation above. In this case it would be welfare reducing for country *X* to consider an investment in sector *z*, losing the relative advantage from the no-tariff policy within the FTA and the additional costs of investing. Thus, each country will specify in its own sector with its comparative advantage.

To show that the investment reduces the possible gains from an MTA, the following ${}_{M}W_{x} - {}_{FI}W_{x} < {}_{M}W_{x} - {}_{F}W_{x}$ should be true.

$$ {}_{M}W_{x} - {}_{F}W_{x} = \left[\frac{\sum_{k=x,y,z} \left({}_{M}Q_{kx} \right)^2}{2} - \frac{\sum_{k=x,y,z} \left({}_{F}Q_{kx} \right)^2}{2} \right] - \left(t^{z}_{zx\,F} q^{z}_{zx} \right) + \left(1 + b_{x} \right) \left[\left(P^{M}_{xz} - c^{x}_{x} \right)_{M} q^{x}_{xz} - \left(P^{F}_{xz} - c^{x}_{x} - t^{x}_{xz} \right)_{F} q^{x}_{xz} \right] \; > 0 $$

We claim this expression to be positive, since otherwise multilateral free trade would not be preferred prior to an FTA, such that

$$ \left[\frac{\sum_{k=x,y,z} \left({}_{M}Q_{kx} \right)^2}{2} - \frac{\sum_{k=x,y,z} \left({}_{F}Q_{kx} \right)^2}{2} \right] + \left(1 + b_{x} \right) \left[\left(P^{M}_{xz} - c^{x}_{x} \right)_{M} q^{x}_{xz} - \left(P^{F}_{xz} - c^{x}_{x} - t^{x}_{xz} \right)_{F} q^{x}_{xz} \right] > \left[t^{t}_{zx\,F} q^{z}_{zx} \right] \qquad (15) $$

the gains from multilateralism, that are the increase in consumers´ surplus due to the reduction in marginal costs and the increase in profits due to the elimination of all tariffs, must be greater than the loss in tariff revenue for country *X* caused by giving up its own protection.

Furthermore, it was shown in equation (7) that, under certain circumstances, an investment in the production of good *z* for country *X* can be profitable, such that ${}_{FI}W_{x} > {}_{F}W_{x}$. Assuming that these consitions are satisfied, it follows that the possible gains of global free trade in the case of an investment are reduced. Are these gains even greater than the ones obtained from an MTA, then *X´*s support to an MTA might be likely to reversed.

RESULT 4

The additional gains that the investing country receives by the investment decrease its possible gains from multilateral free trade. If these gains exceed the possible gains from an MTA, then the FTA is likely to reverse the investing country´s support, hindering global free trade.

In this case the FTA induces its member to obstruct an maybe otherwise feasible multilateral trade agreement. The reason is that member-countries hinder an MTA to keep the rents acquired under a preferential liberalization and that the cost advantage provided by the FTA to the member firms over the outside firms in each other´s market will be lost under global free trade. Thus, the FTA members will block an MTA to avoid such a loss.

From this point of view preferential arrangements are harmful to multilateral free trade.

The additional gains of government *X* will be at the expense of country *Z´*s producer and its domestic consumers, which simultaneously decreases *X´*s possible gains from multilateral free trade. Or in turn increases country *Z´*s possible gains from an MTA.

6. CONSEQUENCES FOR THE FTA PARTNER COUNTRY

In order to carry out a more comprehensive analysis, this situation will also be sketched from the point of country *Y´*s view. Beginning with a consideration of government *Y´*s welfare function before the FTA and before the investment of *X* in sector *z*, we have

$$W_y = \frac{\sum_{k=x,y,z}\left(Q_{ky}\right)^2}{2} + (t^x_{xy}q^x_{xy} + t^z_{zy}q^z_{zy}) + \left(1+b_y\right)\left[\sum_{i=x,z}\left(P_{yi} - c^y_y - t^y_{yi}\right)q^y_{yi} + \left(P_{yy} - c^y_y\right)q^y_{yy} - i_y\right] \quad (16)$$

Following the calculation from (A4)-(A9), we obtain

$$\frac{dW_y}{dt^z_{zy}} = \left[q^z_{zy}\left(1 - \frac{dP_{zy}}{dt^z_{zy}}\right)\right] + \left[t^z_{zy}\frac{dq^z_{zy}}{dt^z_{zy}}\right]$$

$$= \left[\frac{1}{2}q^z_{zy}\right] + \left[-\frac{1}{2}t^z_{zy}\right] \quad (17).$$

Note, that this is the counterpart of the solution from equation (8). As before, it is assumed that country *Y* sets non-prohibitive tariffs against country *Z* in equilibrium.

The marginal effect of a post-FTA change of t^z_{zy} on W_y will lead to a similar result like in equation (9), such that the external tariff that *Y* sets against *Z* depends on the tariff level that country *X* choses. So, recall that in this case $t^z_{zy}\left(t^z_{zx}\right)$.

$${}_F W_y = \frac{\sum_{k=x,y,z}\left({}_F Q_{ky}\right)^2}{2} + (t^z_{zy\,F}\,q^z_{zy}) + \left(1+b_y\right)\left[\left(P^F_{yz} - c^y_y - t^y_{yz}\right)_F q^y_{yz} + \sum_{i=x,y}\left(P^F_{yi} - c^y_y\right)_F q^y_{yi} - i_y\right] \quad (18)$$

$$\frac{d\,{}_F W_y}{dt^z_{zy}} = \left[{}_F q^z_{zy}\left(1 - \frac{dP^F_{zy}}{dt^z_{zy}}\right)\right] + \left[t^z_{zy}\frac{d\,{}_F q^z_{zy}}{dt^z_{zy}}\right]$$

$$= \left[\frac{1}{2}{}_F q^z_{zy}\right] + \left[-\frac{1}{2}t^z_{zy}\right] \quad (19)$$

This result involves that the tariff setting behavior of *Y* after the FTA depends on that of *X*. Furthermore ${}_F Q_{ky} > Q_{ky}$, the elimination of the tariff t_{xy}^x decreases the marginal production costs of firm *X* from $c + t_{xy}^x$ to c such that ${}_F q_{xy}^x > q_{xy}^x$ at $P_{xy}^F < P_{xy}$ which is of benefit for the consumers in market *Y*. This and the increased market access to market *X* outweigh the loss in tariff revenue from *X*, otherwise it would be not profitable for *Y* to join the FTA.

The more interesting case is the impact of country *X´*s investment on country *Y´*s welfare and its tariff setting. Taking this into consideration gives us the following welfare function that government *Y* maximizes,

$$ {}_{FI}W_y = \frac{\sum_{k=x,y,z} \left({}_{FI} Q_{ky} \right)^2}{2} + \left(t_{zy}^z \, {}_{FI} q_{zy}^z \right) + \left(1 + b_y \right) \left[\left(P_{yz}^{FI} - c_y^y - t_{yz}^y \right)_{FI} q_{yz}^y + \sum_{i=x,y} \left(P_{yi}^{FI} - c_y^y \right)_{FI} q_{yi}^y - i_y \right] \qquad (20) $$

where ${}_{FI} Q_{zy} = {}_{FI} q_{zy}^x + {}_{FI} q_{zy}^z$. The more the demand for good z in market *Y* will be satisfied by the production from country *X*, that can be imported without any tariff burden, the more does it cause the tariff revenue term and the consumer´s surplus to decrease.

However, note the very important implication that the investment of country *X* creates trade diversion, since the partner country *Y* gets the supply of *z* from country *X*, that produces good *z* at a higher cost than country *Z*. To see what this implies for the setting of t_{zy}^z, equation (20) will be derived with respect to t_{zy}^z.

$$ \frac{d \, {}_{FI}W_y}{dt_{zy}^z} = \left[{}_{FI} Q_{zy} \left(- \frac{dP_{zy}}{dt_{zy}^z} \right) \right] + \left[{}_{FI} q_{zy}^z + t_{zy}^z \frac{d \, {}_{FI} q_{zy}^z}{dt_{zy}^z} \right] $$

$$= \left[\left({}_{FI}q_{zy}^{x} + {}_{FI}q_{zy}^{z} \right) \left(-\frac{dP_{zy}}{dt_{zy}^{z}} \right) \right] + \left[{}_{FI}q_{zy}^{z} + t_{zy}^{z} \frac{d\,{}_{FI}q_{zy}^{z}}{dt_{zy}^{z}} \right]$$

$$= \left[{}_{FI}q_{zy}^{z} \left(1 - \frac{dP_{zy}}{dt_{zy}^{z}} \right) - {}_{FI}q_{zy}^{x} \frac{dP_{zy}}{dt_{zy}^{z}} \right] + \left[t_{zy}^{z} \frac{d\,{}_{FI}q_{zy}^{z}}{dt_{zy}^{z}} \right]$$

Using the results from (A5), the equation above can also be written as,

$$\frac{d\,{}_{FI}W_{y}}{dt_{zy}^{z}} = \left[\frac{1}{2}\,{}_{FI}q_{zy}^{z} - \frac{1}{2}\,{}_{FI}q_{zy}^{x} \right] + \left[-\frac{1}{2}t_{zy}^{z} \right] \tag{21}$$

where the two square brackets on the right-hand side of equation (21) correspond to `$tot_{FI}$´ and `$trev_{FI}$´, respectively.

To see the effect of the investment more clearly, compare the result in (21) with the one in (19), after the formation of the FTA but without *X*´s investment in *z*,

$$\frac{d\,{}_{F}W_{y}}{dt_{zy}^{z}} = \left[\frac{1}{2}\,{}_{F}q_{zy}^{z} \right] + \left[-\frac{1}{2}t_{zy}^{z} \right]$$

Note that if ${}_{F}q_{zy}^{z} = {}_{F}Q_{zy} = {}_{FI}Q_{zy} = {}_{FI}q_{zy}^{x} + {}_{FI}q_{zy}^{z}$, then $\frac{d\,{}_{FI}W_{y}}{dt_{zy}^{z}} = \frac{d\,{}_{F}W_{y}}{dt_{zy}^{z}}$ with ${}_{FI}q_{zy}^{z} = {}_{F}q_{zy}^{z}$ and ${}_{FI}q_{zy}^{x} = 0$. This really important result implies that if the demand for good *z* on market *Y* would completely be satisfied by imports from country *Z*, then a marginal change in the tariff t_{zy}^{z} would have the same effect on *Y*´s welfare, as without *X*´s investment. However, as soon

as country *X* starts to export good *z* to country *Y*, the positive effect on W_y by an increase in t_{zy}^{z} is weakend for any given level.

This is caused by the reduction in consumers´ surplus and the decrease in tariff revenue coming from *Z*. The bigger the export volume of *z* coming from *X*, the stronger is this weakening effect. To mitigate this effect, government *Y* will be induced to lower its tariff against *Z*, boosting the trade between *Y* and *Z* and driving back the export from *X*. Consequently, the investment of *X* encourages trade diversion and also the incentive for trade deflection.

As stated in section 5 country *X*´s tariff setting behavior depends on that of country *Y*. Since, as shown above, *Y* tends to decrease its external tariffs country *X* will also reduce its level of external tariffs, using Result 2, and implying that the "$_{FI}trev$" and "$_{FI}str$" terms outweigh the "$_{FI}tot$" and the "$_{FI}distr$" terms. Thus, we are able to narrow the implications of Result 3.

RESULT 5

The investment of an FTA member in the outsider´s sector decreases the partner country´s welfare such that the FTA partner reduces its external tariffs to boost trade with the outside country in order to mitigate the negative effect of trade diversion, encouraging trade deflection. This in turn will induce the investing country to reduce its external tariffs as well, in cooperation with Results 2 and 3.

If we compare country *Y*´s welfare before and after the investment of *X* in sector *z*, or the results from equations (18) and (20), then this shows

$$_{FI}W_y - {}_{F}W_y = \left[\frac{\sum\left({}_{FI}Q_{ky}\right)^2}{2} - \frac{\sum\left({}_{F}Q_{ky}\right)^2}{2} \right] + \left[t^z_{zy\,FI} q^z_{zy} - t^z_{zy\,F} q^z_{zy} \right] \quad < 0 \qquad (22)$$

that country *Y* suffers from a welfare loss, or loss of consumers´ surplus plus the loss in tariff revenue coming from *Z*, caused by the trade diversion due to the supply of good z from country *X*. This is because market *Y* is supplied from country *X* with goods *z*, that it produces at higher costs than *Z* would, leading to a consumer´s surplus loss in market *Y*. This in turn will automatically drive back the supply from country Z which will also lead to a reduction of tariff revenue. The higher the supply from *X*, the higher the loss. *X´*s investment makes its partner country worse off. This result supports the implications of Result 5.

It was shown above that *Y* can maximize its welfare, if it buys from country *Z* exclusively. This leads to a reduction of the benefits from the investment for *X*, since the market that it supplies with good *z* constantly shrinks [equation (21)]. But, the increased access to *Y´*s market allows *Z* an increased access to *X´*s market, which is also known as "trade deflection". This way the exports from *Z* get access not only to *Y´*s but also to *X´*s market.

RESULT 6

The FTA partner country will lower its tariffs, using Result 5. This reduces the investing country´s market and also its gains from investing. Furthermore, it allows the outside country not only an increased access to the opening country but to the entire FTA market, including the one of the investing country no matter what tariff policy it pursues.

Furthermore, trade deflection causes high-tariff countries to lose tariff revenue, the higher the tariffs the greater the loss. This will encourage the country to cut tariffs just below the level of their partners, trying to capture the tariff revenue, implied by Result 2.

This in turn further decreases country *X´*s gains from the investment, since country *Z* gets direct increased access to *Y´*s and indirect increased access to *X´*s market. Country *Z´*s supply would be increased in these markets, because it produces z at lower cost than *X* does, such that the consumers in the entire FTA market will switch to the cheaper supply of the outside country. If the investment costs and the loss in tariff revenue exceed the remaining gains, then country *X* might change its mind and reverse its support in favor of the MTA.

RESULT 7

The increased access of the non-member country´s firm in the FTA market, in cooperation with Results 5 and 6, leads to further reduction of the gains from investing in the outside country´s sector. Consequently, the investing country might change its support in favor of an MTA.

In order to see the consequences that "trade deflection" has on the gains from investing, we first consider an investment of an entrepreneur within an FTA without trade deflection, like a CU, where the problem of "trade deflection" cannot occur since all members set common external tariffs.

In this case country *X´*s welfare function is

$$_{FI}\hat{W}_x = \frac{\sum_{k=x,y,z}\left(_{FI}\hat{Q}_{kx}\right)^2}{2} + \left(t^z_{zxFI}\hat{q}^z_{zx}\right) + (1+b_x)\left[\left(\hat{P}^{FI}_{xz} - c^x_x - t^x_{xz}\right)_{FI}\hat{q}^x_{xz} + \sum_{i=x,y}\left(\hat{P}^{FI}_{xi} - c^x_x\right)_{FI}\hat{q}^x_{xi} + \sum_{i=x,y}\left(\hat{P}^{FI}_{zi} - c^c_z\right)_{FI}\hat{q}^x_{zi} - \sum_{k=x,z} I_k\right] \quad (23)$$

The identifier `^´ marks that the variables are evaluated under no consideration of trade deflection. The prices and quantities marked with `FI´ denote that these variables are computed under consideration of the FTA and investment.

The comparison between the equation (23) and equation (5) supports our intuition. Taking the difference between the two profit functions enables us to examine the effect of trade deflection on the entrepreneur´s motive to invest.

$$_{FI}\Pi_x - {}_{FI}\hat{\Pi}_x = \left[\sum_{i=x,y}\left(P^{FI}_{zi} - c^x_z\right)_{FI} q^x_{zi} - \sum_{i=x,y}\left(\hat{P}^{FI}_{zi} - c^x_z\right)_{FI}\hat{q}^x_{zi}\right] < 0 \quad (24)$$

This result confirms the implication by Result 6. “Trade deflection” reduces the possible gains from investing, since the firm in *X* will sell less of good *z* in the FTA market. Is this reduction in profits so large, that the remaning profits are not sufficient to cover the investment costs, then the investment can turn out to be not profitable.

In this case an investment in the production of good *z* would make country *X* only worse off. Thus, multilateral free trade can become the first-best solution with $_{M}W_x > {}_{F}W_x > W_x$.

7. CONSEQUENCES FOR THE NON-MEMBER COUNTRY

However, following Ornelas´ (2003) findings it is the outside country that may bloc multilateral free trade, because of the benefits that it obtains from the FTA without having to

give up the benefits from its own protection. At first, let us consider country *Z´*s welfare function

$$W_z = \frac{\sum_{k=x,y,z} (Q_{kz})^2}{2} + \left(t_{xz}^x q_{xz}^x + t_{yz}^y q_{yz}^y\right) + (1+b_z)\left[\sum_{i=x,y}\left(P_{zi} - c_z^z - t_{zi}^z\right)q_{zi}^z + \left(P_{zz} - c_z^z\right)q_{zz}^z - i_z\right] \quad (25)$$

Now, consider the case where countries *X* and *Y* form an FTA and what kind of impact this has on country *Z´*s welfare.

$${}_F W_z = \frac{\sum_{k=x,y,z} ({}_F Q_{kz})^2}{2} + \left(t_{xz\,F}^x q_{xz}^x + t_{yz_F}^y q_{yz}^y\right) + (1+b_z)\left[\sum_{i=x,y}\left(P_{zi}^F - c_z^z - t_{zi}^z\right)_F q_{zi}^z + \left(P_{zz}^F - c_z^z\right)_F q_{zz}^z - i_z\right] \quad (26)$$

Since countries *X* or *Y* might lower its tariffs, based on equation (12), the formation of the FTA will benefit country *Z*, without having to give up the gains from the own protection. The increased access to the FTA market will enable *Z* to sell higher volumes of good *z* at lower costs and consequently to increase its profits, such that ${}_F W_z > W_z$.

In the case of multilateral free trade country *Z* would maximize the following welfare function

$${}_M W_z = \frac{\sum_{k=x,y,z} ({}_M Q_{kz})^2}{2} + (1+b_z)\left[\sum_{i=x,y,z}\left(P_{zi}^M - c_z^z\right)_M q_{zi}^z - i_z\right] \quad (27)$$

Now suppose that country *X* does invest in the production of good *z*, not anticipating the consequences, then the FTA becomes even more trade creating, enhancing the trade

between the member countries in goods *x* and *y*, and inducing its partner country to open up more towards the outside country, mitigating the trade diverting effect from *X´*s investment.

With global free trade, *Z* would then have to give up the benefits from its own protection. Although free trade would eliminate *Z´*s cost disadvantage, caused by the tariff, in those markets. But the possible benefits from nondiscriminatory multilateral free trade may be insufficient to outweigh the loss caused by opening its markets, especially if *Z´*s government is highly biased.

The increased access to the FTA market and the resulting benefits may be sufficient to make *Z* unwilling to join the MTA.

This case might happen, if the following is true. Let us have a look at the change in *Z´*s welfare caused by the investment by country *Z* in the production of good *z*, and the created possibility to receive increased benefits from trade deflection. Thus, we get the welfare function of the form

$$ {}_{FI}W_z = \frac{\sum\left({}_{FI}Q_{kz}\right)^2}{2} + \left(t^x_{xz\,FI}q^x_{xz} + t^y_{yz\,FI}q^y_{yz}\right) + \left(1+b_z\right)\left[\sum_{i=x,y}\left(P^{FI}_{zi} - c^z_z - \tilde{t}^z_{zi}\right)_{FI}q^z_{zi} + \left(P^{FI}_{zz} - c^z_z\right)_{FI}q^z_{zz} - i_z\right] \qquad (28) $$

Note, that the tariffs marked with `*tilde´* , with $\tilde{t}^z_{zi}$ being lower than t^z_{zi}, implied by the results implied in equations (11) and (21).

That *X´*s investment has a positive effect on *Z´*s welfare can be seen from this

$$ {}_{FI}W_z - {}_{F}W^*_z = \left(1+b_z\right)\left[\sum_{i=x,y}\left(P^{FI}_{zi} - c^z_z - \tilde{t}^z_{zi}\right)_{FI}q^z_{zi} - \sum_{i=x,y}\left(P^{F^*}_{zi} - c^z_z - t^{z^*}_{zi}\right)_{F}q^{z^*}_{zi}\right] > 0 \qquad (29) $$

where `*´ denotes that the variables are evaluated at the equilibrium tariffs.

This difference is unambigiously positive because of $\tilde{t}_{zi}^{z} < t_{zi}^{z^*}$, and ${}_{FI}q_{zi}^{z} > {}_{F}q_{zi}^{z}$ at $P_{zi}^{FI} < P_{zi}^{F^*}$ with i=x,y.

As outlined before, the investment of X is even more trade creating. To reverse government Z´s support to an MTA, the benefits gained from trade deflection must outweigh the gains from multilateral free trade, such that ${}_{M}W_{z} - {}_{F}W_{z}^{*} < 0$. If this is true, then ${}_{M}W_{z} - {}_{FI}W_{z} < 0$ would automatically be true, since ${}_{FI}W_{z} > {}_{F}W_{z}^{*}$.

Thus, the following would be true ${}_{FI}W_{z} > {}_{F}W_{z} > {}_{M}W_{x} > W_{x}$ such that the outside country tends to obstruct an otherwise feasible MTA leading to a serious problem in the implementation of global free trade.

RESULT 8

Because of the success of the FTA, generating pure trade creation, it might not be the member country, but the non-member country that is likely to hinder global free trade. Are the gains from maintaining its own protection and the FTA sufficient to outweigh the possible gains from an MTA, then the FTA might indeed be destructive for multilateral free trade. This is even more likely with the investment of one member country in the outsider´s sector, boosting trade creation.

The analysis of this simplified three-country model allows us to draw important conclusions, whose general validity is not necessarily limited, but to present implications very clearly. An FTA between two countries benefits not only the participants, but in particular the outside country. This is because the member countries are induced to lower

their tariffs in order to mitigate the negative effect of trade diversion and trade deflection, and consequently boosting trade between the countries within and outside the FTA. The excluded country cannot only maintain the gains from its own protection but gets also the gains from the FTA. This effect is even increased by the investment of one of the member countries in the outside country´s production sector. If "trade deflection" reduces the possible gains from investing so much that the fixed costs cannot be covered, then an investment can even turn out to be not profitable at all. This analysis shows that such an investment benefits the outside country in particular. If the benefits for the outside country even outweigh the possible gains from multilateral free trade, then the FTA is likely to reverse the outsider´s support for global free trade.

In this sense, FTAs can be damaging for multilateral free trade.

8. CONCLUSION

The analysis above considered a simplified three-country model with one firm in each country that produces one good entirely different from the other two goods produced. The results obtained above show that the formation of an FTA by two of the three countries, where all tariffs between these two partner countries are eliminated and where the member countries set the tariffs against the outside country individually, opens the way for "trade deflection". This means that outside countries try to get access to the entire FTA market through the member with the lowest level of external tariffs, taking advantage of the tariff difference between FTA members. The higher this difference, the greater the loss for the higher-tariff country.

In order to mitigate this negative effect of trade deflection on the higher-tariff country´s welfare, it will reconcile its external tariff to the one of the lowest-tariff partner. This leads to enhanced trade, not only between the FTA members, but also between non-member and member countries of an FTA. Thus, FTAs are pure trade creating.

However, the outside country is able to keep its gains from the own protection and also benefits from the FTA-formation between the other two countries, since it gets increased access to the FTA market. If these gains outweigh the possible gains from multilateral free trade, then the FTA is likely to reverse the outsider´s support to an MTA.

Furthermore, a potential entrepreneur in one of the FTA countries considers to invest in a new sector, producing the good that has previously been produced by the non-member country, to take advantage of the preferential treatment within the FTA, relative to the excluded country. The elimination of all tariffs between its FTA partners allows increased access to the other member´s market, supplying it with the new good.

But this creates trade diversion, since the partner country buys the new good from a country that produces it at higher costs than the outside country. In order to mitigate this negative effect on its welfare, it will open trade to the outside country to booste trade between them and to drive back the supply by the investing country.

Since the formation of the FTA involves the merge of individual markets to one unified market with a common border, “trade deflection” induces the members to set their external tariffs dependent on the ones set by their partners. Consequently, the investing country will also be induced to reduce its tariffs trying to capture tariff revenue.

This allows the outside country an even increased access to the FTA market than without the investment. Taking advantage from the enhanced access to the investing country, further trade deflection is encouraged.

The outside country will reinforce its position in the FTA market, since consumers will switch to the cheaper producer. Thus, “trade deflection” reduces the possible gains for the investing country. If the remaining gains in the FTA market are not sufficient to justify the investment costs, then the investment can turn out to be non-profitable for the entrepreneur. The investment would even raise the outsider´s benefits due to the increased market access. Consequently, the investment is even more likely to reverse the non-member country´s support to multilateral free trade.

All in all, the analysis above shows that investments in an outsiders sector by an FTA member particularly benefit the outside country, such that it is even more likely to hinder global free trade. In this sense, FTAs in cooperation with investments constitute “*stumbling blocks”* indeed.

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APPENDIX

The consumers´ surplus can be derived from the aggregate utility of good *k* in country *j*, that has the following form (Krishna, 1998),

$$U_{kx} = A_{kx}Q_{kx} - \frac{(Q_{kx})^2}{2} \tag{A1}$$

which is also the area under the demand curve (Varian, 1992) or the integral of the demand curve, $Q_{kx} = A_{kx} - P_{kx}$, where the additive constant is negligible. Substracting the amount that is actually paid by the consumers, $Q_{kx}P_{kx}$, leads to the residue, or specifically consumer surplus,

$$U_{kx} - Q_{kx}P_{kx} = A_{kx}Q_{kx} - \frac{(Q_{kx})^2}{2} - Q_{kx}(A_{kx} - Q_{kx})$$

$$CS_{kx} = \frac{(Q_{kx})^2}{2}.$$

This is only the consumers´ surplus that the consumers in country *X* receive by good *k*. Thus, to receive the total aggregate consumers´ surplus, we need to sum over all goods *k* that are sold in market *X*.

$$CS_x = \sum_k CS_{kx} = \frac{\sum_k (Q_{kx})^2}{2}$$

The tariff revenue that government *X* receives depends on the level of tariffs imposed on countries *Y* and *Z* as well as on the volume of their exports to country *X*. This gives us,

$$TR_x = t_{yx}^y q_{yx}^y + t_{zx}^z q_{zx}^z \qquad \text{(A2).}$$

The last term in the welfare function involves the profits of the firm in country *X*, that the government can weight by b_x to determine its degree of contribution to the welfare function.

The profits themselves depend on the level of tariffs that firm *X* has to pay per exported unit to markets *Y* and *Z*, and their total volume.

We also consider the investments that country *X* transacts, to purchase for example plants, labor and property, to be able to produce good *k*. Hence, we obtain

$$\Pi_x = \sum_{i=y,z} \left(P_{xi} - c_x^x - t_{xi}^x\right) q_{xi}^x + \left(P_{xx} - c_x^x\right) q_{xx}^x - \sum_k i_k \qquad \text{(A3).}$$

Since initially each country is assumed to produce its own good only, we have

$$\sum_k i_k = i_x .$$

We follow Krishna´s (1998) approach.

Consider that the firm from country *X* chooses the quantity to supply in market *i*, solving the following maximization problem:

$$\max_{q_{ki}^j} \ \Pi_j = \max_{q_{ki}^j} \ \left(P_{ki} - c_k^j - t_{ki}^j\right) q_{ki}^j \tag{A4}$$

Recalling that the inverse demand function is $P_{ki} = A_{ki} - Q_{ki}$ and that $Q_{ki} = \sum_j q_{ki}^j$, we receive the following equivalent expression for the objective function above:

$$\max_{q_{ki}^j} \ \left(A_{ki} - \sum_j q_{ki}^j - c_k^j - t_{ki}^j\right) q_{ki}^j$$

Deriving this expression with respect to q_{ki}^j and setting it equal to zero leads to

$$\frac{d\Pi_j}{dq_{ki}^j} = \left(A_{ki} - \sum_j q_{ki}^j - c_k^j - t_{ki}^j\right) - q_{ki}^j = 0$$

$$\left(A_{ki} - \sum_{i \neq j} q_{ki}^i - c_k^j - t_{ki}^j\right) = 2q_{ki}^j$$

$$q_{ki}^{j^*} = \frac{A_{ki} - \sum_{i \neq j} q_{ki}^i - c_k^j - t_{ki}^j}{2} \tag{A5}$$

which is the equilibrium output level of the firm in market *i*.

Taking the Total Differential and setting $dc_k^j = 0$,

$$dq_{ki}^j = \frac{-\sum_{i \neq j} dq_{ki}^j - dt_{ki}^j}{2} \qquad \text{(A6).}$$

Setting $dq_{ki}^i = 0$ with $i \neq j$,

$$dq_{ki}^j = -\frac{1}{2} dt_{ki}^j$$

$$\frac{dq_{ki}^j}{dt_{ki}^j} = -\frac{1}{2} \qquad \text{(A7)}$$

To get $\frac{dQ_{ki}}{dt_{ki}^j} = -\frac{dP_{ki}}{dt_{ki}^j}$, we begin with (A6),

$$dq_{ki}^j + \frac{\sum_{i \neq j} dq_{ki}^i}{2} = -\frac{dt_{ki}^j}{2}$$

$$\frac{2dq_{ki}^j + \sum_{i \neq j} dq_{ki}^i}{2} = -\frac{dt_{ki}^j}{2}$$

$$dQ_{ki} + dq_{ki}^j = -dt_{ki}^j$$

$$\frac{dQ_{ki}}{dt_{ki}^j} + \frac{dq_{ki}^j}{dt_{ki}^j} = -1$$

$$\frac{dQ_{ki}}{dt_{ki}^{j}} = -\left(1 + \frac{dq_{ki}^{j}}{dt_{ki}^{j}}\right)$$

Using result (A7), we get

$$\frac{dQ_{ki}}{dt_{ki}^{j}} = -\frac{1}{2} \tag{A8}$$

and

$$\frac{dP_{ki}}{dt_{ki}^{j}} = \frac{1}{2} \tag{A9}$$

After the formation of the FTA, we have a dependence between the tariff setting behavior of one FTA member from the behavior of the other, such that $t_{ki}^{j}\left(t_{k\hat{i}i}^{j}\right)$, and vice versa.

This alters the firm´s maximization problem in country *j,* in the following manner,

$$\max_{FI\, q_{ki}^{j}} \Pi_j = \max_{FI\, q_{ki}^{j}} \left[A_{ki} - {}_{FI}Q_{ki} - c_k^j - t_{ki}^{j}\left(t_{k\hat{i}}^{j}\right)\right]_{FI} q_{ki}^{j} \tag{A10}$$

Deriving (A10) with respect to ${}_{FI}q_{ki}^{j}$ and setting equal to zero delivers the following first-order condition,

$$\frac{d\Pi_j}{d_{FI}q_{ki}^{j}} = \left[A_{ki} - {}_{FI}Q_{ki} - c_k^j - t_{ki}^{j}\left(t_{k\hat{i}}^{j}\right)\right] - {}_{FI}q_{ki}^{j} = 0$$

$$\left(A_{ki} - \sum_{i \neq j} {}_{FI} q_{ki}^{i} - c_k^j - t_{ki}^j \left(t_{k\hat{i}}^j \right) \right) = 2_{FI} q_{ki}^j$$

$$ {}_{FI} q_{ki}^{j^*} = \frac{A_{ki} - \sum_{i \neq j} {}_{FI} q_{ki}^{i} - c_k^j - t_{ki}^j \left(t_{k\hat{i}}^j \right)}{2} \tag{A11}$$

Taking the Total Differential of (A11) and setting $dc_k^j = 0$,

$$d_{FI} q_{ki}^j = \frac{-\sum_{i \neq j} d_{FI} q_{ki}^j - \left(t_{ki}^j \right)' dt_{k\hat{i}}^j - dt_{ki}^j}{2} \tag{A12}$$

where $\left(t_{ki}^j \right)' = \frac{dt_{ki}^j}{dt_{k\hat{i}}^j}$. Using (A12), we can receive the following comparative statics results,

$$d_{FI} q_{ki}^j = -\frac{1}{2} \left(t_{ki}^j \right)' dt_{k\hat{i}}^j$$

$$\frac{d_{FI} q_{ki}^j}{dt_{k\hat{i}}^j} = -\frac{1}{2} \left(t_{ki}^j \right)' \quad < 0 \tag{A13}$$

In order to get $\frac{d_{FI} Q_{ki}}{dt_{k\hat{i}}^j} = -\frac{dP_{ki}^{FI}}{dt_{k\hat{i}}^j}$, we make use of (A12),

$$d_{FI} q_{ki}^j = \frac{-\sum_{i \neq j} d_{FI} q_{ki}^j - \left(t_{ki}^j \right)' dt_{k\hat{i}}^j}{2}$$

$$d_{FI}q_{ki}^{j} + \frac{\sum_{i \neq j} d_{FI}q_{ki}^{i}}{2} = -\frac{\left(t_{ki}^{j}\right)' dt_{k\hat{i}}^{j}}{2}$$

$$\frac{2d_{FI}q_{ki}^{j} + \sum_{i \neq j} d_{FI}q_{ki}^{i}}{2} = -\frac{\left(t_{ki}^{j}\right)' dt_{k\hat{i}}^{j}}{2}$$

$$d_{FI}Q_{ki} + d_{FI}q_{ki}^{j} = -dt_{ki}^{j}$$

$$\frac{d_{FI}Q_{ki}}{dt_{k\hat{i}}^{j}} = -\left(\left(t_{ki}^{j}\right)' + \frac{d_{FI}q_{ki}^{j}}{dt_{ki}^{j}}\right)$$

Substituting (A13) into the expression above, we get

$$\frac{d_{FI}Q_{ki}}{dt_{k\hat{i}}^{j}} = -\left(t_{ki}^{j}\right)' - \left[-\frac{1}{2}\left(t_{ki}^{j}\right)'\right]$$

$$\frac{d_{FI}Q_{ki}}{dt_{k\hat{i}}^{j}} = -\frac{1}{2}\left(t_{ki}^{j}\right)' \quad < 0 \qquad \text{(A14)}$$

Since $dP_{ki}^{FI} = -d_{FI}Q_{ki}$, we receive

$$\frac{dP_{ki}^{FI}}{dt_{k\hat{i}}^{j}} = \left[\left(t_{ki}^{j}\right)' + \frac{d_{FI}q_{ki}^{j}}{dt_{k\hat{i}}^{j}}\right]$$

$$\frac{dP_{ki}^{FI}}{dt_{k\hat{i}}^{j}} = \frac{1}{2}\left(t_{ki}^{j}\right)' \quad > 0 \qquad \text{(A15)}$$

Recalling that $\left(t_{ki}^{j}\right)' = \frac{dt_{ki}^{j}}{dt_{k\hat{i}}^{j}}$ which evaluates the change in t_{ki}^{j} caused by a marginal change in $t_{k\hat{i}}^{j}$. Or specifically the tariff setting behavior of country i as a reaction to the behavior of country $\hat{i}$. The more sensitive i is, the greater is $\left(t_{ki}^{j}\right)'$. Thus, if country $\hat{i}$ lowered its tariffs, then the extend of the decrease in country i´s tariffs would depend on its sensitvity towards the behavior of country $\hat{i}$. This depends on the relationship between the FTA members and their priorities, whether they assign more importance to own more selfish interests or if they are very cooperative in order to keep good relations in trade, war or politics.

Furthermore, using (A12) again, we get

$$\frac{d_{FI}q_{ki}^{j}}{dt_{ki}^{j}} = -\frac{1}{2} \tag{A16}$$

$$\frac{d_{FI}Q_{ki}}{dt_{ki}^{j}} = -\frac{1}{2} \tag{A17}$$

and

$$\frac{dP_{ki}^{FI}}{dt_{ki}^{j}} = \frac{1}{2} \tag{A18}$$

where (A16)-(A18) correspond to (A7)-(A9).

Due to the FTA the two markets *X* and *Y* merged to a unified market, such that $P_{zx}^{FI}(t_{zx}^{z},t_{zy}^{z}) = P_{zy}^{FI}(t_{zx}^{z},t_{zy}^{z})$, ${}_{FI}q_{zx}^{x}(t_{zx}^{z},t_{zy}^{z})$, ${}_{FI}q_{zy}^{x}(t_{zx}^{z},t_{zy}^{z})$, ${}_{FI}q_{zx}^{z}(t_{zx}^{z},t_{zy}^{z})$ and ${}_{FI}q_{zy}^{z}(t_{zx}^{z},t_{zy}^{z})$.

This implies that $\frac{dP_{zx}^{FI}}{dt_{zx}^{z}}$ will have the same sign as $\frac{dP_{zy}^{FI}}{dt_{zx}^{z}}$, and $\frac{d_{FI}q_{zx}^{x}}{dt_{zx}^{z}}$ as $\frac{d_{FI}q_{zy}^{x}}{dt_{zx}^{z}}$, which can be seen from comparing the result (A13) with (A16), (A14) with (A17) and (A15) with (A18).