Free Trade Areas, Policy Independence, and Industrialization Targets*

Earl L. Grinols and Peri Silva†

Abstract

We investigate a mechanism whereby a group of nations forming a free trade area simultaneously can efficiently satisfy industrialization targets. The mechanism does not rely on cross-country transfers, and it is efficient for each member country individually even if other members of the free trade area do not implement the efficient policy. It allows each member country to gain from participating in the free trade area when the objective is to protect the level of industrialization achieved by the target industry prior to formation of the free trade area. Because industrialization targets are satisfied without the need of tariff harmonization or cross-country transfers, the mechanism is politically palatable. Members of the free trade area enjoy policy independence in achieving their goals under the mechanism, a significant advance over other mechanisms and an advantage of free trade areas over customs unions.

JEL classification numbers: D60, F13, F15
Keywords: Free trade area, industrialization target, rules of origin, welfare analysis.

*This paper was previously entitled "Industrialization Targeting and Free Trade Areas." We are grateful to Eric Bond, Hadi Esfahani, Giovanni Facchini, Murray Kemp, Carsten Kowalczyk, Marcelo Olarreaga, Raymond Riezman, and Gerald Willmann for helpful comments, as well as participants in the Midwest International Economics meetings at Indiana University, Society for the Advancement of Economic Theory meetings at Rhodes, as well as seminar audience at the Univeristy of Illinois at Urbana-Champaign.

†Department of Economics, University of Illinois, 1206 S. 6th Street, Champaign, Illinois 61820. E-mail: grinols@uiuc.edu, pasilva@uiuc.edu. Fax: 217-244-6678.

1 Introduction

Ongoing interest in preferential trading arrangements (PTAs) remains high, despite the fact that Jacob Viner's (1950) seminal investigation revealed that PTAs have an ambiguous impact on the welfare of participant countries that depends on whether trade creation or trade diversion predominates. The last decade and a half has witnessed an explosion in the number of preferential trading areas. According to the World Bank (2000), 87 of the 194 trade bloc agreements formalized under the General Agreements on Trade and Tariffs (GATT) and the World Trade Organization (WTO) were adopted since 1990. The dream of moving the world to free trade through the formation of ever expanding preferential trading areas coupled with WTO negotiations is as strong today as when Viner wrote his landmark treatise.

The General Agreement on Tariffs and Trade and the World Trade Organization recognize three varieties of preferential trading arrangements. First, countries can form free trade areas and customs unions according to Article XXIV, which explicitly deals with them. Second, developing countries can engage in preferential trade arrangements according to the Enabling Clause, adopted in 1979 as the legal basis for the Generalized System of Preferences (GSP). Third, the GSP allows developed countries to give special trade preferences to developing nations.

The modern theory of preferential trading arrangements dates to Kemp and Wan (1976), who showed that a group of nations choosing their common external tariff to freeze the aggregate trade of union countries with the rest of the world at pre-formation levels can always compensate members in the new equilibrium so that their participation will be welfare enhancing. However, their result relied on an existence proof that did not provide any hint about how to calculate or implement the needed transfers.[1] Grinols (1981) extended their analysis by identifying the transfers needed to compensate each union member and household, and showing that they were self-financing in the sense that they summed to the tariff revenues of the union as a whole. Under certain circumstances, Grinols' transfers are the only ones feasible to achieve a Pareto Superior allocation in a Kemp-Wan customs union.[2]

The Kemp and Wan theorem is a powerful proposition about the ability of a customs union to create and distribute gains from trade. Yet, with the notable exception of the European Union, this form of preferential trading arrangement has been used relatively little; certainly its popularity is dominated by the popularity of free trade areas. Until recently there were no results comparable to the Kemp-Wan and Grinols theorems that applied to free trade areas. In contrast to customs unions, free trade areas allow members to set different tariffs that requires the adoption of rules of origin so that independent tariff setting is consistent. The need to analyze potentially complicated rules of origin and their interaction with trade was an obstacle to the

extension of these theorems to free trade areas. Panagariya and Krishna (2002) proved that an appropriate selection of rules of origin, coupled with each member choosing its tariffs to freeze its trade with the non-FTA rest of the world at the pre-formation level, supports the formation of a welfare-enhancing free trade area. Re-proving this result for a general context, Grinols and Silva (2003a) showed that the tariff revenues collected by each member on trade passing its border equal the payments needed to insure welfare gains to the FTA member, so that cross country transfers are unnecessary. Eliminating the need to adopt a common external tariff and the need to implement cross-country payments comes at a some welfare cost: Grinols and Silva also show that the move from a free trade area to a Kemp-Wan customs union is welfare-enhancing, but the reverse is not true. Caveats notwithstanding, the fact that welfare gains can be generated and shared by a group of countries without the need to adopt a common external tariff, and without the need to implement cross-country transfers is a significant advance for the political economy of preferential trade arrangements.

This paper removes two other obstacles to free trade area formation. In trade negotiations, the desire of governments to protect particular industries from the effects of freer trade often has important consequences. Concern for the output of selected industries was certainly an issue in the discussions preceding the Canada-US Free Trade Agreement[3] and later the North American Free Trade Agreement (NAFTA). The presence of the Escape Clause in the WTO is a reflection of the same concern. A few examples further highlight this perspective. Baer et al. (2002) states that even after formation of the Common Market of the Southern Cone (MERCOSUR), the Argentinean government maintained policies to provide support to the automobile industry located in its country. In this case, the goal of the Argentinean government was to increase its automobile sector output. A similar pattern prevailed in Brazil.[4] In the case of the US, Panagariya (1996) and Estevardeordal et al. (2002) highlight the fact that textiles continued to receive special treatment after the formation of NAFTA in the form of US-applied stiffer rules of origin for Mexican textiles. Textile products are considered domestic products in NAFTA only if they satisfy a "triple transformation" mandate that requires specified domestic content in each one of the following three transformation phases: Fiber to yarn, yarn to fabric and fabric to garment. Such rules are consistent with the US objective to protect the output of its domestic industry.

The necessity to satisfy the political demands of particular industries that oppose freer trade is an important obstacle to the formation of free trade areas. On the same level of importance, however, are the impacts of the policies to satisfy political targets on other member countries. It is evident from investigation of the major preferential trade agreements that cross country transfers are rarely used.[5] It is also evident that the need to satisfy political/industrial targets can overturn

(or diminish substantially) the gains that other member countries might achieve from preferential trade. The political economy of preferential trade agreements dictates, therefore, that in addition to the ability to satisfy the needs of a domestic political agenda, member countries should possess a high degree of policy independence that frees them from the difficult-to-negotiate and administer need for cross country transfers and the threat of being harmfully affected by other members' policies.

In view of these facts, the specific questions we wish to address here are: to what extent can policy independence and industrialization targets/political objectives be incorporated into the theory of welfare-enhancing free trade areas? In particular, can conservative objectives—ones that protect a previously attained level of output—be incorporated and still allow welfare gains to all members without cross country transfers? In this paper, we interpret the term "industrialization target" to refer to a production constraint that takes the form of specifying an industry size in terms of output or employment. Non-conservative industrialization targets might prevent one from guaranteeing welfare gains, but we still are able to characterize the efficient policy for achieving them.

Currently, no results exist to show that an industrialization target is consistent with welfare enhancing free trade areas. Cooper and Massell (1965) and Bhagwati (1968) conjectured that a group of countries might achieve a conservative industrialization target while forming a welfare enhancing customs union using appropriate policies, and Bhagwati and Krishna (1997) subsequently demonstrated this in a two-sector model with inelastic factor supplies and constant returns to scale.[6] But Panagariya (2000) explains that transferring customs unions' results to the case of FTAs is complex. In the case of customs unions, freezing the joint trade flows of union members at the pre-formation levels and eliminating all barriers to trade within the union maximizes the welfare of union members since it equalizes the marginal rate of transformation and the marginal rate of substitution for each pair of goods in the union. In the case of FTAs, however, freezing trade flows of each member country at the pre-formation levels, and implementing free trade between members, does *not* equalize consumers' and producers' prices within the trade bloc because member countries will, in general, employ different tariffs with respect to the rest of the world. Free trade areas therefore require that rules of origin be implemented to avoid transshipment of goods from low to high tariff member countries, and, once this feature is present, their relation with internal trade flows and welfare are more complex to investigate.[7]

In the present paper we nevertheless prove four new results: First, we show that an arbitrary group of countries can form a welfare-enhancing free trade area with conservative industrial targeting that preserves selected production, employment, or consumption levels in one or more countries, if they select external tariffs to freeze trade with the non-FTA rest of the world at pre-

formation levels, apply our specified rules of origin, and employ narrowly directed taxes/subsidies to those variables whose level is to be held at pre-formation levels. Second, we show that for countries that adopt general industrial targets, the described strategy corresponds to an optimal policy among the class of all policies. Third, we show—and this is significant because it contrasts with industrial targeting in the case of customs unions—that the specified policies do not require cross country transfers. This is a feature that must be proved. Fourth, we prove that even if one or more FTA members do not appropriately implement the conservative optimal policy—as for example when a member country satisfies its quantitative target at a level exceeding the minimum acceptable level—that the policy remains optimal for other members.[8]

Our results describe a significant difference between free trade areas and customs unions. Customs unions place a heavy political burden on countries that must both harmonize their tariffs and implement cross-country transfers. Instead, free trade areas allow member countries to have a substantial degree of policy independence since they can satisfy their domestic political agenda and enjoy the benefits of freer trade without having to adopt a common external tariff, use cross country transfers, or suffer the consequences of (possibly) inefficient policies used by other members. In essence, we show that free trade areas might be easier to implement than customs unions—in the political economy sense—and we believe that this fact may be an important reason why so many countries form free trade areas instead of customs unions.[9] Our analysis to show these results applies to general economies and discrete changes, and does not rely on assumptions such as inelastic factor supplies or on constant returns to scale.[10]

The results are organized as follows. Section 2 sets up the notation and model. Section 3 proves the first proposition dealing with conservative industrial targeting. Section 4 then shows that the specified policy for achieving general quantitative industrialization or consumption targets is optimal. Section 5 shows that the policy in Section 4 is optimal for each country individually, meaning that cross country transfers are not required to spread the welfare gains from the formation of that FTA. We also prove that even if conservative industrial targeting is not implemented by one of the FTA members, the policy in section 4 remains optimal for the remaining FTA members. Section 6 describes some extensions that can be analyzed using the framework presented in the paper. Section 7 provides concluding remarks.

2 The Model and FTA Formation

Consider an FTA formed from two member countries, a home country and a foreign country indexed by $m = h, f$, respectively. The rest of the world is denoted by letter w. Goods are differentiated both by their characteristic and location. Any good can be used for final consumption

or as an intermediate good in production. A good produced in one country and transported to another becomes a different good. Each economy produces K types of products, implying $9K$ goods in total (3 countries of origin and 3 countries of destination). Since goods are differentiated by their location and description, the prices prevailing in the FTA are described in a $9K \times 1$ vector.

Richardson (1992) points out that producers in an FTA will sell their output in the member country market with higher price. In a free trade area, members may set different tariffs and thus may have different internal prices. Firms located in the FTA have an incentive to transship products imported from the rest of the world by a low tariff member to a high tariff FTA partner. This conflicts with FTA members being able to set tariffs independently and thus is an impediment to the formation of the FTA. The conflict arises because the transshipment technology implies a relationship between goods prices that is potentially inconsistent with the tariffs of FTA members. Rules of origin must be chosen to prevent the transshipment of goods originated in the rest of the world among FTA member countries and make independent tariff setting consistent. We make the following two assumptions. In conjunction, they insure consistency between transshipment and independent member tariffs.[11]

Assumption 1 *(Choice of Tariffs) Each FTA member chooses tariffs so that its trade with the rest of the world (country w) is unchanged between the initial pre-FTA situation 0 and post-FTA-formation situation 1.*[12]

Assumption 2 *(Rules of Origin) A good or service may enter duty free to one FTA country from the other if and only if it contains strictly positive value added of the sending FTA country. If the good is "new" (neither produced nor consumed at the initial pre-FTA situation), it may pass duty free to one FTA country from the other if and only if it contains 100 percent value added of the sending FTA country.*

The prices prevailing within the FTA in the absence of taxes on consumption and production, and duties on goods traded within the FTA set to zero, are denoted by p. World prices differ from FTA internal prices by tariffs t, $p = p_w + t$:

$$p \equiv \begin{pmatrix} p_{hh} \\ p_{fh} \\ \underline{p_{wh}} \\ p_{hf} \\ p_{ff} \\ \underline{p_{wf}} \\ p_{hw} \\ p_{fw} \\ p_{ww} \end{pmatrix} = p_w + \begin{pmatrix} 0 \\ 0 \\ \underline{t_{wh}} \\ 0 \\ 0 \\ \underline{t_{wf}} \\ t_{hw} \\ t_{fw} \\ 0 \end{pmatrix} \quad (1)$$

where $t_{ab} \epsilon R^K$ is the vector of tariffs applied to goods originating in country a and whose location of final use is country b. For example, it is clear from equation (1) that country h selects tariffs t_{wh} on goods acquired from country w, which may differ from country's f tariffs on products originating in the same location, t_{wf}.[13]

In addition to tariffs, the government in each FTA country can tax its consumers and producers. Let p_c^m be the price vector that applies to country m's representative consumer; and let p_j^m be industry j's prices. These prices differ from the FTA internal prices p by the relevant taxes, $p_c^m = p + t_c^m$, $p_j^m = p - t_j^m$. In this case, t_c^m, and t_j^m denote the vector of taxes applied to the representative consumer and the vector of taxes applied to industry j in country m, respectively.

The consumption vector of the consumer in country m is denoted by $x^m \epsilon R^{9K}$ and its n-th element is x_n^m. Following the usual convention, a positive element of x^m is a good consumed, while a negative element is the supply of a good or service such as labor hours supplied.

$y_j^m \epsilon R^{9K}$ is the production of industry j of country m. The n-th element of the production vector of industry j of country m is denoted by $y_{j,n}^m$. For example, when we distinguish between situation 0 and situation 1, $y_{j,1}^{h,0}$ would be the output of good 1 by industry j of country h in situation 0. Positive elements of y_j^m are outputs and negative elements inputs. The aggregate production of country m is $\sum_{j=1}^{J} y_j^m = y^m$. The set of industries in country h is J_h and in country f is J_f. Many elements of the representative household consumption vector and of an industry production vector are zero. For instance, the household physically residing in country h can not consume products whose final place of use is country f.

The international trade vector of the FTA member country m is $z^m \epsilon R^{9K}$. International trade is a type of production where imports play the role of outputs and exports the role of inputs. If an element of the international trade vector is negative it is an exported good and if it is positive it is an imported good. If the element is zero it means the good is non-traded.

Endowments are nonproduced goods inherited from nature or the past. The vector of endow-

ments of member country m is $\omega^m \epsilon R_+^{9K}$.

Notice that a levy on the n-th good is a tax if it collects positive revenue $t_{c,n}^m x_n^m > 0$, $t_{j,n}^m y_{j,n}^m > 0$, and $t_n^m z_n^m > 0$. It is a subsidy if it collects negative revenue.

3 Industrialization Preserving FTA Formation

Now consider the formation of an FTA where a member country imposes an industrialization constraint. That is, suppose that the home country h forms an FTA with partner f subject to the constraint that the output of industry 1 be no lower than it was in the pre-FTA equilibrium. Then the following theorem holds.

Theorem 1 *Industrialization-Preserving FTA Formation*

Let countries h and f form a free trade area satisfying assumptions 1 and 2. Assume that cross country transfers are allowed, that the trade of FTA members with the rest of the world is balanced, that producer and consumer efficiency obtain, and that country h applies a subsidy $\tau < 0$ to the output of industry 1 to maintain it at the pre-FTA level $y_{j,1}^{h,1} = y_{1,1}^{h,0} \equiv \theta$ for $j = 1$. Then the FTA is welfare enhancing.

Proof: Write the change in welfare between situation 0 and situation 1 for country $m = h, f$ as $\Delta W^m \equiv e^m(p_c^{m,1}, u^{m,1}) - e^m(p_c^{m,1}, u^{m,0})$, where $e^m(\cdot,\cdot)$ is the expenditure function for the representative consumer in country m and $u^{m,0}$ and $u^{m,1}$ pre- and post- utility levels. Apply the identities for $m = h, f$ that $e^m(p_c^{m,1}, u^{m,1}) = p_c^{m,1} \cdot x^{m,1}$, $x^{m,1} = y^{m,1} + \omega^{m,1} + z^{m,1}$ and likewise in situation 0. Use also the identities $p_c^{m,1} = p^1$ and $p_j^{m,1} = p^1 - t_j^{m,1}$, where the the first element of $t_j^{m,1} = \tau < 0$ for $m = h$ and $j = 1$ and zero otherwise (i.e. country h subsidizes the output of industry 1 at the minimum level needed to induce output θ). Then, by direct computation,

$$\begin{aligned}
\Delta W^h + \Delta W^f \;=\; & \sum_{m=h,f} \left(p_c^{m,1} \cdot x^{m,0} - e^m(p_c^{m,1}, u^{m,0})\right) && \text{Term 1} \\
& + \sum_{m=h,f} \left(\sum_{j \epsilon J_m} p_j^{m,1} \cdot (y_j^{m,1} - y_j^{m,0}) \right) && \text{Term 2} \\
& + \sum_{m=h,f} p^1 \cdot \left(z^{m,1} - z^{m,0}\right) && \text{Term 3} \\
& + \tau \cdot (y_{1,1}^{h,1} - \theta). && \text{Term 4}
\end{aligned}$$

Term 1 ≥ 0 by the assumption of consumer efficiency (consumers minimize the cost of achieving a given level of utility subject to their budget constraint). Term 2 ≥ 0 by the assumption of

producer efficiency (firms maximize the value of aggregate output). Term 3 $= p^1 \cdot [\left(z^{h,1} + z^{f,1}\right) - \left(z^{h,0} + z^{f,0}\right)] = 0$ because the trade of a good produced and consumed in the same country is zero; the export of one member country corresponds to the import of the other for goods traded between FTA members; and trade between country w and an FTA member is frozen. Term 4 $= 0$ because industry 1 achieves the the same output in both periods, $\tau \cdot (y_{1,1}^{h,1} - \theta) = 0$. Thus, $\Delta W^h + \Delta W^f \geq 0$. ■

Remarks:

- Theorem 1 is attractive for a number of reasons, not least of which is its broad applicability. For example, we show below that theorem 1 applies in general to conservative constraints—meaning ones that preserve quantities at pre-FTA levels—including consumption constraints, factor usage constraints, and constraints involving a combination of production, consumption, and factor input objectives.
- Theorem 1 does not require that the target industry have been subject to any specific policy at the pre-FTA equilibrium. Therefore, its application is broad, ranging from the necessity to satisfy non-economic objectives to the neutralization of political opposition to the formation of welfare enhancing FTAs. See section 6 for more details.
- $\sum_{m=h,f} p^1 \cdot (z^{m,1} - z^{m,0}) = 0$ implies that the welfare gains from FTA formation derive from consumers' and producers' substitution terms as has been described elsewhere. See Grinols and Wong (1991).
- Setting tariffs to freeze trade between each member country and the rest of the world allows the FTA to freeze its terms of trade at pre-FTA values. Formation of the FTA therefore does not affect welfare in the rest of the world.
- We show below that cross country transfers are unnecessary if each country retains the tariff revenues collected on traded goods that cross its border. In that case, each country retains the welfare gains generated by its own consumers and producers.

4 Optimal FTA Formation with General Industrialization Constraints

Welfare gains can be guaranteed for FTAs limited by conservative industrialization constraints because the constraint involves the maintenance of an existing level of production. A related

question is whether there exist superior policies to those described by Theorem 1 for countries that impose a quantitative constraint. For instance, could some yet-to-be-specified partial trade liberalization be superior to the formation of an FTA following the identified strategy? We show below that the answer to this question is no. The specified strategy is efficient.

Before demonstrating this fact in Theorem 2, we enlarge the set of policies considered to include those that impose a floor or ceiling on the variable of interest. The objective in the last section was a special case of this objective.

Theorem 2 *Assume in situation* 0 *that an FTA exists consisting of member countries* $m = h, f$*. Assume that rules of origin satisfy assumption 2, consumer and producer efficiency obtain, that the trade of member countries is balanced, and that subsidy* τ *has been applied to the output of industry 1 in country* h *to satisfy the quantitative objective* $y_{j,1}^{h,0} \geqslant \theta$*. Then, if the restriction is satisfied as an equality, no Pareto superior policy exists that satisfies the objective and holds trade of members with the rest of the world at situation* 0 *levels.*

Proof: Write the change in welfare between situation 0 and situation 1 for country $m = h, f$ as $\overset{o}{\Delta W}{}^m \equiv e^m(p_c^{m,0}, u^{m,1}) - e^m(p_c^{m,0}, u^{m,0})$, where $e^m(\cdot,\cdot)$ is the expenditure function for the representative consumer in country m. Use the identities for $m = h, f$ that $e^m(p_c^{m,0}, u^{m,0}) = p_c^{m,0} \cdot x^{m,0}$, $x^{m,0} = y^{m,0} + \omega^{m,0} + z^{m,0}$ and likewise in situation 1, $p_c^{m,0} = p^0$, $p_j^{m,0} = p^0 - t_j^{m,0}$, where the the first element of $t_j^{m,0} = \tau < 0$ for $m = h$ and $j = 1$ and zero otherwise (i.e. country h subsidizes the output of industry 1 at the minimum level needed to induce output θ). Then, by direct computation,

$$
\begin{aligned}
\overset{o}{\Delta W}{}^h + \overset{o}{\Delta W}{}^f \;=\; & -\sum_{m=h,f} \left(p_c^{m,0} \cdot x^{m,1} - e^m(p_c^{m,0}, u^{m,1})\right) && \text{Term 1} \\
& -\sum_{m=h,f} \left(\sum_{j \epsilon J_m} p_j^{m,0} \cdot (y_j^{m,0} - y_j^{m,1})\right) && \text{Term 2} \\
& -\sum_{m=h,f} p^0 \cdot \left(z^{m,0} - z^{m,1}\right) && \text{Term 3} \\
& -\tau \cdot (\theta - y_{1,1}^{h,1}). && \text{Term 4}
\end{aligned}
$$

Term 1 ≤ 0 by the assumption of consumer efficiency (consumers minimize the cost of achieving a given level of utility subject to their budget constraint). Term 2 ≤ 0 by the assumption of producer efficiency (firms achieve maximized the value of aggregate output). Term 3 $= -p^0 \cdot [\left(z^{h,0} + z^{f,0}\right) - \left(z^{h,1} + z^{f,1}\right)] = 0$ because the trade of a good produced and consumed in the same country is zero, the export of one member country corresponds to the import of

the other for goods traded between FTA members, and trade between country w and an FTA member is frozen. Term 4 ≤ 0 because $\tau \leqslant 0$ is a subsidy, and the alternative policy causes industry 1 to achieve the same or higher output, $-\tau \cdot \left(\theta - y_{1,1}^{h,1}\right) \leqslant 0$. Thus, $\Delta \overset{o}{W}{}^{h} + \Delta \overset{o}{W}{}^{f} \leqslant 0$ and the replacement of the given policy with any other lowers welfare. ■

Remarks:

- A reason for the failure of many preferential trading arrangements during the 1960s and '70s, according to Bhagwati (1993), was that the agreements did not fully liberalize trade. Some countries sought to increase their degree of industrialization when they joined the trade blocs. Theorem 2 says that efficient trade liberalization via an FTA that is consistent with an industrialization quantitative target is accomplished by a directed tax that achieves the objective at the minimum level needed. By Theorem 1, if the industrialization target is to maintain the pre-existing output level, then the efficient policy also guarantees welfare gains for all members. Attempting to induce a higher level of industrialization may not be consistent with welfare gains, but will still be achieved efficiently using the specified directed tax.
- Assuming convexity and compactness we can also show necessity in the case of theorem 2. This result is proved in the appendix.

5 Transfers, Industrialization Targets, and FTAs

Theorems 1 and 2 are pleasant news to countries anticipating forming a free trade area and who are concerned with the level of industrialization in a sensitive industry. As stated, they assume the possibility of transfers between members. Panagariya and Krishna (2002) also rely on transfers to prove that an FTA can be formed that is welfare enhancing to all members.

We now show that forming an FTA with industrialization constraints does not require cross country transfers to improve the welfare of members as long as each country is able to retain the tariff revenues collected on goods crossing its border, a mild restriction that is likely to be met in practice.

Theorem 3 *Let countries h and f form an FTA in situation 0. Assume that rules of origin satisfy assumption 2, trade is balanced, producer and consumer efficiency obtain, each country retains the tariff revenues collected on trade crossing its own border, cross country transfers are zero, and that each country achieves its own quantitative target $y_{1,1}^{m,0} \geqslant \theta^m$ at the least level*

needed using a directed subsidy. Then, the policy is optimal for each member country individually among the class of policies that freeze trade of members with the rest of the world at situation 0 *levels.*

Proof: Write the change in welfare between situation 0 and situation 1 for country $m = h, f$ as $\overset{o}{\Delta W}{}^{m} \equiv e^m(p_c^{m,0}, u^{m,1}) - e^m(p_c^{m,0}, u^{m,0})$, where $e^m(\cdot,\cdot)$ is the expenditure function for the representative consumer in country m. Then,

$$\begin{aligned}
\overset{o}{\Delta W}{}^{m} \;=\; & -\left(p_c^{m,0}\cdot x^{m,1} - e^m(p_c^{m,0}, u^{m,1})\right) && \text{Term 1}\\
& -\left(\sum_{j\epsilon J_m} p_j^{m,0}\cdot(y_j^{m,0} - y_j^{m,1})\right) && \text{Term 2}\\
& -p^0\cdot\left(z^{m,0} - z^{m,1}\right) && \text{Term 3}\\
& -\tau\cdot(\theta - y_{1,1}^{m,1}) && \text{Term 4}
\end{aligned}$$

Terms 1 and 2 ≤ 0 by the assumption of consumer and producer efficiency (see proof of Theorem 2). Term 3 $= 0$ by direct calculation: $p^0\cdot(z^{m,0} - z^{m,1}) = (p_w^0 + t^0)\cdot(z^{m,0} - z^{m,1})$. Since trade flows of each country are fixed at situation 0 levels, $p_w^0 = p_w^1$ which implies $p_w^0\cdot z^{m,0} = p_w^1\cdot z^{m,1} = 0$. Term $t^0\cdot(z^{m,0} - z^{m,1}) = 0$ as can be seen by

$$t^0\cdot\left(z^{m,0} - z^{m,1}\right) = \begin{pmatrix} 0\\ 0\\ t_{wh}^0\\ \hline 0\\ 0\\ t_{wf}^0\\ \hline t_{hw}^0\\ t_{fw}^0\\ 0 \end{pmatrix}\cdot\begin{pmatrix} 0\\ z_{fh}^{m,0} - z_{fh}^{m,1}\\ 0\\ \hline z_{hf}^{m,0} - z_{hf}^{m,1}\\ 0\\ 0\\ \hline 0\\ 0\\ 0 \end{pmatrix} = 0 \qquad (2)$$

Term 4 ≤ 0 because $\tau \leqslant 0$ is a subsidy, and the alternative policy causes industry 1 to achieve the same or higher output. Thus, $\overset{o}{\Delta W}{}^{m} \leq 0$, $m = h, f$, and the replacement of the policy with any other lowers welfare. ■

Theorem 3 is important because transfers among members of preferential trading areas are not common. For example, NAFTA does not provide for any kind of compensatory transfers among its members. Transfers are possible in the European Union, but they total 0.1 percent of the total GDP and, therefore, are extremely low.[14] Not only might the formation of FTAs satisfying assumptions 1-2 be politically more feasible, since members have independence in their tariffs,

but they also might be easier to implement because compensatory transfers among members are not necessary.[15]

Some questions regarding the impact that a country's policy has on the welfare of others can be studied in our framework. For example, let's assume that country h achieves its internal quantitative target using taxation directed only to the targeted variable or variables and that country f's policy achieves its target, but not at the minimum level needed. Does the formation of the FTA of h and f using tariffs to freeze trade flows of each member country with respect to the rest of the world continue to enhance welfare for country h? Does the specified policy remain optimal for country h? We show below that the answer to both questions is yes. In other words, f's behavior does not taint h.

Theorem 4 *Let countries h and f form an FTA in situation 0. Assume that rules of origin satisfy assumption 2, trade is balanced, that producer and consumer efficiency obtain, and that each country retains the tariff revenues collected on trade crossing its own border. Cross country transfers are zero. Suppose that each country imposes a separate quantitative constraint on its own industry $y_{1,1}^{m,0} \geqslant \theta^m$, $m = h, f$. Let country h satisfy its quantitative target at the least level needed using a directed subsidy. Then, whatever the tool and its level employed by country f to satisfy its quantitative target, the policy is optimal for country h among the class of policies that freeze each member country trade with the rest of the world at situation 0 levels.*

Proof: Write the change in welfare between situation 0 and situation 1 for country h as $\overset{o}{\Delta W}{}^h \equiv e^h(p_c^{h,0}, u^{h,1}) - e^h(p_c^{h,0}, u^{h,0})$, where $e^h(\cdot,\cdot)$ is the expenditure function for the representative consumer in country h. Then,

$$\begin{aligned}
\overset{o}{\Delta W}{}^h \;=\; & -\left(p_c^{h,0}\cdot x^{h,1} - e^h(p_c^{h,0}, u^{h,1})\right) && \text{Term 1}\\
& -\left(\sum_{j\epsilon J_h} p_j^{h,0}\cdot(y_j^{h,0} - y_j^{h,1})\right) && \text{Term 2}\\
& -p^0\cdot\left(z^{h,0} - z^{h,1}\right) && \text{Term 3}\\
& -\tau\cdot(\theta - y_{1,1}^{h,1}) && \text{Term 4}
\end{aligned}$$

Terms 1 and 2 ≤ 0 by the assumption of consumer and producer efficiency. Their signs are independent of country f's policy. Term 3 = 0 by direct calculation: $p^0\cdot(z^{m,0} - z^{m,1}) = (p_w^0 + t^0)\cdot\left(z^{h,0} - z^{h,1}\right) = p_w^0\cdot z^{h,0} - p_w^0\cdot z^{h,1} + t^0\cdot\left(z^{h,0} - z^{h,1}\right) = p_w^0\cdot z^{h,0} - p_w^1\cdot z^{h,1} + t^0\cdot\left(z^{h,1} - z^{h,0}\right) = t^0\cdot\left(z^{h,1} - z^{h,0}\right) = 0$, where the last equality follows from (2). Term 4 ≤ 0 because $\tau \leqslant 0$ is a subsidy, and the alternative policy causes industry 1 to achieve the same or higher output.

Thus, $\overset{o}{\Delta W}{}^h \leq 0$; the replacement of the policy with any other is non-increasing in the welfare of country h. ■

Remarks:

- Country f influences country h's welfare through the term $p^0 \cdot \left(z^{h,0} - z^{h,1}\right)$, which codifies the terms of trade and tariff revenue effects of moving from the policy implemented in period 0. See Grinols and Wong (1991). Since the trade of each country with respect to the rest of the world is unchanged between the situations and country h sets its duties to goods traded with f at zero in situation 0, the terms of trade and tariff revenue effects are zero in country h.

- Theorem 1-3 evaluate the welfare outcome of policies preserving free trade within the FTA. Theorem 4 considers however that country f might deviate from optimal behavior and may, for example, apply duties to goods traded with country h. Theorem 4 shows that even if country f applies trade barriers within the FTA, country h's optimal policy is not to impose any trade barrier on goods traded with f. Thus, the mechanism described in this paper tends to reduce the confrontation between preferential trade agreements' members through the formation of FTAs.

- The mechanism displayed in Theorem 4 considers that both countries adjust their tariffs to keep trade flows with the rest of the world at situation 0 levels. In some situations this might not be necessary. Consider the case when country f is small and, consequently, can not affect world prices. Then, country h's terms of trade can not be affected by country f's policy so that the policy described in Theorem 4 is optimal for country h (among the class of policies that keeps its trade flows frozen) whether or not country f freezes its trade flows at situation 0 levels. In this case, country h has total independence on its economic policy (with respect to f's policy) which constitutes an important result in preferential trade negotiations that involve small countries.

- Theorem 4 displays a significant advantage of free trade areas over customs unions. The formation of a free trade area where each member keeps fixed its trade flows with the rest of the world, allows the sign of welfare change to depend solely on each country's own policy, even in the presence of quantitative restrictions. It is an important discovery because the literature tends to emphasize the fact that customs unions are welfare superior to free trade areas. See Krueger (1997) and Grinols and Silva (2003a). This may be true in terms of reaping fuller static welfare gains, but omits the political economy considerations

that customs unions require cross country transfers and do not allow as much de-coupling of members to pursue internal industrialization objectives and acquire gains independently of partner policies. The politics of transfers can be problematical and lead to welfare losses for member countries as shown in Grinols (1984).

6 Applications

Theorems 1-4 take as given the sectors or consumers that should be the government's intervention objective. Non-economic objectives are very important reasons for economic intervention—see the discussion in the introduction—but the presence of increasing returns to scale and the relation between economic intervention and the political economy viability of FTAs deserves attention as well. It is also important to investigate whether our results are robust to the presence of transportation costs. Below we address how our framework can be used to discuss these points.

6.1 Increasing Returns to Scale

The presence of increasing returns to scale increases the scope for welfare gains but also enlarge the possibilities of welfare reductions. Term 2 in Theorems 1-4 summarizes in our framework the effects of increasing, constant and decreasing returns to scale. Producer efficiency can not be assumed in the presence of increasing returns, which implies that Term 2 in Theorems 1-4 may be positive or negative. Therefore, a welfare respecting government might wish to protect sectors that exhibit significant scale effects. There are no results in the literature that relate the formation of welfare enhancing FTAs, the presence of increasing returns to scale, and industrial targeting. Our framework can address this issue.

Let's concentrate on the formation of welfare enhancing FTAs as described in Theorem 1. Grinols (1991) discusses necessary and sufficient conditions for Term 2 in Theorem 1 to be non-negative in the presence of increasing returns to scale. He shows in the cited paper that if perfect competition prevails in industries exhibiting constant and decreasing returns to scale then the increase of a weighted output of the industries that exhibit increasing returns is sufficient to guarantee non-negativity of Term 2.[16]

It is sufficient that Term 2 be non-negative for an FTA to be welfare enhancing if assumptions 1-2 are valid and consumer efficiency prevails since Terms 1, 3, and 4 are non-negative as explained in Theorem 1. Applying taxes/subsidies to maintain the same level of output for sectors that exhibit significant economies of scale between situations 0 and 1, thus implies that Term 2 is non-negative, and following Theorem 1, that the formation of the resulting FTA is welfare enhancing.

Optimality of this policy among the class of policies that keeps trade with the rest of the world constant is straightforward and preserves output of the targeted industries is left to the reader.

6.2 Political Viability of FTAs

Theorems 3-4 show that the formation of FTAs satisfying assumption 2 and the application of taxes/subsidies to achieve separate quantitative targets is optimal for each country individually among the class of policies that keeps trade with the rest of the world frozen at situation 0 levels. Transfers are not necessary for this policy which is an important feature for the political economy of PTAs. Moreover, this policy adds something to the influence driven approach to the political economy of trade. This approach emphasizes that the politicians (government) implement trade related tools taking into consideration welfare aspects and monetary contributions offered by interest groups (lobbyists).[17]

Grossman and Helpman (1995) argue that the exclusion[18] of sensitive sectors from the formation of an FTA increases the political viability of the trade bloc. In their framework, the exclusion of a sector depends on the political value of the exclusion to the governments forming the FTA. The political value of the exclusions in turn, depends on the monetary contributions offered by sectorial lobbies and the welfare impact of the exclusion. Thus, an excluded sector tends either to have a lot to lose from FTA formation—what might imply it contributes a lot to be excluded—or have a negative impact on welfare if included in the FTA.

Instead of using exclusions to make the formation of an FTA more palatable, the application of taxes/subsidies on the output of politically sensitive sectors accomplish the same objective. Using a similar lobbying game as described in Grossman and Helpman (1995) coupled with formation of an FTA with the characteristics specified in Theorem 1, the sectors whose political exclusion values were greater could receive taxes/subsidies to freeze their output at pre-formation levels so that the profitability of these sectors´ interest groups would be unaffected by the formation of the FTA. Theorems 1-2 show that this FTA is welfare enhancing and the specified policy is optimal. Besides, the WTO specifies limitations on the use of exclusion on PTAs but not in the use of taxation within a trade bloc. Therefore, the use of commodity taxation may be part of the formation of welfare enhancing FTAs and it's more advantageous with respect to exclusions since its use is not monitored by the WTO/GATT.[19]

6.3 Transportation Costs

Goods are differentiated by characteristic and location. The transshipment technology is a form of production, and, therefore, a process of transforming certain inputs to specific outputs.

Moving a good from one location to another transforms it and so the equilibrium FTA vector of prices p expresses the cost of transportation between locations as well as preferences and production technology.[20] Thus, when transportation is recognized the FTA vector of prices continues to be described by equation (1) and the resource-using activity of transporting commodities between countries is addressed without change in our notation. Consequently, the proofs of Theorems 1-4 hold without modification.

7 Summary and Conclusions

Preferential trading agreements, especially free trade areas, are popular tools among countries seeking to reap greater gains from trade. The prime directive for successful PTA formation is that member countries experience an increase in welfare from participation. Beyond that requirement impediments to the formation and implementation of PTAs often include the need to adopt common external tariffs, the need to make cross-country transfers, the political necessity to protect specific industries through satisfying selected industrialization targets or constraints and the effects of inefficient policies implemented by some members. Customs unions generate the greatest gains from trade from a static welfare perspective, but impose the requirements that countries adopt a common external tariff and bring into play cross country transfers to guarantee the prime directive. This paper examined the welfare economics of free trade areas. It provides a mechanism that meets the prime directive, allows industrialization constraints to be imposed and met efficiently, and that grants members of the free trade area with a substantial degree of policy independency.

Appendix: Generalized Industrialization Constraints and Necessity

Generalizing the result in Theorem 2 requires an extension of the notation used up to now. Let's define an allocation in countries $m = h, f$ by $\vec{a} \equiv \{\vec{a}^h, \vec{a}^f\}$ where the vector $\vec{a}^m \equiv \{x^m, (y_j^m)_{j=1,...,J}, z^m\} \in R^{(2+J)9K}$. The quantitative objective of member m is described by the inequality $c^m(\vec{a}^m) \leqq 0$, where c^m is a vector function, and is distinct from the quantitative objective that another country may have.[21] If an allocation $\vec{a}^m$ satisfies the quantitative objective at the minimum level needed then $c^m(\vec{a}^m) = 0$. The quantitative restriction of the countries h and f is described by the vector $c(\vec{a}) \equiv \{c^h(\vec{a}^h), c^f(\vec{a}^f)\} \leqq 0$. The methodology is totally

general, allowing the investigation of cases involving targets in different sectors or a mix of industrialization, consumption, and international trade targets.

The government of country m satisfies the quantitative objective $c^m(\vec{a}^m) \leqq 0$ applying taxes on consumption and production and tariffs on international trade. Let's represent the tax vector of country m by $\beta^m \equiv \{t_c^m, (t_j^m)_{j=1,...,J}, t^m\} \epsilon R^{(2+J)9K}$. The tax vector of the countries h and f is represented by $\beta \equiv \{\beta^h, \beta^f\}$. Note that if the tax vector of country m is directed only to those variables involved in the restriction $c^m(\vec{a}^m) \leqq 0$ then $\beta^m = \lambda^m v^m$, where $\lambda^m > 0 \epsilon R$ and v^m is a vector whose elements are zero except for elements corresponding to the variables involved in the quantitative restriction. In the example investigated in Theorem 2, $\beta^{m,0} = \lambda^{m,0} v^{m,0}$ where $\lambda^{m,0} = \tau < 0$ and $v^{m,0}$ is a vector of zeros except for the first element corresponding to industry 1, which is one, and for elements corresponding to trade with the rest of the world.[22] Now we are ready to generalize Theorem 2.

Generalization of Theorem 2 (Sufficiency and Necessity): Suppose country $m = h, f$ chooses tariffs so that its trade with the rest of the world (country w) is unchanged between the initial situation 0 and situation 1, consumer and producer efficiency obtain and that the trade of each country is balanced. Let countries $m = h, f$ impose separate quantitative objectives, which are described by $c^m(\vec{a}^m) \leqq 0$. Assume that the set of feasible allocations that satisfy the quantitative objective in country m, $L^m = \{\vec{a}^m | \, c^m(\vec{a}^m) \leqq 0\}$, is compact, convex and its interior is non-empty. Then, there exists an allocation for each country m that satisfies the quantitative restriction and is optimal among the class of policies that freeze trade with the rest of the world and hold world prices fixed. Optimal policies are characterized by the formation of an FTA with appropriate external-trade-freezing tariffs, the rules of origin specified in assumption 2, and the application of directed tax incentives to achieve industrialization or consumption quantitative targets at the minimum level acceptable.

Proof (Sufficiency) Write the change in welfare between situation 0 and situation 1 for country $m = h, f$ as $\Delta \overset{o}{W}{}^m \equiv e^m(p_c^{m,0}, u^{m,1}) - e^m(p_c^{m,0}, u^{m,0})$, where $e^m(\cdot, \cdot)$ is the expenditure function for the representative consumer in country m. Use the identities for $m = h, f$ that $e^m(p_c^{m,0}, u^{m,0}) = p_c^{m,0} \cdot x^{m,0}$, $x^{m,0} = y^{m,0} + \omega^{m,0} + z^{m,0}$ and likewise in situation 1, $p^{m,0} = p^{w,0} + t^0$, $p_c^{m,0} = p^0 + t_c^{m,0}$, $p_j^{m,0} = p^0 - t_j^{m,0}$ because we consider that both FTA partners present quantitative

objectives. Then, by direct computation,

$$\begin{aligned}
\overset{o}{\Delta W}{}^h + \overset{o}{\Delta W}{}^f \;\; = \;\; & -\sum_{m=h,f} \left(p_c^{m,0} \cdot x^{m,1} - e^m(p_c^{m,0}, u^{m,1})\right) && \text{Term 1} \\
& -\sum_{m=h,f} \left(\sum_{j \epsilon J_m} p_j^{m,0} \cdot (y_j^{m,0} - y_j^{m,1})\right) && \text{Term 2} \\
& -\sum_{m=h,f} p_w^0 \cdot \left(z^{m,0} - z^{m,1}\right) && \text{Term 3} \\
& -\sum_{m=h,f} \beta^{m,0} \cdot (\overrightarrow{a}^{m,0} - \overrightarrow{a}^{m,1}) && \text{Term 4}
\end{aligned}$$

Terms 1 and 2 ≤ 0 as explained in Theorem 2. Term 3 $= 0$ because $p_w^0 = p_w^1$, which implies $p^{w,0} \cdot z^{m,0} = p^{w,0} \cdot z^{m,1} = 0$. Since $\beta^{m,0}$ is directed only to those variables involved in the restriction $c^m(\overrightarrow{a}^m) \leqq 0$ then $\beta^{m,0} = \lambda^{m,0} v^{m,0}$ using the notation discussed above. By assumption, $\beta^{m,0}$ satisfies the restriction at the minimum level acceptable so that $v^{m,0} \cdot \overrightarrow{a}^{m,1} \leqslant v^{m,0} \cdot \overrightarrow{a}^{m,0}$ for all feasible allocations $\overrightarrow{a}^{m,1}$ such that $c(\overrightarrow{a}^{m,1}) \leqslant c(\overrightarrow{a}^{m,0}) = 0$. Then, Term 4 $\leqslant 0$ because we have that $-\beta^{m,0} \cdot (\overrightarrow{a}^{m,0} - \overrightarrow{a}^{m,1}) = -\lambda^{m,0}(v^{m,0} \cdot \overrightarrow{a}^{m,0} - v^{m,0} \cdot \overrightarrow{a}^{m,1}) \leqslant 0$. Thus, $\overset{o}{\Delta W}{}^h + \overset{o}{\Delta W}{}^f \leq 0$ and the replacement of the given policy with any other lowers welfare. ■

Proof (Necessity) A sketch of the proof can be shown as follows. Denote the optimal allocation with quantitative restriction for countries h and f by $\overrightarrow{a}^0 \equiv \{\overrightarrow{a}^{h,0}, \overrightarrow{a}^{f,0}\}$. Closedness, convexity and the assumption of non-empty interior of L_m imply that $\overrightarrow{a}^{m,0}$ is on the boundary of this set. Otherwise, $\overrightarrow{a}^0$ would not be optimal which is a contradiction. On the other hand, if the restriction $c^m(\overrightarrow{a}^m) \leqq 0$ is not binding them we would have an unconstrained maximization problem and market equilibrium would satisfy the quantitative restriction. Thus, we have that $c^m(\overrightarrow{a}^{m,0}) = 0$ so that $\overrightarrow{a}^{m,0}$ satisfies the quantitative restriction at the minimum level acceptable.

Convexity of L^m and the fact that $\overrightarrow{a}^{m,0}$ is on the boundary of L^m imply—using the supporting hyperplane theorem— there exist supporting vectors at $\overrightarrow{a}^{m,0}$, s^m, where $s^m \cdot l^m \leqslant s^m \cdot \overrightarrow{a}^{m,0}$ with $s \equiv \{s^h, s^f\}$ and $l^m \epsilon\ L^m$. Let's call this set $S \equiv \{S^h, S^f\}$.[23] Since allocation $\overrightarrow{a}^0$ is optimal, following Theorem 1 there is no allocation $\overrightarrow{a}^1$ and policy intervention β^1 such that

$$\Delta W^h + \Delta W^f \geqslant \sum_{m=h,f} \beta^{m,1} \cdot \left(\overrightarrow{a}^{m,1} - \overrightarrow{a}^{m,0}\right) = \beta^1 \cdot \left(\overrightarrow{a}^1 - \overrightarrow{a}^0\right) > 0$$

using the facts that Term 1 and 2 $\geqslant 0$ and Term 3 $= \sum_{m=h,f} p_w^0 \cdot (z^{m,0} - z^{m,1}) = 0$ as described in the sufficiency proof of the generalized version of Theorem 2.

Let $x = \left(\overrightarrow{a}^1 - \overrightarrow{a}^0\right)$. Then, the system $\beta^1 \cdot x > 0$ and $-s \cdot x \geqslant 0$ has no solution x. Otherwise, there would be $\overrightarrow{a}^{m,1} \epsilon\ L^m$ such $\beta^m \cdot [\overrightarrow{a}^{m,1} - \overrightarrow{a}^{m,0}] > 0$ which contradicts the fact

that allocation $\overrightarrow{a}^0$ is optimal. Therefore, according to Slater's Theorem[24], there exist vectors $r_1 = \{r_1^h, r_1^f\} \geqslant 0$ and $r_2 = \{r_2^h, r_2^f\} \geqq 0$ which are conformable to vectors β and s, respectively, such that $r_1 \cdot \beta - r_2 \cdot s = 0$. Thus, $r_1^m \cdot \beta^{m,1} - r_2^m \cdot s = 0$ so that each member country m implements the optimal policy vector $\beta^m = \frac{1}{r_1^m} r_2^m s^m$.

Since the optimal allocation has to be supported by a nonvacuous vector of taxes and tariffs then $r_1 > 0$ and $r_2 \geqslant 0$. Assume $\lambda^{m,0} = \frac{1}{r_1^m} > 0$ and $v^{m,0} = r_2^m s^m$. If vector $s \, \epsilon \, S$ is not zero for components of $\overrightarrow{a}^0$ not contained in the constraint $c(\overrightarrow{a}) \leqq 0$ then conditions $s^m \cdot l^m \leqslant s^m \cdot \overrightarrow{a}^{m,0}$ might be violated. Thus, the optimal tax vector β contain taxes and subsidies directed to only those variables involved in the industrialization and consumption targets of each country. Considering that the rules of origin shown in assumption 2 are in place, β also contain non-zero tariffs and subsidies on trade between country m and the rest of the world but contain tariffs equal to zero on trade between countries h and f because trade between those countries is not restricted. Thus, the formation of an FTA is optimal. Concluding, the formation of an FTA with appropriate external-trade-freezing tariffs and the rules of origin specified in assumption 2, and the application of directed tax incentives to achieve industrialization or consumption quantitative targets at the minimum level accepted is the optimal policy among the class of policies that freeze trade with the rest of the world.

Notes

[1]Bond et al. (2001) use a dynamic model with trigger strategies to evaluate the set of cooperative tariffs that is incentive compatible when a group of countries forms a customs union. In particular, they derive conditions under which Kemp-Wan adjustments in the external tariffs of the union—adoption of a common external tariff that leaves the world prices unchanged—are incentive compatible and, consequently, a pareto improvement is achieved.

[2]Kowalczyk et al. (2000, 2003) investigate the use of Grinols transfers to implement world free trade. They conclude that these transfers bring free trade to the core of a game where countries can form preferential agreements and, consequently, allow free trade to prevail. Besides, Grinols transfers can be easily implemented since their application only requires the knowledge of pre-change import flows and prices.

[3]A remarkable example in this preferential trade agreement is the adoption of provisions for the US to impose temporary duties on Canadian fresh fruits and vegetables to ensure timely relief to its domestic producers of like goods. These provisions to restrict trade between US and Canada remained valid after the formation of NAFTA.

[4]See Chang and Winters (2002) and Baer (2001, chapter 4). Since Brazil and Argentina present differentiated incentives (including external tariffs) to the automotive industry, both countries agreed —on what is called the Mercosur Automotive Agreement stablished in June of 2000—to implement a rule of origin that defines what is a domestic produced vehicle in MERCOSUR. This rule states that new vehicles (cars, bus and trucks) need to achieve 60 percent of regional value content to be traded free of duties within Mercosur. See Gawande et al (2003) and Vieira (2002) for details on internal and external barriers to trade in Mercosur.

[5]With the exception of the European Union, we are not aware of any trade bloc that officially uses cross crountry transfers. For instance, the Free trade Area of the Americas scheduled to be formed in 2005 and have 34 member countries does not provide (up to now) any provision for cross country transfers.

[6]See also Panagariya and Krishna's (2000) survey of second best results in the literature of international trade.

[7]See the discussion in Panagariya and Krishna (2002) and Grinols and Silva (2003a).

[8]These results were originally shown in Grinols and Silva (2003b).

[9]We thank Eric Bond for calling our attention to this implication of our results.

[10]Bond et al. (2003) use a three-country endowment model to investigate the welfare consequencies of the formation of an FTA. Assuming that each member country of the FTA chooses tariffs with the rest of the world optimally, they conclude that FTA members' terms of trade deteriorate and, therefore, the welfare effect on member countries is ambiguous. The results proved in this paper, however, describe a mechanism where members of an FTA enjoy policy independence with positive welfare effects.

[11]See Grinols and Silva (2003a) and Panagariya and Krishna (2002) for a discussion.

[12]Assumption 1 deals with a meta-time comparison that supposes that non-member countries keep their trade policies unchanged. See Richardson (1995) for an example where non-members act strategically in real time and assumption 1 is not valid. See also Kemp and Shimomura (2001) for further comments on this.

[13]Because duties on products imported by one FTA member from the other are zero, we have $t_{hf} = t_{fh} = 0 \; \epsilon \; R^K$. Theorems 2-4 investigate the cases where FTA members (possibly) use duties on goods traded within the trade bloc.

[14]See Neal (1998) pp. 94-99.

[15]In a tariff distorted world economy, Kemp (2000) shows that the formation of an FTA where members choose their tariffs to keep their joint trade flows with the rest of the world constant is welfare enhancing. It is clear that in this case the proof of theorems 1 and 2 remain correct. However, cross country transfers might be necessary since a member might have tariff revenue losses, and, in the absence of transfers, its welfare may decrease. Algebrically, the term $t^0 \cdot (z^{m,0} - z^{m,1})$ in theorem 3 might not be zero since the assumption that each member chooses tariffs to keep its trade flows with the rest of the world constant is not satisfied.

[16]See Grinols (1991) pp. 978 for further details.

[17]Some examples of the influence driven approach applied to the formation of PTAs are Cadot et al. (2003), Gawande et al. (2003) and Krishna (1998).

[18]Exclusion means that FTA members do not exchange trade preferences in an industry. A broad definition of the term would include phase-in periods for some sectors.

[19]In a small economy model where the government can apply duties on internatonal trade and consumption/production taxes, Dixit (1996) shows that if individuals have identical quasilinear preferences, and separable lobbying is not present, free trade would prevail in equilibrium. In this sense, the influence driven approach might generate the application of direct taxes and subsidies to increase the political viability of FTAs as we discuss in this section. However, our mechanism increases welfare and is efficient while the influence driven approach forecast the formation of protection enhancing (trade diverting) FTAs. Besides, our model is general and allow the presence of intermediate and non-tradable goods as well as transportation costs as discussed in the next section.

[20]See Grinols and Silva (2003a) for more information on this point.

[21]For instance, country h's quantitative restriction studied in Theorem 2 can be described by $c^h(\overrightarrow{a}^h) = \begin{bmatrix} y^h_{1,1} - \theta \\ z^{h,0}_{h,w} - \bar{z}_{h,w} \\ z^{h,0}_{w,h} - \bar{z}_{w,h} \end{bmatrix} \leqq 0$, where $\bar{z}_{h,w}$ and $\bar{z}_{w,h}$are constants.

[22]Trade with respect to the rest of the world will be fixed in the generalization of Theorem 2. Thus, the elements in vector v corresponding to trade with the rest of the world will not be important.

[23]Instead of assuming convexity and non-emptiness of the interior of the set L^m, we could have chosen contraint qualifications on the vector function C^m to avoid situations where the social indefference function is irrelevant to the choice of the constrained maximum. See Mangasarian (pp.78-79 and 102-103) for constraint qualifications and examples of situations where the social indifference function (objective function) is irrelevant.

[24]See Mangasarian (1969) pp. 27.

References

[1] Baer, Werner (2001) "The Brazilian Economy: Growth and Development," Praeger Publishers, 5th edition.

[2] Baer, Werner; Peri Silva and Tiago Cavalcanti (2002) "Economic Integration without Policy Coordination: The Case of Mercosur," *Emerging Markets Review*, Vol. 3, No. 3, pp. 269-291.

[3] Bhagwati, Jagdish (1968) "Trade Liberalization Among LDCs, Trade Theory and GATT rules, in: Wolfe ed., Value, Capital and Growth: Papers in honor of Sir John Hicks, (Edinburgh University Press, Edinburgh) chap. 2, pp. 21-43.

[4] Bhagwati, Jagdish (1993) "Regionalism and Multilateralism: An Overview", in New Dimensions in Regional Integration, ed. Jaime de Melo and Arvind Panagariya, pp. 22-51.

[5] Bond, Eric W., Constantinos Syropoulos and Alan L. Winters (2001) "Deepening of Regional Integration and Multilateral Trade Agreements", *Journal of International Economics*, 53, pp. 336-361.

[6] Bond, Eric W., Raymond Riezman and Constantinos Syropoulos (2003) "A Strategic and Welfare Theoretic Analysis of Free Trade Areas", *Journal of International Economics* (forthcoming).

[7] Cadot, Olivier, Jaime de Melo and Marcelo Olarreaga (2003) "The Protectionist Bias of Duty Drawbacks: Evidence from Mercosur," *Journal of International Economics* 59, pp. 217-229.

[8] Chang, Won and Alan Winters (2002) "How Regional Blocs Affect Excluded Countries: The Price Effects of Mercosur," *American Economic Review*, Vol. 92, No. 4, pp. 889-904.

[9] Cooper, C. A. and B. F. Massell (1965) "Toward a General Theory of Customs Union for Developing Countries", *Journal of Political Economy*, 73, pp. 256-283.

[10] Dixit, Avinash (1996) "Special-Interest Lobbying and Endogenous Commodity Taxation", *Eastern Economic Journal*, vol. 22, no. 4, pp. 375-388.

[11] Estevardeordal, Antoni; Jaime de Melo, Olivier Cadot, Akiko Suwa-Eisenmann and Bolormaa Tumurchudur (2002) "Assessing the Effect of Nafta's Rules of Origin", Working Paper, World Bank.

[12] Gawande, Kishore, Pablo Sanguinetti and Alok K. Bohara (2003) "Exclusions for Sale: Evidence on the Grossman-Helpman Model of Free Trade Agreements," *Journal of International Economics* (forthcoming).

[13] Grinols, Earl L. (1981) "An Extension of the Kemp-Wan Theorem on the Formation of Customs Unions," *Journal of International Economics*, 11, pp. 259-266.

[14] Grinols, Earl L. (1984) "A Thorn in the Lion's Paw: Has Britain Paid Too Much for Common Market Membership?" *Journal of International Economics*, 16, 3/4, 271-294.

[15] Grinols, Earl L. (1991) "Increasing Returns and the Gains from Trade," *International Economic Review*, vol. 32, issue 4, pp. 973-984.

[16] Grinols, Earl L. and Kar-yiu Wong (1991) "An Exact Measure of Welfare Change," *The Canadian Journal of Economics*, vol. 24, pp. 428-449.

[17] Grinols, Earl L. and Peri Silva (2003a) "An Enhancement of Modern Free Trade Area Theory", Working Paper 03-0104, College of Commerce and Business Administration, University of Illinois.

[18] Grinols, Earl L. and Peri Silva (2003b) "Industrial Targeting and Free Trade Areas", Working Paper 03-0109, College of Commerce and Business Administration, University of Illinois.

[19] Grossman, Gene and Elhanan Helpman (1995) "The Politics of Free Trade Agreements," *American Economic Review,* vol. 85, issue 4, pp. 667-690.

[20] Kemp, Murray and Henry Y. Wan (1976) "An Elementary Proposition on the Formation of Customs Unions," *Journal of International Economics*, 6, pp. 95-97.

[21] Kemp, Murray and Koji Shimomura (2001) "A Second Elementary Proposition Concerning the Formation of Customs Unions," *Japanese Economic Review*, 52, no.1, pp.64-69.

[22] Kemp, Murray (2000) "Welfare Comparisons of Customs Union and Other Free Trade Associations", *Pacific Economic Review*, 5, 1, 1-3.

[23] Kowalczyk, Carsten and Tomas Sjostrom (2000) "Trade as Transfers, GATT and the Core," *Economics Letters,* 66, 163-169.

[24] Kowalczyk, Carsten, Tomas Sjostrom and Hideo Konishi (2003) "Free Trade, Customs Unions and Transfers", mimeo.

[25] Krishna, Pravin and Jagdish Bhagwati (1997) "Necessarily Welfare-Enhancing Customs Unions with Industrialization Constraints," Japan and the World Economy 9: 4, pp. 441 – 46.

[26] Krishna. Pravin (1998) "Regionalism and Multilateralism: A Political Economy Approach." *Quarterly Journal of Economics* 113, pp. 227-251.

[27] Krueger, Anne (1997) "Free Trade Agreements versus Customs Unions", *Journal of Development Economics*, vol. 54, pp. 169-187.

[28] Neal, Larry and Daniel Barbezat (1998) "The Economics of European Union and the Economies of Europe," Oxford University Press.

[29] Panagariya, Arvind (1996) "The Free Trade Area of Americas: Good for Latin America?" *World Economy* 19: 5, pp. 485 – 515.

[30] Panagariya, Arvind (2000) "Preferential Trade Liberalization: The Traditional Theory and New Developments", *Journal of Economic Literature,* vol. 38, pp. 287-331.

[31] Panagariya, Arvind and Pravin Krishna (2000) "A Unification of Second Best Results in International Trade," *Journal of International Economics*, 52, pp. 235-257.

[32] Panagariya, Arvind and Pravin Krishna (2002) "On Necessarily Welfare-Enhancing Free Trade Areas," *Journal of International Economics*, 57, pp. 353-367.

[33] Richardson, Martin (1992) "Some Implications of Internal Trade in a Free Trade Area", Working Paper No. 92-01, Georgetown University, 1992.

[34] Richardson, Martin (1995) "On the Interpretation of the Kemp-Wan Theorem", *Oxford Economic Papers*, volume 47, issue 4, pp. 696-703.

[35] Vieira, Luciana Fonseca (2001) "The Effect of Preferential Trade Agreement in the Economy of the Countries Involved: The Case of MERCOSUR", School of Business and Public Management, George Washington University, mimeo.

[36] World Bank (2000), "Trade Blocs ".