Preferential Trading and Welfare:

The Small-Union Case Revisited

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Abstract

The welfare analyses of preferential trading arrangements have been characterized by generally inconclusive and messy results. In this paper, I attempt to give order to the analysis of one important case: a union between two small countries. The analysis has two key advantages over the existing literature. First, the model employed is fully general in that it allows for goods that are exported and imported by both partners as well as those that are exported by one and imported by the other partner. Second, the results are derived for finite changes in tariff rates rather than being limited to infinitesimally small changes.

The main results of the paper can be summarized as follows. First, assuming all goods to be normal in consumption, if two small countries form a free trade area or exchange some tariff preferences, their joint welfare falls or rises as their joint output, valued at world prices, rises or falls. Second, if, in addition, the numeraire good uses only labor and all other goods use labor and a sector-specific factor, the exchange of preferences or free trade area necessarily lowers the union's joint welfare. Third, a union member is necessarily hurt by its own preferential liberalization. The higher are its external tariffs and the larger its imports from the partner, the more it loses from extending the preferences. Fourth, in the specific-factors case just mentioned, a union member necessarily benefits from the tariff preference it receives from the partner. The more it exports to the partner and the higher the latter's tariffs, the greater the gain. Finally, in the specific-factors case, an FTA benefits a member more the larger its bilateral trade surplus with the partner and the lower its external tariffs relative to the partner.

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1. Introduction

Since the publication of Viner's (1950) classic work, *The Customs Union Issue*, a voluminous literature has come to exist on the welfare effects of preferential trade arrangements (PTAs). Sadly, however, the literature has remained remarkable for its lack of robust and clear results. Much of the older literature, generated by the first wave of PTAs, employed homogeneous goods models characterized by perfect competition. As Corden's (1984) survey of that literature testifies, the results of these models depend critically on the number of goods, the direction of trade and initial levels of various tariffs.[1] The new literature, triggered by what Bhagwati (1993) has called the Second Regionalism, has largely switched to imperfect competition models. As far as the welfare effects of PTAs go, this switch has only added to the fragility of the results.[2]

The purpose of this paper is to revisit the old problem of a PTA between two or more small countries and give some measure of order to its analysis. Of course, the small-country context necessarily requires that goods be homogeneous. In differentiated goods models, firms and countries necessarily have market power. Moreover, as long as trade restrictions take the form of non-prohibitive tariffs, which are the focus of this paper and much of the literature, the small-country assumption necessarily implies perfectly

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[1] Some of the key contributions relying on two-good models are Gehrels (1956-57), Lipsey (1957) and Bhagwati (1971). Among the analyses based on three-good models are Meade (1955), Mundell (1964), Corden (1976), Berglas (1979), Riezman (1979), McMillan and McCann (1981), Lloyd (1982), Kowalczyk (1990) and Panagariya (1997a, 1997b). Some of the recent contributions employ these models to study political economy issues. Thus, Richardson (1993, 1994) and Levy (1997) use the two-good model and Panagariya and Findlay (1996) the three-good model to address the impact of PTAs on external protection.

[2] Krugman (1991), Bond and Syropoulos (1996), Yi (1996) and Ethier (1998) use the differentiated goods model while Krishna (1998) employs a homogeneous-good, oligopoly model. See Panagariya (1999) for a survey of this and older literature.

competitive behavior in the goods markets. Thus, the natural context for analyzing the problem of a PTA between two small countries is that of homogeneous goods with perfect competition.

At the center of the literature on PTAs between small countries is the three-good Meade (1955) model, as analyzed originally by Lipsey (1958) and elaborated subsequently by Corden (1976), McMillan and McCann (1981), Lloyd (1982) and Panagariya (1997a, 1997b).[3] As traditionally formulated and analyzed, this model is quite unrealistic, however. The analysis usually begin with the assumption that, of the three goods, each union member exports one and imports the other two. Of the latter, one good is imported exclusively from the partner and the other from the rest of the world. Prices in the rest of the world are fixed. Internal prices facing a union member differ from those in the rest of the world by tariff per unit. Initially, the *ad valorem* tariff is assumed to be the same on both imports. Preferential trade is then introduced by a small reduction in the tariff on the good imported from the partner.

There are four important limitations of this approach to analyzing the implications of preferential trading. First, there is no reason whatsoever in this model for countries to form a PTA. Given that the prices facing consumers and producers in each member country depend entirely on its own tariffs, the model permits no distinction between liberalization within the context of a PTA and voluntary reductions in tariffs by the country. This is because internal prices facing the country are altered solely by alterations in its own tariffs and not of the partner. This, in turn, implies that the country has no incentive to make its

[3] Meade himself did not consider the small-union case. Instead, as discussed in detail in Panagariya (1997a), he allowed the terms of trade to vary and focused on the world welfare. In an important paper, Mundell (1964) later worked out explicitly the terms of trade effects of a PTA in this model.

liberalization contingent on that of the partner. Its welfare is solely the outcome of its own tariff policy.

Second, assuming the good imported from outside is also produced by both PTA members, there is an internal inconsistency in the model.[4] The inconsistency is explained most easily in the case when the PTA takes the form of an FTA, though it also applies to partial tariff preferences. Denoting the FTA members by A and B, suppose the tariff on the good imported from the outside country is higher in A. Then the price paid for this product by consumers in A will exceed that in B. Because goods produced in A and B are free to move anywhere within the union, all of within-union output will be sold in country A, which has the higher price. But the conventional analyses of the Meade model do not allow for this kind of arbitrage, assuming, instead, that the price received by producers in each member country continues to equal the price in the outside country plus its own tariff.[5] One way to get around the problem is to simply assume that the good imported from outside is not produced by union members at all, or at least the member with lower tariff on it. But such an assumption is quite restrictive and arbitrary.

Third, the analysis is carried out for small changes in the tariff on the partner country. Assuming substitutability, the model predicts that, as the tariff on the partner is lowered successively by small amounts, welfare first rises and then falls. This leaves uncertain the welfare outcome in the FTA equilibrium relative to that in the initial

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[4] This point was originally made by Richardson (1994) and incorporated into the production model, underlying their political-economy analysis of FTAs, by Grossman and Helpman (1995). Panagariya and Krishna (1997) exploited it to establish a result similar to the Kemp-Ohyama-Kemp-Wan theorem for FTAs (Kemp and Wan, 1976).

[5] As discussed in Panagariya (1997a), this problem also arises in a slightly different form in the case of a partial tariff preference.

equilibrium. To-date, we have do not have a general condition that allows us to compare the pre- and post-FTA outcomes.

Finally, the results in the model are derived for a specific pattern of trade. As Lloyd (1982) shows systematically, altering this pattern of trade significantly influences the outcome. Thus, any conditions derived for the improvement in welfare even for a small change in the tariff preference depend on the assumed pattern of trade.

One or more of these criticisms also apply to other welfare analyses of PTAs between small countries. For instance, Berglas (1979) assumes a different pattern of trade and is able to deal with first two of the above problems to some degree. But his analysis is also limited to small changes and relies on the chosen pattern of trade.

In this paper, I present an analysis of PTAs between small countries that is quite general along many dimensions. First, I accommodate all possible patterns of trade into the model. This is done by considering a union between A and B that allows for four types of goods: those exported by both, those imported by both, those imported by A and exported by B and those exported by A and imported by B. Leaving aside non-traded goods, which are readily incorporated into the analysis following the technique in Dixit and Norman (1980, pp. 208-11), these types of goods exhaust all possible patterns of trade. Second, I allow all goods to be produced and consumed everywhere and also for the full exploitation of arbitrage opportunities. This means that, in the presence of an FTA, within-union producers sell their output in the country where they get the highest price. Third, I allow for perfectly general preferences. The only restriction I impose is that all goods be normal in consumption and even this restriction is a sufficiency condition, not necessary. Finally, the

analysis is not limited to infinitesimally small changes. Instead, it allows for finite changes in tariffs, permitting a direct comparison of pre- and post-FTA equilibria.

This level of generality is achieved with the aid of two important restrictive assumptions, however. First, I assume that the union member with higher tariff on a good continues to import that good after the formation of the PTA. This assumption is necessary to ensure that internal prices remain linked to the corresponding world prices via relevant tariff rates. In the analysis of tariff policy in a small country, this is a standard assumption. The traditional general-equilibrium models of PTAs, mentioned, for example, in footnote 2, also make this assumption. Nevertheless, there is a strand of the literature, principally diagrammatic and partial-equilibrium in its approach that relaxes this assumption. For example, Bhagwati and Panagriya (1996) consider the case in which a tariff preference eliminates the imports of higher-tariff member from the rest of the world and, thus, de-links its internal price of the good from the corresponding world price. The present paper does not cover this case. Second, the paper also assumes that there are no redundant tariffs. In particular, if a good is exported in the initial equilibrium, it is subject to a zero tariff. Theoretically, this is not a particularly strong assumption and it is commonly made in the literature. But, in practice, countries do have tariffs on goods they export. The assumption is non-trivial in the FTA analysis due to the fact that a good that is initially exported can also turn into an import good in the post-FTA equilibrium. That, in turn, can convert a redundant tariff into an effective one.[6]

A key advantage of my approach is that it links closely the analysis of PTAs to the more traditional tariff analysis in a small, open economy. Kowalczyk (1990) has argued in

favor of bringing these two strands of the literature closer, offering his own version of how this can be done for infinitesimally small changes. Likewise, Neary (1998) has offered what he calls a "warehouse" model that also aims to build a bridge between customs union theory and tariff analysis in the presence of market power on the part of the customs union. His analysis also employs differential calculus and is, thus, confined to infinitesimally small changes.

The paper is organized as follows. In Section 2, I study the effect of an FTA on the joint welfare of the union. In Section 3, I focus on individual welfare of a union member, distinguishing between the effects of its own liberalization and those of the liberalization by its partner. In Section 4, I conclude the paper. It should be borne in mind that though the analysis is presented for an FTA for sharpness, the extension to partial preferences is straightforward.

2. FTA and the Joint Welfare of the Union

Let us begin with the notation to be used throughout the paper. As usual, there are three countries, A, B and C. The only variables of C, relevant to the analysis, are prices, which are fixed. By appropriate choice of units, we set them all equal to unity. Lower-case letters denote variables and functions relating to A and upper-case letters those relating to B. When there is no likelihood of confusion, I spell out explicitly the variables and functions relating to A only. Superscript 0 is used to denote the value of a function or variable in the initial equilibrium and superscript 1 that in the post-FTA equilibrium.

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[6] Panagariya and Dutta-Gupta (1999) offer a partial equilibrium analysis of this case. I am not aware of any general-equilibrium analysis of this case.

There are four goods, 0, 1, 2 and 3. Both A and B export good 0 and import good 1. In addition, A imports good 3 and exports good 4 while B does the opposite. These four goods exhaust possible patterns of trade. We can accommodate many goods of each type but it will complicate the presentation without adding to the generality of the analysis. The interested reader can try out the extension on his own.

Country A imposes a tariff t_i on good i, which is positive if good i is imported and zero otherwise.[7] The price of good i is denoted p_i in country A and P_i in B. Correspondingly, p and P stand for the entire price vectors. Thus, in the initial equilibrium, the price vector in country A is written $p^0 \equiv (p_0^0, p_1^0, p_2^0, p_3^0) = (1, 1+t_1, 1+t_2, 1)$ and that in B $P^0 \equiv (P_0^0, P_1^0, P_2^0, P_3^0) = (1, 1+T_1, 1, 1+T_3)$. Letting u stand for utility level in country A, the expenditure function there can be written e(p, u) where e(.) is positive, concave and linear homogeneous in p and increasing in u. The partial derivative of the expenditure function with respect to the ith price, denoted $e_i(p, u)$, gives the compensated demand curve for good i and is positive. On the supply side, we represent the revenue function in country A by r(p), where r(.) is convex and linear homogeneous in p and its partial derivative with respect to the ith price, denoted $r_i(p)$, gives the output of good i. For brevity, we will write $e^0 = e(p^0, u^0)$, $e_i^0 = e_i(p^0, u^0)$, $r^0 = r(p^0)$ and $r_i^0(p^0)$, where u^0 is endogenous. Analogous notation applies to post-FTA period distinguished by superscript 1.

Assuming that all tariff proceeds are rebated in to consumers in a lump-sum fashion, in Country A, the initial equilibrium can be represented by the condition:

(1) $e^0 = r^0 + t_1(e_1^0 - r_1^0) + t_2(e_2^0 - r_2^0)$

The only endogenous variable in this equation is u^0. Corresponding to (1), in B, the equilibrium is represented by

(2) $E^0 = R^0 + T_1(E_1^0 - R_1^0) + T_3(E_3^0 - R_3^0)$.

The only endogenous variable in (2) is U^0.

Suppose now that A and B form a free trade area such that the goods produced within the union are allowed to move between the countries free of duty. Without loss of generality, assume $t_1 \geq T_1$. Assume, as noted in the introduction, that country A continues to import good 1 from C in the post-FTA equilibrium. Then the consumer price of good 1 in A in the post-FTA equilibrium is the same as in the initial equilibrium. We have $p_1^1 = p_1^0 = 1+t_1$. Because the good can be imported into B at $1+T_1$, which is less than $1+t_1$, the consumer price of the good there cannot rise above $1+T_1$. It then follows that all of good 1, produced in B (as also that produced in A), will be sold in A. The demand in B will be satisfied entirely by imports, with consumers there paying the price $P_1^1 = P_1^0 = 1+T_1$.

Good 2 is imported by A and exported by B. Again, by assumption, A continues to import the good from C in the post-FTA equilibrium. Therefore, the price in the country remains unchanged; $p_2^1 = p_2^0 = 1+t_2$, which is less than $P_2^1 = P_2^0 = 1$, the price prevailing in B. All of good 2 produced in B (as also that produced in A) is sold in A.

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[7] I remind the reader that this is not an entirely innocent assumption. Though a positive tariff on an exportable is redundant in the initial equilibrium, it may become effective in the post-FTA equilibrium. The implications of this possibility will be explained later in the paper.

The outcome with respect to good 3 is opposite of that with respect to good 2. The price of this good in B is $P_3^1 = P_3^0 = 1+T_3$, which is higher than $p_3^1 = p_3^0 = 1$, the price in A. Therefore, all of A's output of this good will be sold in B and the domestic demand satisfied through imports.

The upshot of this discussion is that, in the post-FTA equilibrium, the prices facing consumers in each member will be the same as those in the initial equilibrium. But the producer prices, now equalized between members, are different from those prevailing in the initial equilibrium. The vector of producer prices is now given by $(1, 1+t_1, 1+t_2, 1+T_3)$. Note the asymmetry here: for the good imported by both countries in the initial equilibrium, the producer price is determined by the consumer price in the country with the higher tariff. The FTA gives all producers access to the highest price prevailing in the union.

My objective in this section is to study the effect of the FTA on the joint welfare of A and B. For this purpose, I will assume that A gives a "gift" to B in the amount G in terms of the numeraire good, good 0, such that it guarantee B the same level of welfare as in the initial equilibrium. We then calculate the welfare in A relative to its pre-FTA welfare. If it rises, we can conclude that the union as a whole benefits and if it falls, the union is hurt. If, in the absence of the gift, the FTA would have raised B's welfare, G takes a negative value.

We can now write the equilibrium conditions in the post-FTA equilibrium as follows:

$$(3) \qquad e^1 = r^1 + t_1(e_1^1 - r_1^1 - R_1^1) + t_2(e_2^1 - r_2^1 - R_2^1) - G$$

$$(4) \qquad E^0 = R^1 + T_1 E_1^0 + T_3(E_3^0 - R_3^1 - r_3^1) + G$$

Note that $e^1 = e(p^0, u^1)$, $r^1 = r(1, 1+t_1, 1+t_2, 1+T_3)$ and $R^1 = R(1, 1+t_1, 1+t_2, 1+T_3)$. Since the level of utility in B is held at its pre-FTA level through the lumps-sum transfer and consumer prices are unchanged, the left-hand side in equation (4) stays fixed at E^0. Equations (3) and (4) have two endogenous variables, u^1 and G.

Subtracting equation (1) from (3) and (2) from (4), respectively, we obtain

$$(5)\quad e^1 - e^0 = (r^1 - r^0) + t_1[(e_1^1 - r_1^1 - R_1^1) - (e_1^0 - r_1^0)] + t_2[(e_2^1 - r_2^1 - R_2^1) - (e_2^0 - r_2^0)] - G$$

$$(6)\quad 0 = (R^1 - R^0) + T_1 R_1^0 + T_3(R_3^0 - R_3^1 - r_3^1) + G$$

Adding (5) and (6) and rearranging, we obtain

$$(7)\quad (e^1 - t_1 e_1^0 - t_2 e_2^0) - (e^0 - t_1 e_1^0 - t_2 e_2^0) = [(r^1 - t_1 r_1^1 - t_2 r_2^1 - T_3 r_3^1) - (r^0 - t_1 r_1^0 - t_2 r_2^0)] + [(R^1 - t_1 R_1^1 - t_2 R_2^1 - T_3 R_3^1) - (R^0 - T_1 R_1^0 - T_3 R_3^0)]$$

Recalling that expenditure and revenue functions are linear homogeneous in their arguments, this equation can be written as

$$(7')\quad \sum_{i=0}^{3} e_i^1 - \sum_{i=0}^{3} e_i^0 = [\sum_{i=0}^{3} r_i^1 - \sum_{i=0}^{3} r_i^0] + [\sum_{i=0}^{3} R_i^1 - \sum_{i=0}^{3} R_i^0]$$

Or, rearranging slightly, we have

$$(8)\quad \sum_{i=0}^{3} [e_i^1 - e_i^0] = \sum_{l=0}^{3} [(r_i^1 + R_i^1) - (r_i^0 + R_i^0)]$$

This is a neat expression. The left-hand side represents the difference between country A's post- and pre-FTA total expenditure *at world price* (recall that world prices are

all set equal to 1 by the choice of units). The right-hand side represents the difference between post- and pre-FTA output of the union as a whole, also valued at world prices. If we hold country B's utility fixed, at world prices, the expenditure in country A can be increased by the increase in the value of the union-wide output.

Recall that, since the price vector facing the consumer before and after the FTA is the same, $e^0 = e(p^0, u^0)$ and $e^1 = e(p^0, u^1)$. It is then immediate that, assuming all goods to be normal, $e_i^1 - e_i^0$ is positive or negative as $u^1 - u^0$ is positive or negative for all i. Therefore, from equation (7"), ruling out inferiority in consumption, the FTA increases or reduces the joint welfare of A and B as it increases or reduces the value of the union-wide output, at world prices. In the spirit of the standard tariff theory for a small, open economy, we have

> Proposition 1: Suppose two small countries form an FTA by eliminating tariffs between themselves but retaining them on the rest of the world at their original levels. All goods are normal in consumption and, after the union is formed, each good continues to be imported from the rest of the world into the union member with the higher tariff. Then the FTA increases the joint welfare of the union members if and only if it increases the value of the union's total output at world prices.

Note that given the manner, in which this proposition has been proved, it can be readily extended to more than two countries and many goods of each type. Indeed, it can also be proved readily for partial tariff preferences.

On the face of it, Proposition 1 gives a simple condition that allows us to determine the desirability of a specific PTA. But, despite its intuitive appeal, its practical application is limited for two reasons. First, it requires the knowledge of outputs in the post-PTA equilibrium, which is not available *ex-ante*. As such, it can be applied only after the

formation of the PTA. Second, and more importantly, even *ex post*, outputs can change due to many factors. For instance, technology may have changed for exogenous reasons or the external prices themselves may have shifted.

Given these limitations, we need to push the theoretical analysis a little further. Needless to say that this can only be accomplished by imposing further restrictions on the structure of the model. It turns out that in at least one special, *albeit* important, model, we can derive a clear cut result. This is the production model underlying the important contribution by Grossman and Helpman (1995) on the politics of FTAs and employed frequently in the recent international-trade literature including Panagariya and Rodrik (1993). This model assumes that the numeraire good uses only labor while all other goods use labor and a sector-specific factor.[8] Focusing on this model, I now proceed to demonstrate the following result.

> Proposition 2: In addition to the conditions stated in Proposition 1, if we assume that the numeraire good uses only labor and all other goods use labor and a sector-specific factor, a PTA between two small countries necessarily lowers the joint welfare of the union.

To prove proposition 2, let us make use of linear homgeneity of r(.) and R(.) and rewrite (7") as

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[8]The demand side in this paper is more general than in Grossman and Helpman (1995). They assume the utility function to be quasi linear. I only require that all goods be normal in consumption.

$$(8)\ \sum_{i=0}^{3}(e_i^1 - e_i^0) = [(r^1 - t_1 r_1^1 - t_2 r_2^1 - T_3 r_3^1) - (r^0 - t_1 r_1^0 - t_2 r_2^0)]$$
$$+ [(R^1 - t_1 R_1^1 - t_2 R_2^2 - T_3 R_3^1) - (R^0 - T_1 R_1^0 - T_3 R_3^0)]$$

Next, take into account the restrictions implied by the specific production structure of the model. We focus on the first term in (8), relating to country A. The second term, relating to country B, can be developed symmetrically. Choose the units of labor such that it takes one unit of labor to produce one unit of the numeraire good, good 0. This allows us to set the wage $w = p_0 = 1$ in the pre- as well as post-FTA equilibrium. Denoting the quantity of labor used in sector i (i = 1, 2, 3) by ℓ_i, the sector-specific factor by k_i, and the production function by $f_i(k_i, \ell_i)$, we can represent the profit function in the sector by $s_i(p_i, w)$. The profit function is the envelope function obtained by maximizing $\{p_i f_i(k_i, \ell_i) - w\ell_i\}$ with respect to ℓ_i. As usual, taking the partial derivatives of $s_i(p_i, w)$ with respect to p_i and w, respectively, we have

(9a) $s_{ip}(.) = f_i$

(9b) $s_{iw}(.) = \ell_i$

The revenue function r(.), used to derive Proposition 1, is related to the $s_i(.)$ as follows:

(10a) $r(.) = w.\ell + \sum_{i=1}^{3} s_i(p_i, W)$

(10b) $s_{ip}(.) = r_i(.)$

Note that ℓ denotes the total endowment of labor in A and $w = p_0 = 1$.

On the other hand, they do not impose the assumption that each good continue to be imported after the FTA by the member with the higher tariff on it.

Since w is constant, according to (10a), the assumed production structure makes r(.) additively separable in p_1, p_2 and p_3. Moreover, since $p^0 = (1, 1+t_1, 1+t_2, 1)$ and $p^1 = (1, 1+t_1, 1+t_2, 1+T_3)$, we also have $w^0 = w^1$, $r_1^0 = r_1^1$ and $r_2^0 = r_2^1$. Taking into account these relationships and substituting for r^0 and r^1 from (10a), the term associated with country A in (8) can be written as

$$(11) \qquad \begin{aligned} &[(r^1 - t_1 r_1^1 - t_2 r_2^1 - T_3 r_3^1) - (r^0 - t_1 r_1^0 - t_2 r_2^0)] = (s_3^1 - T_3 s_{3p}^1) - s_3^0 \\ &\quad = [s_3(1+T_3, w) - T_3 s_{3p}(1+T_3, w)] - s_3(1, w) \end{aligned}$$

Note that $s_{3p}(.)$ denotes the partial derivative of $s_3(.)$ with respect to $1+T_3$ ($= p_3^1$).

It can now be shown that strict convexity of $s_3(.)$ in the first argument, implied by the presence of constant returns and the sector-specific factor, makes the right-hand side of equation (11) unambiguously negative. Thus, consider Figure 1, which graphs $s_3(.)$ as a function of its first argument, p_3. By construction, we have

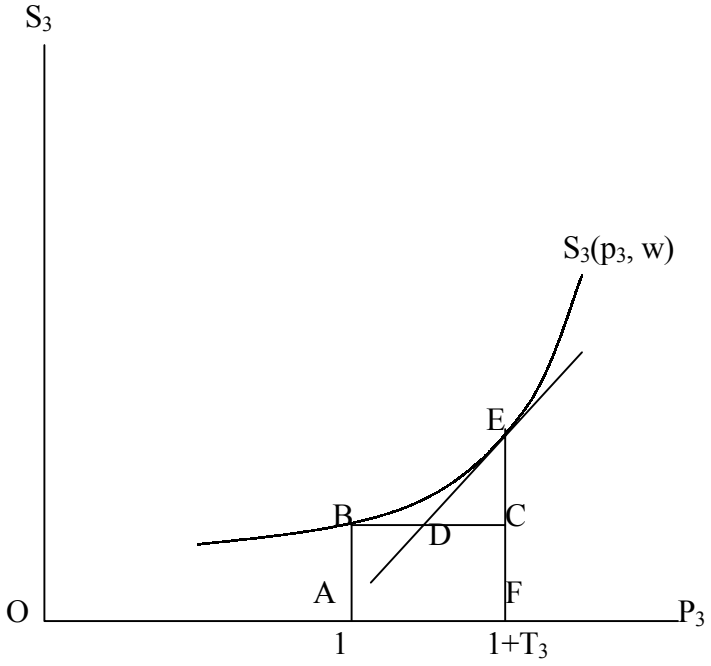

Figure 1

(12) $s_3(1+T_3, w) = EF$

$= EC + CF$

$= EC + AB$

$= EC + s_3(1, w).$

We also have

(13) $EC = DC.s_{3p}(1+T_3, w)$

$= (BC-BD)s_{3p}(1+T_3, w)$

$= (T_3-BD)s_{3p}(1+T_3, w)$

Substituting from (13) into (12) and rearranging, we obtain

(14) $s_3(1+T_3, w) - T_3s_{3p}(1+t_3, w) - s_3(1, w) = - BD.s_{3p}(1+T_3, w) < 0.$

The first term on the right-hand side of (8) is, thus, shown to be negative. Proceeding in an analogous manner, we can show that the second term in this equation is negative as well. This completes the proof of Proposition 2.

The key to Proposition 2 lies in the fact that, given the assumed production structure, non-numeraire goods are independent of one another in production (that is, neither substitutes nor complements). A change in the producer price of a good causes labor to move solely between that good and the numeraire. In country A, the only price change due to the FTA relates to the producer price of good 3, which increases from 1 to $1+T_3$. This increase in the price of good 3 moves labor from good 0 to good 3. At the initial equilibrium, at world prices, the value of marginal product of labor in sector 3 is the same as in sector 1. Therefore, for the first unit of labor moved from good 0 to good 3, there is no net change in the value of output at world prices. But for subsequent units, due to the

operation of diminishing returns, the value of marginal production at world prices declines in sector 3 but not in sector 0 since it is characterized by constant marginal product of labor. Therefore, the aggregate value of output at world prices declines.

A similar explanation applies to country B. There, the FTA leads to an increase in the producer price of good 1 from $1+T_1$ to $1+t_1$ (recall $t_1 > T_1$ by assumption) and of good 2 from 1 to $1+t_2$. Once again, labor is drawn from sector 0 where the value of marginal product at world prices exceeds that in good 1 and equals that in good 2 at the initial equilibrium. Given constant marginal product in sector 0 and diminishing marginal product in sectors 1 and 2, the movement necessarily reduces the value of output at world prices.

Relaxation of two key assumptions, underlying Propositions 1 and 2, naturally give rise to alternative possibilities. Thus, if the imports of a good from the outside country into the union member with the higher tariff cease altogether in the post-FTA equilibrium, the consumer price of that good falls. Under this scenario, we cannot determine the welfare effects of the FTA from the value of output alone and we cannot derive either Proposition 1 or Proposition 2. Alternatively, if the numeraire good also uses a specific factor or, more generally, all factors are used in all sectors, the effect of the FTA on the union's joint welfare is ambiguous due to the fact that resources may be drawn from the initially distorted sectors to initially undistorted sectors. In this case, Proposition 2 cannot be derived.

It is interesting to contrast Propositions 1 and 2 to the recent result of Panagariya and Krishna (1998) on welfare improving FTAs. In the spirit of Kemp and Wan (1976), these authors show that if two countries freeze their initial trade vectors with the rest of the world via appropriate external tariff vectors and form an FTA, their joint welfare necessarily rises.

In contrast, this paper has shown that if countries freeze their external tariffs rather than trade vectors, joint welfare falls. This contrast arises due to asymmetric implications of policy changes in the presence of price versus quantity distortions as explained in Krishna and Panagariya (1999).

3. The Welfare of Individual Member Countries

In the previous section, we were concerned with the welfare of the union as a whole. Let us now briefly turn to the welfare of individual union members. Using partial-equilibrium models, I have emphasized in a number of recent writings [Panagariya (1996, 1999a, 1999b) and Bhagwati and Panagariya (1996)] that, even in the small-union context, individual members stand to lose from preferential trade liberalization and benefit from the partner's liberalization. This stands in sharp contrast to nondiscriminatory liberalization, which is beneficial to a small country. The analysis below confirms the validity of this result in general equilibrium.

For the issue at hand, we rule out any direct transfers and set G = 0. Continuing to assume that the imports from the outside country do not cease, equation (3) remains valid with G = 0. We have

$$(15) \qquad \sum_{i=0}^{3} (e_i^1 - e_i^0) = (r^1 - r^0) - t_1[(r_1^1 - r_2^1) + R_1^1] - t_2[(r_2^1 - r_2^0) + R_2^1]$$

As before, assuming all goods to be normal, the left-hand side is positive or negative as u^1 is larger or smaller than u^0. Therefore, the FTA raises or lowers country A's welfare as the right-hand side is positive or negative.

Suppose for a moment that all liberalization is done by country A and none by country B. Then, like the consumer prices, producer prices facing country A also remain unchanged in the post-FTA equilibrium. Therefore, we obtain $r^1 = r^0$ and $r_i^1 = r_i^0$ and equation (15) reduces to

$$(16) \qquad \sum_{i=0}^{3} (e_i^1 - e_i^0) = - [t_1 R_1^1 + t_2 R_2^1]$$

The right-hand side being negative, we immediately obtain $u^1 < u^0$. Note that, as emphasized in the author's papers just mentioned, the loss to country A from its own liberalization is exactly equal to the tariff revenue it fails to collect on the imports from country B. The more it imports from country B, the greater the loss. We can state

> Proposition 3: Suppose a small country removes partially or wholly its tariffs on another small country but retains them at their original levels on the rest of the world. All goods are normal in consumption and, after the preferential liberalization, the country continues to import each good from the rest of the world. Then the country's welfare necessarily declines, with the loss in real income equaling the lost tariff revenue on the imports from the country receiving the tariff preference. The more the country imports from the partner and the greater the magnitude of tariff preference, the more it loses.

Observe that this result does not rely on the special specific-factors model and applies to all technologies giving rise to the standard revenue functions. Also note that though the formal derivation in equation (16) assumes that tariffs on the partner are pushed all the way to zero, the extension to partial tariff preference is trivial. Hence, I have stated the above proposition to include both partial and full tariff preferences.

Next, consider the opposite case in which tariff preferences are extended exclusively by country B. In this case, the price of good 3 rises from 1 to $1+t_3$ and there is no loss of tariff revenue on the imports coming from country B. Equation (15) reduces to

$$(17)\qquad \sum_{i=0}^{3}(e_i^1 - e_i^0) = (r^1 - r^0) - t_1(r_1^1 - r_2^1) - t_2(r_2^1 - r_2^0)$$
$$= \sum_{i=0}^{3}(r_i^1 - r_i^0) + T_3 r_3^1$$

The first term on the right-hand side represents the change in the value of country A's output at world prices. The sign of this term is ambiguous in general. The second term represents the benefit reaped from the tariff-free access to country B's market; it equals precisely the tariff revenue due to country B in the absence of the preference. The more country A exports to country B and the greater the extent of tariff preference, the larger this term and more likely country A benefits from the preference.

Once again, in the important Grossman-Helpman (1995) case, the ambiguity of the right-hand side can be eliminated. Thus, assuming (9) and (10) to be valid, (17) can be reduced to

$$(17')\qquad \sum_{i=0}^{3}(e_i^1 - e_i^0) = s_3^1 - s_3^0$$
$$= s_3(1+T_3, w) - s_3(1, w) > 0$$

The sign of the inequality follows from the strict convexity of the restricted profit function in its arguments. We can state the following result.

Proposition 4: Suppose a small country receives a tariff preference on a good from another small country and the latter continues to import some quantity of the good from the rest of the world. Suppose further that the numeraire good uses only labor

and other goods use labor and a sector-specific factor. Then the tariff preference necessarily benefits the country receiving the preference.

We can combine Propositions 3 and 4 to obtain the following broader result.

Proposition 5: Suppose the numeraire good uses only labor while other goods use labor and a sector-specific factor. Also assume that, following an exchange of tariff preferences, all goods continue to be imported from the rest of the world into the partner with higher tariff. Then, if trade between two PTA partners is approximately balanced in the post-PTA equilibrium, the country with higher external tariffs will lose and the one with lower external tariffs will benefit. Alternatively, if the countries have approximately equal tariff rates, the country with bilateral trade surplus will benefit while the other country will lose.

4. Conclusion

Despite the passage of half a decade since the publication of Viner's (1950) seminal contribution to the theory of preferential trading, the welfare analyses of these arrangements have suffered from inconclusive and generally messy results. Whatever results have been derived relate to infinitesimally small tariff preferences. In this paper, I have attempted to give order to the analysis of one important case: a union between two small countries.

My analysis has several advantages over the existing literature. First, the model employed is fully general in that it allows for goods that are exported and imported by both partners as well as those that are exported by one and imported by the other partner. Second, the results are derived for finite changes in tariff rates rather than being limited

to infinitesimally small changes. As such they can be applied to limited tariff preferences as well as a full free trade area. Finally, unlike the existing literature, the paper offers clear and transparent results.

The main results of the paper can be summarized as follows. First, assuming all goods to be normal in consumption, if two small countries form a free trade area or exchange some tariff preferences, their joint welfare falls or rises as their joint output, valued at world prices, rises or falls. Second, if, in addition, the numeraire good uses only labor and all other goods use labor and a sector-specific factor, the exchange of preferences or free trade area necessarily lowers the union's joint welfare. Third, a union member is necessarily hurt by its own preferential liberalization. The higher are its external tariffs and the larger its imports from the partner, the more it loses from extending the preferences. Fourth, in the specific-factors case just mentioned, a union member necessarily benefits from the tariff preference it receives from the partner. The more it exports to the partner and the higher the latter's tariffs, the greater the gain. Finally, in the specific-factors case, an FTA benefits a member more the larger its bilateral trade surplus with the partner and the lower its external tariffs relative to the partner.

References

Berglas, Eitan, 1979, "Preferential Trading: The n Commodity Case," *Journal of Political Economy* 87, No. 21, 315-331.

Bhagwati, Jagdish, 1971, "Trade-Diverting Customs Unions and Welfare Improvement: A Clarification," *Economic Journal* 81, 580-587.

Bhagwati, Jagdish, 1993, "Regionalism and Multilateralism: An Overview," in Melo and Panagariya, eds., *New Dimensions in Regional Integration*, Cambridge, Great Britain: Cambridge University Press, 22-51. Also in Bhagwati, Krishna and Panagariya, 1999.

Bhagwati, Jagdish, Krishna, Pravin and Panagariya, Arvind, 1999, *Trading Blocs: Alternative Approaches to Analyzing Preferential Trade Agreements*, Cambridge, MA: MIT Press, February.

Bhagwati, Jagdish and Panagariya, Arvind, 1996a, "Preferential Trading Areas and Multilateralism: Strangers, Friends or Foes?" in Jagdish Bhagwati and Arvind Panagariya, eds., *The Economics of Preferential Trade Agreements*, AEI Press, Washington, D.C. Also in Bhagwati, Krishna and Panagariya, 1999.

Bond, Eric W. and Syropoulos, Constantinos, 1996, "The Size of Trading Blocs, Market Power and World Welfare Effects," *Journal of International Economics* 40, 411-437.

Corden, Max, 1976, "Customs Unions Theory and the Nonuniformity of Tariffs," *Journal of International Economics* 6, 99-106.

Corden, W.M., 1984, "Normative Theory of International Trade," in R.W. Jones and P.B. Kenen, eds., *Handbook of International Economics, Vol. I*, Amsterdam: North-Holland, chapter 2.

Ethier, W., 1998, "Regionalism in a Multilateral World, *Journal of Political Economy* 106(6), 1214-45.

Gehrels, Franz, 1956-57, "Customs Union from a Single-Country Viewpoint," *Review of Economic Studies* 24(63), 61-64.

Grossman, Gene and Helpman, Elhanan, 1995, "The Politics of Free Trade Agreements," *American Economic Review* 85(4), September, 667-690. Also in Bhagwati, Krishna and Panagariya, 1999.

Kemp, M. and Wan, Henry Jr., 1976, "An Elementary Proposition Concerning the Formation of Customs Unions", *Journal of International Economics* 6 (February), 95-98. Also in Bhagwati, Krishna and Panagariya, 1999.

Kowalczyk, Carsten, 1990, "Welfare and Customs Unions," NBER Working Paper No. 3476, October.

Krishna, Pravin, 1998, "Regionalism and Multilateralism: A Political Economy Approach," *Quarterly Journal of Economics* 113(1), February, 227-251. Also in Bhagwati, Krishna and Panagariya, 1999.

Krishna, Pravin and Panagariya, Arvind, 1999, "A Unification of the Second Best Results in International Trade," University of Maryland, mimeo.

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

Levy, Philip. 1997, "A Political-Economic Analysis of Free-Trade Agreements," *American Economic Review* 87(4), September, 506-519.

Lipsey, Richard, 1957, "The Theory of Customs Unions: Trade Diversion and Welfare," *Economica* 24, February, 40-46.

Lipsey, Richard, 1958, *The Theory of Customs Unions: A General Equilibrium Analysis*, University of London, Ph.D. thesis.

Lloyd, Peter J., 1982, "3x3 Theory of Customs Unions," *Journal of International Economics* 12, 41-63.

McMillan, John and McCann, Ewen, 1981, "Welfare Effects in Customs Union," *Economic Journal* 91, 697-703, September.

Meade, James, E., 1955, *The Theory of Customs Unions*, Amsterdam: North-Holland.

Mundell, Robert A., 1964, "Tariff Preferences and the Terms of Trade," *Manchester School of Economic and Social Studies*, 1-13. Also in Bhagwati, Krishna and Panagariya, 1999.

Panagariya, Arvind, 1996, 'The Free Trade Area of the Americas: Good for Latin America?' *World Economy* 19, no. 5, September, 485-515.

Panagariya, Arvind, 1997a, "Preferential Trading and the Myth of Natural Trading Partners," *Japan and the World Economy* 9(4): 471-489.

Panagariya, Arvind, 1997b, "The Meade Model of Preferential Trading: History, Analytics and Policy Implications," in Cohen, B.J., ed., *International Trade and Finance: New Frontiers for Research. Essays in Honor of Peter B. Kenen* (Cambridge

University Press, New York) 57-88. Also in Bhagwati, Krishna and Panagariya, 1999.

Panagariya, Arvind, 1999, "Preferential Trade Liberalization: The Traditional Theory and New Developments," University of Maryland, mimeo.

Panagariya, Arvind and Dutta-Gupta, Rupa, 1999, Preferential Trading and Welfare: The Small-Union Case Revisited," University of Maryland, mimeo.

Panagariya, Arvind and Ronald Findlay, 1996, "A Political Economy Analysis of Free Trade Areas and Customs Unions," Robert Feenstra, Douglas Irwin and Gene Grossman, eds., *The Political Economy of Trade Reform*, Essays in Honor of Jagdish Bhagwati, MIT Press. Also in Bhagwati, Krishna and Panagariya, 1999.

Panagariya, Arvind and Pravin Krishna, 1997, "On the Existence of Necessarily Welfare-Enhancing Free Trade Areas," Center for International Economics, Department of Economics, University of Maryland, mimeo.

Panagariya, Arvind and Rodrik, Dani, 1993, "Political Economy Arguments for a Uniform Tariff," *International Economic Review*, August, 685-703.

Richardson, Martin, 1993, "Endogenous Protection and Trade Diversion, " *Journal of International Economics* 34(3-4), 309-24.

Richardson, M. 1994. "Why a Free Trade Area? The Tariff Also Rises," *Economics & Politics* 6, no. 1, March, 79-95. Also in Bhagwati, Krishna and Panagariya, 1999.

Riezman, Raymond, 1979, "A 3x3 Model of Customs Unions, *Journal of International Economics* 9(4), 341-354.

Viner, Jacob, 1950, *The Customs Union Issue*, New York: Carnegie Endowment for International Peace. Chapter 4 is reproduced in Bhagwati, Krishna and Panagariya, 1999.

Yi, Sang-Seung, 1996, "Endogenous Formation of Customs Unions under Imperfect Competition: Open Regionalism is Good," *Journal of International Economics* 41, 153-77.