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ABSTRACT

The market access and welfare effects of Free Trade Areas (FTAs) without Rules of Origin (ROOs) are studied. We consider both the final and intermediate goods markets and their interlinkage. The FTA weakly reduces all tariffs and prices within the FTA. This raises quantity demanded and reduces quantity supplied for both the final and intermediate goods, thereby raising imports. This is the classic trade creation effect and is welfare improving. We identify two additional effects which work in the opposite direction and identify conditions under which these welfare reducing, import reducing effects dominate.

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1. Introduction

In the last few decades, and especially since the North American Free Trade Area (NAFTA), there has been considerable interest in Free Trade Areas (FTAs). A FTA is a Preferential Trading Arrangement (PTA) in which tariff rates among members are zero, although tariffs set by members on non members are not necessarily equalized. In a FTA, members maintain their own external tariffs. As such, tariffs are likely to differ among member countries.

What prevents all trade in a product from going through the country with the lowest tariff on it? The answer, in the absence of transport costs, is Rules of Origin (ROOs). A good is eligible for zero tariffs in the FTA only if it originates there and these ROOs specify the conditions under which such origin is granted. In the absence of ROOs, imports of any particular commodity will enter through the country with the lowest tariff on the item and be reexported to other countries in the FTA. This is termed *trade deflection.* Of course, the country with the lowest tariff would collect all the tariff revenue[1]. In contrast, a Customs Union (CU)

[1]In the absence of ROOs, this competition for tariff revenue can result in a race to the bottom in tariff setting by FTA menbers.

sets a common external tariff. Note that aside from the tariff revenue effects on a country of trade deflection, a FTA without ROOs is analytically equivalent to a CU. [2]

The traditional analysis of CUs has used the concepts of trade creation and trade diversion developed in the classic work of Viner (1950) and Meade (1953). Trade creation is thought of as welfare increasing while trade diversion is seen as possibly welfare decreasing. Trade creation takes place when a PTA leads to new trade. Trade diversion takes place when a PTA results in trade being diverted from efficient producers outside the PTA to less efficient ones inside. Kowalczyk (1990), makes a strong case for abandoning this terminology on the basis on a lack of clarity[3]. More modern approaches merely treat the problem like any other second best problem in piecemeal policy reform, and de-emphasize this terminology. Nevertheless, the terminology has a life of its own.

The traditional approach also neglects interaction effects between final and intermediate goods markets. It is precisely the complementarity between final and intermediate goods which is the focus of our paper and the key to our results. While one might be tempted to argue that such effects are likely to be less

[2]In companion papers, Krishna and Krueger (1993), Ju and Krishna (1996), we analyze FTAs with ROOS.

[3]Kowalczyk (1990) provides an excellent survey of the literature to which the reader is directed.

important than direct effects and so may be neglected, this argument would be incorrect. Of course, more modern approaches explicitly take into account all the general equilibrium effects. Yet, a completely general equilibrium approach may obfuscate rather than illuminate the implications of such complementarities. For this reason, we use a model which links final and intermediate input markets, yet retains the simplicity of partial equilibrium by using a quasi linear utility setup. This rules out income effects, but permits simple graphical expositions.

The policy debate has focused on the effects of FTAs on market access and the resulting welfare changes. While ROOs can create hidden protection, one might argue that a FTA without ROOs is unlikely to restrict market access and reduce welfare. After all, in the absence of ROOs, a FTA does not create trade diversion: Imports from the member country with the lowest tariff on the item are just reexports of the rest of world since price and domestic supply in the lowest tariff country are unchanged.

All tariffs and prices fall weakly as we assume given world prices. Thus, one might conjecture that the total imports of the FTA (the sum of imports of all member countries) would increase after the FTA is established, that is, trade creation would occur, and that this would result in a welfare improvement as all tariffs, which are the only distortions in this model, fall weakly. We show that this

is not true. While this is not really surprising given the theory of the second best, we are able to provide conditions under which such counter intuitive results could occur. Our results are also relevant in analyzing the likely effects of developing country tariff reform since developing countries are large importers of intermediate goods, so that the kinds of linkages we model are likely to be important.[4]

We do not focus on many other important aspects of FTAs. Issues of why they might be created, whether they are stepping stones to global integration or impediments to it, their political economy aspects, are all neglected. The reader is directed to Krueger (1995) for a fascinating discussion of such issues.

2. The Model

Let there be three countries called A, B, and C. We will assume that countries A and B form a FTA, excluding C which can be thought of as the rest of the world. There are two goods, a final good x and an intermediate good z in addition to a numeraire consumption good. Prior to the FTA, the pattern of trade is such that A and B both import the final good from C. The intermediate good is also

[4]There is little work explicitly on this issue with two notable exceptions. Lopez and Panagariya (1992) focus on peicemeal policy reform with pure imported intermediate goods and argue that the standard restrictions used need not ever hold here. Lopez and Rodrik (1991) develop an intertemporal model, again with pure imported intermediate inputs, to show that the trade balance may deteriorate with import restrictions on intermediate goods as these act like supply shocks. We do not need to make the usual assumption of pure imported intermediate inputs.

imported by both A and B. Of course, the numeraire good is exported by them to C so that trade balances[5].

Both A and B are assumed to be small countries so that they take the world price as given. The world price for $j \in \{x, z\}$is denoted by p_j^w. Both A and B have tariffs on x and z. These are assumed to be ad valorem tariffs for concreteness. The tariffs on x and z by A and B are denoted by t_j^i for $j \in \{x, z\}$ and $i \in \{A, B\}$. Hence, the price of j in country i, before the FTA, p_j^{i0}, is given by $p_j^{i0} = p_j^w(1+ t_j^i)$.

Demand for the final good in a country arises from utility maximization of a representative consumer. The representative consumer in country i has a utility function given by:

$$U^i(x^i) + n \tag{2.1}$$

which he maximizes subject to the budget constraint:

[5]We choose to model this particular pattern of trade for a number of reasons. First, as both countries import the same goods, an FTA does not cause trade diversion; the usual reason for adverse welfare effects. Nevertheless, adverse welfare effects can occur. Second, many FTAs are created between similar countries with similar import patterns so that this is not a completely uninteresting case. Third, our basic approach can be used to accommodate different trade patterns and this one can be seen as an illustration. Of course, with other trade patterns, trade diversion can exist and as that is well understood, our assumption on trade patterns can be seen as a way of eliminating it for ease of exposition.

$$p_x^i x^i + n = L + \Pi_x^i + \Pi_z^i + t_x^i p_x^w M_x^i + t_z^i p_z^w M_z^i \tag{2.2}$$

where Π_x^i and Π_z^i denote profits of the final and intermediate goods in country i respectively, and $t_x^i p_x^w M_x^i$ and $t_z^i p_z^w M_z^i$ give tariff revenue. L denotes any other lump sum income and is set at zero from here on. The representative consumer, as usual obtains the surplus of the government and profits of the firms in the country as lump sum income.

After the FTA the budget constraint of the representative consumer in i becomes:

$$p_x^m x^i + n = \Pi_x^i + \Pi_z^i + I_x^i t_x^m p_x^w (M_x^A + M_x^B) + I_z^i t_z^m p_z^w (M_z^A + M_z^B) \tag{2.3}$$

where $p_j^m = \min\{p_j^A, p_j^B\}$ for $j \in \{x, z\}$. I_j^i is an indicator function which equals 1 if $t_j^m = \min\{t_j^A, t_j^B\} = t_j^i$ and zero otherwise as long as $t_j^A \neq t_j^B$. If $t_j^A = t_j^B$ then we assume that the budget constraint is unchanged by the FTA as no trade deflection occurs.

Utility maximization results in the inverse demand for the final good being

defined by:

$$U^{i'}(x^i) = p_x^i \tag{2.4}$$

Let the corresponding demand for x in country i be denoted by $D_x^i(p_x^i)$. The production function for x in country i is given by:

$$F^i(z,k) = x \tag{2.5}$$

where F is a constant returns to scale production function and k is a fixed factor of production. Consider the maximization problem:

$$\underset{z}{Max}\ \Pi_x^i(z) = p_x^i F^i(z,k) - p_z^i z. \tag{2.6}$$

Let $z^i(p_x^i,\ p_z^i)$ be the solution to this problem, and let $R^i(p_x^i, p_z^i)$ be the value function for this problem. Note that $z^i(p_x^i, p_z^i)$ is the derived demand for the input, and is the result of equating marginal value product of z to its price. As such $z^i(\cdot)$ is increasing in p_x^i and decreasing in p_z^i. Also, $F^i(z^i(p_x^i, p_z^i), k) = x^i(p_x^i, p_z^i)$ is the supply of the final good. Finally, define $S_z^i(p_z^i)$ to be the supply in i for z. Let the subscripts on $R(\cdot)$ denote partial derivatives.[6]

[6]Note that R(.) is HD1 and convex in its arguments. All the usual duality and homogeniety results associated with such problems are used below.

Imports of z are given by:

$$M_z^i(p_x^i, p_z^i) = z^i(p_x^i, p_z^i) - S_z^i(p_z^i). \tag{2.7}$$

Imports of x are given by:

$$M_x^i(p_x^i, p_z^i) = D_x^i(p_x^i) - x^i(p_x^i, p_z^i). \tag{2.8}$$

2.1. Imports

Now we are in a position to illustrate the effects of a FTA. Figure 1 depicts the situation in country A in the left hand panel and that in B in the right hand panel. The upper set of figures depict the situation in the final good market, while the lower ones depict that in the intermediate good market. As drawn, initially $p_x^{A0} > p_x^{B0}$, while $p_z^{A0} < p_z^{B0}$. After the FTA, the prices of good j in country i are equalized and given by p_j^m. In Figure 1 the effect of the FTA on $A's$ imports of x are twofold. First, the fall in the price of x from p_x^{A0} to $p_x^{B0} = p_x^m$ reduces quantity supplied and increases quantity demanded, *raising imports.* This is the *trade creation effect.* Second, the reduction in supply caused by the fall in the price of x shifts the derived demand for z in A inwards as shown in the lower left

panel. This is called the *derived demand effect* and it *reduces imports* of z. The price of z is unchanged in A since $p_z^{A0} = p_z^m$ so that there is no trade creation effect in z for A.

The effect of the FTA on $B's$ imports are slightly different. There is no trade creation effect in the final goods market for B as there is no change in the price faced by it. However, there is a *trade creation effect* in the intermediate good market for B as the price has fallen to p_z^{A0}. Thus quantity supplied falls and quantity demanded rises, and *imports rise* of z in country B. The fall in the input price shifts out the supply of the final good in B as depicted in the upper right hand figure. Thus *imports fall* due to this *input price effect.* [7]

More formally:

$$\Delta M_x^i(p_x^i, p_z^i) = \frac{\partial M_x^i(p_x^i, p_z^i)}{\partial p_x^i}\Delta p_x^i + \frac{\partial M_x^i(p_x^i, p_z^i)}{\partial p_z^i}\Delta p_z^i. \tag{2.9}$$

The first term is the trade creation effect. The second is the input price effect. In addition,

$$\Delta M_z^i(p_x^i, p_z^i) = \frac{\partial M_z^i(p_x^i, p_z^i)}{\partial p_z^i}\Delta p_z^i + \frac{\partial M_z^i(p_x^i, p_z^i)}{\partial p_x^i}\Delta p_x^i. \tag{2.10}$$

[7]Similar results also go through with many countries in the FTA and many final goods, each using an intermediate input, in an obvious manner.

The first term is the trade creation effect in the intermediate good market, while the second is the derived demand effect. The trade creation effects raise imports, while the derived demand and input price effects reduce them. When are the latter likely to outweigh the former? Here we have three results to offer.

2.2. The Value of Imports:

We have three results to offer concerning the effect of a FTA on the value of imports. First we distinguish between the value of imports at domestic prices and at world prices. At domestic prices, import value for country i is denoted by V^i, where:

$$V^i(p_x^i, p_z^i) = p_x^i M_x^i(p_x^i, p_z^i) + p_z^i M_z^i(p_x^i, p_z^i). \tag{2.11}$$

Totally differentiating imports and using the properties of $R(\cdot)$, in particular the homogeneity of degree zero of its partial derivatives, shows that:[8]

$$dM_x^i(p_x^i, p_z^i) = D_x^{i\prime}(\cdot)dp_x^i - R_{11}(\cdot)p_x^i\left(\hat{p}_x^i - \hat{p}_z^i\right), \tag{2.12}$$

[8]From the expressions below it follows that if the FTA causes the the relative price of x to rise, that is, $\hat{p}_x^i - \hat{p}_z^i > 0$, then imports of z must rise. Imports of x fall in this case if demand for x is completely inelastic. If the relative price of x falls, then imports of x must rise. Imports of z fall in this case as long as the supply of z is completely inelastic.

and:

$$dM_z^i(p_x^i, p_z^i) = -S_z^{i\prime}(\cdot)dp_z^i - R_{21}p_x^i\left(\hat{p}_x^i - \hat{p}_z^i\right). \tag{2.13}$$

Hence:

$$dV^i(\cdot) = p_x^i D_x^{i\prime}(\cdot)dp_x^i - p_z^i S_z^{i\prime}(\cdot)dp_z^i + M_x^i(\cdot)dp_x^i + M_z^i(\cdot)dp_z^i \tag{2.14}$$

where $\hat{p}_j^i$ stands for the proportional change in p_j^i. Now since prices can only fall in an FTA, we get Proposition 2.1[9].

Proposition 2.1. *The value of imports at domestic prices must fall due to a FTA if the demand for the final good and the supply of the input are completely inelastic.*

However, this does not mean that the same is true for the value of imports at world prices. Let $V^{i*}(\cdot)$ denote the value of imports at world prices. As world

[9]Note that the value of existing inputs used falls due to the FTA as prices fall. However, the effect on supply of final goods and demand for intermediate goods cancels out, leaving only the effects via the demand for the final good and supply of the intermediate good.

prices do not change, we get:

$$\begin{aligned} dV^{i*}(p_x^i, p_z^i) &= p_x^w D_x^{i'}(\cdot)dp_x^i - p_z^w S_z^{i'}(\cdot)dp_z^i \\ &\quad -\{p_x^w(R_{11}(\cdot)dp_x^i + R_{12}(\cdot)dp_z^i) \\ &\quad +p_z^w(R_{21}(\cdot)dp_x^i + R_{22}(\cdot)dp_z^i)\} \end{aligned} \tag{2.15}$$

$$\begin{aligned} &= p_x^w D_x^{i'}(\cdot)dp_x^i - p_z^w S_z^{i'}(\cdot)dp_z^i \\ &\quad +\frac{(p_x^i)^2 R_{11}^i(\cdot)}{(1+t_x^i)(1+t_z^i)}\left(\hat{p}_x^i - \hat{p}_z^i\right)\left(t_x^i - t_z^i\right) \end{aligned}$$

This gives us Proposition 2.2:

Proposition 2.2. *The value of imports at world prices must rise due to a FTA if the relative price of the good with the lower tariff falls. If the relative price of the good with the higher tariff falls, then the value of imports at world prices falls if the demand for the final good and the supply of the intermediate good are completely inelastic.*

This suggests that even if a FTA reduces the value of imports at domestic prices, it need not reduce their value at world prices. Moreover, Proposition 2.2 implies that a decrease in the tariff of the more highly protected good *reduces* the value of imports at world prices if the demand for the final good and supply of the

intermediate good is inelastic. This seems counter intuitive as one might associate *decreases* in imports, and hence their value at given world prices, with *decreases* in welfare. However, we show below (Proposition 3.3) that the opposite tends to be true: *decreases* in imports, and hence their value at given world prices, tend to be associated with *increases* in welfare.

If we look at the $dV^{i*}(p_x^i, p_z^i)$ in a different manner, it is easy to verify that a reduction in all tariffs of the same *amount* must raise the value of imports at world prices. From (2.15) it is clear that:

$$dV^{i*}(p_x^i, p_x^i) = p_x^w D_x^{i'}(\cdot) dp_x^i - p_z^w S_z^{i'}(\cdot) dp_z^i - P' H I_t P \tag{2.16}$$

where I_t is the diagonal matrix with dt_x^i and dt_z^i along the diagonal, and $P'HP$ is the usual quadratic form. Note that if $dt_x^i = dt_z^i < 0$, the term $-P'HI_tP$ is positive. This gives the next result.

Proposition 2.3. *An equal reduction in all tariffs due to a FTA raises the value of imports at world prices.*

This suggests that if one country has *uniformly* higher tariffs than the other in a FTA, then the FTA is likely to raise imports from the rest of the world.

3. Welfare

Here we ask what determines the effect of a FTA on welfare. Substituting (2.2) into (2.1) gives the welfare of country i to be:

$$W^i(p_x^i, p_z^i) = CS_x^i(p_x^i) + R^i(p_x^i, p_z^i) + \Pi_z^i(p_z^i) + t_x^i p_x^w M_x^i(p_x^i, p_z^i) + t_z^i p_z^w M_z^i(p_x^i, p_z^i) \quad (3.1)$$

before the FTA[10]. After the FTA the country with the lower tariff gets all the revenues, but as this is merely a transfer within the FTA, we ignore this effect so that the change in welfare of country i due to the FTA can be written as:

$$\begin{aligned} W^i(p_x^m, p_z^m) - W^i(p_x^i, p_z^i) &= \left\{W^i(p_x^m, p_z^i) - W^i(p_x^i, p_z^i)\right\} \\ &\quad + \left\{W^i(p_x^m, p_z^m) - W^i(p_x^m, p_z^i)\right\} \end{aligned} \quad (3.2)$$

The first term can be thought of as capturing the welfare consequences of the trade creation effect in x and the derived demand effect since the price of the intermediate good is fixed and that of the final good varies. The second term can be thought of as capturing the welfare consequences of the trade creation effect in z and the input price effect since the price of the final good is fixed and that

[10] $CS_x^i(p_x^i)$ of course stands for consumer surplus from x in country i.

of the intermediate good varies. Consider the case where A has a higher tariff on x and a lower one on z than B. Then the change in welfare for country A is given by:

$$\begin{aligned} W^A(p_x^m, p_z^m) - W^A(p_x^A, p_z^A) &= W^A(p_x^B, p_z^A) - W^A(p_x^A, p_z^A) \\ &= \Big[\Big\{CS_x^A(p_x^B) - CS_x^A(p_x^A)\Big\} \\ &\quad + \Big\{\Pi_x^A(p_x^B, p_z^A) - \Pi_x^A(p_x^A, p_z^A)\Big\} \\ &\quad + \Big\{t_x^B p_x^w M_x^A(p_x^B, p_z^A) - t_x^A p_x^w M_x^A(p_x^A, p_z^A)\Big\}\Big] \\ &\quad + \Big\{t_z^A p_z^w((M_z^A(p_x^B, p_z^A) - M_z^A(p_x^A, p_z^A))\Big\} \end{aligned} \tag{3.3}$$

The last term gives the effect of a reduction in the price of x alone on the derived demand in the intermediate good market, and so represents the welfare implications of the derived demand effect. The first three terms inside the square brackets which remain represent the change in welfare due to trade creation. In Figure 1, (IA and IIA) these terms correspond to $[\{p_x^{A0} f p_x^{A1} e\} + \{-p_x^{A0} c p_x^{A1} h\} + \{hage - cbfd\}] + \{-juvl\}$. Simplifying the terms in the square brackets shows that the welfare consequences of the trade creation effect boil down to the area $hcab + fedg$. Hence, *the trade creation effect results in a welfare improvement. The derived demand effect, area {-juvl}, reduces welfare.*

The change in welfare of country B is given by:

$$
\begin{aligned}
W^B(p_x^m, p_z^m) - W^B(p_x^B, p_z^B) &= W^B(p_x^B, p_z^A) - W^A(p_x^B, p_z^B) \qquad (3.4)\\
&= \Big[\Big\{\Pi_x^B(p_x^B, p_z^A) - \Pi_x^B(p_x^B, p_z^B)\Big\} \\
&\quad + \Big\{\Pi_z^B(p_z^A) - \Pi_z^B(p_z^B)\Big\} \\
&\quad + \Big\{t_z^A p_z^w M_z^B(p_x^B, p_z^A) - t_z^B p_z^w M_z^B(p_x^B, p_z^B)\Big\}\Big] \\
&\quad + \Big\{t_x^B p_x^w \Big[M_x^B(p_x^B, p_z^A) - M_x^B(p_x^B, p_z^B)\Big]\Big\}
\end{aligned}
$$

The last term gives the welfare consequences of the input price effect. The first three terms put in the square brackets represent the trade creation effect. In Figure 1, (IB and IIB) these terms correspond to $[\{PRp_z^{B0}p_z^{B1}\} + \{-p_z^{B0}p_z^{B1}LM\} + \{MRSU - LVPT\}] + \{ABCD - EFBD\}$ respectively. The first term in the square brackets is the difference in profits in the x market in country B due to the FTA. Recall that revenue is the value of output of x and that this also equals the area under the demand for z since this is just the marginal value product of z in making x. This makes the difference in profit, revenue less cost of inputs, equal $PRp_z^{B0}p_z^{B1}$. The difference in profits in the z market is $\{-p_z^{B0}p_z^{B1}LM\}$ as the area between the price and the supply curve gives profits.

Simplifying the three terms in the square brackets shows that the welfare

consequences of the trade creation effect boil down to the area $\{PRp_z^{B0}p_z^{B1}\} - \{p_z^{B0}p_z^{B1}LM\} + \{MNSV + QRTU - LPNQ\} = LMPR - LPNQ + MNSV + QRTU = SVLM + TURP$. Hence the *trade creation effect results in a welfare improvement.* As the area $\{ABCD - EFBD\} = -EAFC$, *the input price effect reduces welfare.*

3.1. Welfare Effects

What about the net effect of a FTA? To answer this precisely, it is necessary to totally differentiate the welfare function. Doing so gives:

$$\begin{aligned} dW^i(p_x^i, p_z^i) &= [t_x^i p_x^w D_x^{i'}(\cdot) dp_x^i - t_z^i p_z^w S_z^{i'}(\cdot) dp_z^i] \\ &\quad -\{[t_x^i p_x^w R_{11}(\cdot) + t_z^i p_z^w R_{21}(\cdot)] dp_x^i \\ &\quad +[t_z^i p_z^w R_{22}(\cdot) + t_x^i p_x^w R_{12}(\cdot)] dp_z^i\}. \end{aligned} \tag{3.5}$$

Let the term in curly brackets above be called Q. This can be written in a number of illuminating forms. First, note that:

$$\begin{aligned} Q &= \{[t_x^i p_x^w R_{11}(\cdot) p_x^w t_x^i + t_z^i p_z^w R_{21}(\cdot) p_x^w t_x^i] \hat{t}_x^i \\ &\quad +[t_z^i p_z^w \; R_{22}(\cdot) \; p_z^w t_z^i + t_x^i p_x^w R_{21}(\cdot) p_z^w t_z^i]\} \hat{t}_z^i \end{aligned} \tag{3.6}$$

$$= E' I_{\hat{t}} H E$$

where $I_{\hat{t}}$ is a diagonal matrix with the percentage change in tariffs on x and z along the diagonal, and $E'HE$ is the usual quadratic form and would be positive here as H is positive semi definite. This gives the next result which is the usual one in the literature:

Proposition 3.1. *An equal percentage reduction in the tariff on the final and intermediate good raises welfare.*

It is illuminating to rewrite the expression for Q as follows:

$$\begin{aligned} Q &= -p_x^w R_{21}(\cdot) p_z^w (t_x^i - t_z^i)\{\hat{p}_x^i - \hat{p}_z^i\} \qquad (3.7) \\ &= \frac{(p_x^i)^2 R_{11}(\cdot)}{(1+t_x^i)(1+t_z^i)} \left\{(t_x^i - t_z^i)(\hat{p}_x^i - \hat{p}_z^i)\right\} \end{aligned}$$

Note that $Q < 0$, if and only if $(t_x^i - t_z^i)(\hat{p}_x^i - \hat{p}_z^i) < 0$, and that this is a sufficient condition for an increase in welfare. This results in:

Proposition 3.2. *A reduction in the relative price of the good with the higher tariff must raise welfare. A reduction in the relative price of the good with the*

lower tariff reduces welfare if the demand for the final good and the supply of the input are completely inelastic.

It is also worth noting that the sign of Q and Proposition 2.2 are related. If the value of imports of country i fall, then Q must be negative. If Q is positive, then the value of imports of country i must rise. Its implications are brought out in our last result.

Proposition 3.3. *If the value of imports of country i fall, when evaluated at world prices, ($Q < 0$), then its welfare must rise. If the welfare of country i falls, then the value of imports when evaluated at world prices must rise*[11].

If we take a mercantilistic view and think of the rest of the world's welfare being the value of its exports, this result shows that when the rest of the world loses, country i gains and when country i loses, the rest of the world gains. This does *not* mean that if a country's welfare rises, its imports must fall or if a

[11] *It is also possible to see this diagrammatically. Note that the area $S_x^{A1}S_x^{A0}ch$ in Figure 1, (I-A) equals the area $D_z^{A0}D_z^{A}vl$ in Figure 1, (II-A). $S_x^{A1}S_x^{A0}ch$ is the area under the marginal cost or supply curve and so gives the change in total cost when the price of x changes from p_x^{A0} to p_x^{A1}. As z is the only variable input, this also equals the change in the demand for z when price of x changes from p_x^{A0} to p_x^{A1} which is given by the area $D_z^{A0}D_z^{A}vl$. Decomposing these two areas into their constituent parts gives us $abch + abS_x^{A1}S_x^{A0} = D_z^{A0}D_z^{A}jk + jkvl$. Thus $abch - jkvl = -\{p_x^w(\ S_x^{A0} - S_x^{A1}) - p_z^w(D_z^{A0} - D_z^{A})\}$. The right hand side term inside the brackets of course equals the change in the value of imports at world prices, (ΔV^*) and the left hand side term equals the change in welfare, (ΔW) if the demand for the final good is inelastic so that the area $dgef$ vanishes. Thus, $\Delta W = -\Delta V^*$.*

country's imports rise, its welfare must fall! In other words, it can be understood as meaning that if one party loses, the other must gain, and *not* that if one party gains, the other must lose! Thus reform, whether in the form of a FTA or not, is not zero sum: all countries gaining is not ruled out.

4. Conclusion

This paper focuses on the linkages in the final and intermediate goods markets in examining the effects of a FTA in the absence of ROOs. Our results above have a number of policy implications. First, developing countries are often thought of as having higher tariffs, especially on final goods, than developed ones. If so, in a FTA with a developed country, the developing country's tariffs on its most protected goods will fall the most, while those of the developed one will not change. Proposition 3.2 then suggests that the welfare of the FTA is likely to rise. Also, by Proposition 2.2, its imports valued at world prices are likely to fall if domestic demand for the final good and supply of the input are completely inelastic. If so, the rest of the world would lose from such FTAs.

Second, when domestic demand for the final good and supply of the input are completely inelastic, an increase in the value of imports, at world prices by country i, is necessary and sufficient for a fall in its welfare! Under these conditions,

pressure to open its markets and raise its imports is likely to be resisted by a country.

Third, if domestic demand for the final good is elastic as is the domestic supply of intermediate inputs, welfare and imports are more likely to rise, *ceterus paribus*, with a reduction in tariffs. It is often argued that developing countries have a very limited ability to expand supply in the short run. This suggests that developing countries are less likely, *ceterus paribus*, to gain from such liberalizations.

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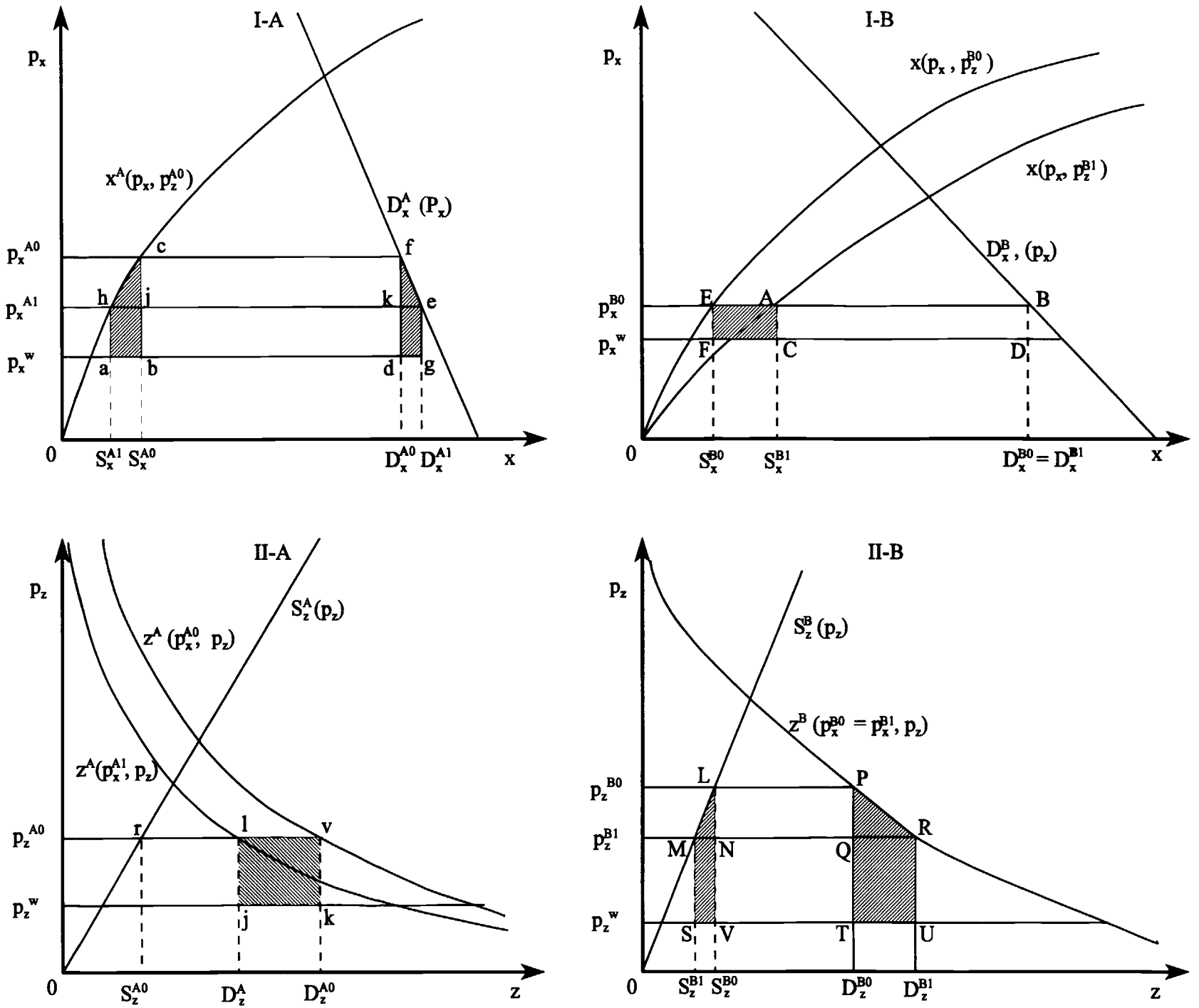
I-A
p_x
$x^A(p_x, p_z^{A0})$
$D_x^A(P_x)$
p_x^{A0}
p_x^{A1}
p_x^w
c
f
h
j
k
e
a
b
d
g
0
S_x^{A1} S_x^{A0}
D_x^{A0} D_x^{A1}
x
I-B
p_x
$x(p_x, p_z^{B0})$
$x(p_x, p_z^{B1})$
$D_x^B, (p_x)$
p_x^{B0}
p_x^w
E
A
B
F
C
D
0
S_x^{B0}
S_x^{B1}
$D_x^{B0} = D_x^{B1}$
x
II-A
p_z
$S_z^A(p_z)$
$z^A(p_x^{A0}, p_z)$
$z^A(p_x^{A1}, p_z)$
p_z^{A0}
p_z^w
r
l
v
j
k
0
S_z^{A0}
D_z^A
D_z^{A0}
z
II-B
p_z
$S_z^B(p_z)$
$z^B(p_x^{B0} = p_x^{B1}, p_z)$
p_z^{B0}
p_z^{B1}
p_z^w
L
P
R
M
N
Q
S
V
T
U
0
S_z^{B1} S_z^{B0}
D_z^{B0}
D_z^{B1}
z

Figure 1