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Regional Economic Integration and Article XXIV of the GATT

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ABSTRACT

This paper analyzes the impact of various configurations of regional economic integration on member countries as well as on outside countries under realistic assumptions. That is, we consider constant external tariffs as required by Article XXIV of the GATT and the asymmetric formation of the FTA where some countries form a FTA while others are left behind. Extending the Krugman framework for the analysis of regional integration, we decompose the impact of regional integration into a few subeffects, each of which has a clear economic implication. Further, we show that economic integration definitely worsens the welfare of the countries that are left behind even if the external tariffs of the FTA remain unraised.

Finally, we calibrate the model to obtain insights into motivations for countries to form regional integration. The simulation results clarify the incentive structure of major participants, e.g., the United States, Japan, and smaller Asian countries, who face various configurations of regional integration, such as EU, NAFTA, "EAEC", and APEC. The simulation suggests that the APEC may be a politically feasible configuration in the world because it substantially increases the welfare level of major participants. Moreover, world-wide free trade may be difficult to achieve, because completely free trade implies a reduction of the welfare level of the major players from the levels that are achieved under various configurations of the FTA.

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I. Introduction

The present world is an experimental ground for economic integration. Europe is attempting to achieve integration of trade, factor movements, and money. In the field of trade and investment alone, the European Union (EU) is followed by the North American Free Trade Agreement (NAFTA). Asian countries were looking forward to forming a union like the East Asian Economic Caucus (EAEC), but the United States is now embracing all the Pacific rim countries into the Asia-Pacific Economic Cooperation Conference (APEC). One cannot exaggerate the need for an analytical framework to assess the benefit-cost of joining in an economic integration because the decision to join or not to join should depend on the benefit and cost of the participation of a country.

Krugman (1991) developed an elegant model of optimal tariffs and regional integration based on the theoretical work of Gros (1987). Krugman considered the process of economic integration by proceeding from the collection of independent individual nations to the divided world where the same number of nations form a symmetric economic union. Frankel, Stein, and Wei (1994) generalized Krugman's model by relying on simulations.

This paper addresses similar issues, but deviates from their approach in the following three important aspects. First, we do not analyze the situation in which nations adopt, as in a Nash equilibrium fashion, optimal tariffs. For economists who are accustomed to optimization, the analysis of the interaction of optimal tariffs may seem a natural theoretical setup. However, it is not a realistic set up. Note that Article XXIV of the GATT stipulates:

"..... the duties and other regulations of commerce imposed at the institution of any such union or interim agreement in respect of trade with contracting parties not parties to such union or agreement shall not on the whole be higher or more restrictive than the general incidence of the duties and regulations of commerce applicable in the constituent territories prior to the formation of such union or the adoption of such interim agreement, ..."

Thus the adoption of optimal tariffs is precluded *de jure*. Moreover, seldom does one, or we should say never, observe circumstances under which countries that join an economic union happen to raise their external tariff rates to the rest of the world. Thus the assumption of optimal tariffs is unrealistic *de facto*. Accordingly, we study the world in which tariff rates are constant. This makes the analysis more realistic as well as less complicated. The simplicity we obtain by the assumption of constant tariff enables us to address more realistic questions.

Second, even though we also rely on simulation methods, we pursue analytical solutions to the problem as far as possible. It is where the analytical method extends to the extreme that we resort to the simulation of the calibrated model. By analytical method, we can decompose the impact of regional integration into a few components and interprete each component by economic reasoning. By this effort, the interpretation of the simulation results can become more transparent and more instructive.

Third, and most importantly, Krugman's framework is limited to symmetric cases, i.e., cases in which each union has the same number of countries. Although this assumption allows the situation to be simplified, it gives the model limited implications for the world economy, where country sizes vary and economic unions contain different number of countries. Moreover, a symmetric framework, one cannot analyze the welfare

of those left behind.[2] Thus, in this paper we analyze the effect of asymmetric unions. By doing so, we are able to calculate the benefits and costs of forming a new regional union for the countries in the world. In the last section's simulation, the benefits and costs of the EU countries, the NAFTA countries and the Asian countries are explicitly calculated. This could not be done under the symmetry assumption.

In short, this paper will analyze the impact of various configurations of regional economic integration on member countries as well as on outside countries under the realistic assumptions of constant external tariffs and asymmetric formation of the free trade area (FTA). In the next section, a general model of regional economic integration, which incorporates various realities, including product differentiation and increasing returns to scale, will be developed. Its basic production structure will be analyzed.

In Section III, the model is applied to the analysis of asymmetric regional integration, where only some of the countries form an FTA while others are left out of any FTA. We can decompose the impact of regional integration on the third country as well as on a member country into several components, each of which has distinct economic implications. Further, we will show that when the FTA is created or enlarged, the terms of trade for outside countries always worsen, and that *even if the external tariffs of the FTA remain the same, as Article XXIV of the GATT requires, the welfare of the third country, which is left out of the FTA, unambiguously declines.* Moreover, while the impact of the regional integration on the member's welfare cannot be determined analytically,

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[2] Goto and Hamada (1994) analyzes the welfare of those who are left behind by using a four-country model.

simulation results suggest that the welfare level of the member increases at first with the expansion of an FTA. However, when the size of the FTA becomes large, the member's welfare begins to be decreased by the further expansion of the FTA. This constitutes a disincentive for admitting new members.

In Section IV, the model is calibrated to obtain the likely welfare impact of various scenarios of regional integration in the real world, e.g., EU, NAFTA, EAEC, and APEC. For each configuration of regional economic integration, the welfare level of major players will be calculated and compared with that in alternative configuration. The simulation results show the following: When EU and NAFTA are formed, smaller Asian countries incur substantial welfare loss; When Asian countries including Japan form a counter bloc such as the EAEC, the welfare level of the United States declines to the level lower than the pre-NAFTA situation; When all countries in Asia and Pacific are united into the APEC, not only small Asian countries but also large countries like the U.S. and Japan would substantially benefit from it; When the complete free trade of the world realizes, the welfare levels of the major countries substantially decline from those being achieved in various configurations of the FTA, although the welfare of the rest of the world who had been left behind from any FTA before is dramatically improved by the worldwide free trade.

Section V concludes the paper and presents some agenda for further researches on the subject.

II. The General Model

1. Specification of the General Model

In this section we present a general model for the analysis of regional economic integration that incorporates various realities including product differentiation, increasing returns to scale, differences in country size, etc. In the later sections we add further simplifying assumptions to keep the analysis compact.

In the general model, the situation of a representative country k (k=1,2,3,.....M) is as follows. Consumers possess the individualistic social utility function (U_k)

$$(1) \quad U_k = [\sum_{i=1}^{N} C_{ik}^{\beta}]^{\frac{1}{\beta}} , \quad 0 < \beta < 1 ,$$

where C_{ik} is the amount of consumption of the i-th differentiated product in country k, and N is the number of types of differentiated products available to consumers. Some of the differentiated products are domestically produced while others are imported from foreign countries. Consumers maximize their utility subject to the budget constraint

$$(2) \quad \sum_{i=1}^{N} P_{ik} C_{ik} = Y_k ,$$

where P_{ik} is the domestic price (i.e., tariff-inclusive price) of the i-th differentiated product in country k, and Y_k is the national income of country k.

From the above utility maximization problem, we obtain the inverse demand functions:

$$(3) \quad P_{ik} = \frac{C_{ik}^{\beta-1} Y_k}{Z_k} ,$$

where

$$(4) \quad Z_k = \sum_{i=1}^{N} C_{ik}^{\beta} .$$

From (3) the elasticity of demand for the i-th differentiated product (ϵ_{ik}) is

$$(5) \qquad \epsilon_{ik} = \frac{1}{(1-\beta) + \frac{\beta C_{ik}^{\beta}}{Z_k}} \ .$$

If we assume the symmetry of each differentiated product and a large number of N, as Krugman (1979) and Dixit and Norman (1980) did, (5) reduces to the following by neglecting the second term of the denominator of the right-hand-side.

$$(5)' \qquad \epsilon_k = \frac{1}{1-\beta} \ .$$

In equation (5)' we omit the subscript i for ϵ because the demand elasticity turns out to be the same for all products due to the assumptions of symmetry and the large number of N. These assumptions would simplify the analysis to a greater extent.

The producer of the i-th differentiated product in country k is characterized by the cost function

$$(6) \quad TC_{ik} = W_k F + W_k m(\sum_{j=1}^{M} C_{ij}) \ ,$$

where TC_{ik} and W_k are total cost of the i-th producer and wage rate in country k, respectively, and m is the labor input requirement per unit of output, while F is a fixed amount of factor input necessary for any positive amount of production. Due to the fixed cost W_kF, the production technology exhibits increasing returns to scale. The producer maximizes the profit function

$$(7) \quad \pi_{ik} = \sum_{j=1}^{M} \frac{P_{ij}}{1+t_{ij}} C_{ij} - [W_k F + W_k m(\sum_{j=1}^{M} C_{ij})] \ ,$$

where π_i is the profit of the i-th producer and t_{ij} is the tariff rate imposed by country j on

the i-th differentiated product. When country j is the home country, a tariff rate is zero (i.e., $t_{ik}=0$). From the profit maximization problem, we obtain the profit maximizing price for the i-th producer in country k as

$$(8) \quad P_{ij} = \frac{W_k m (1+t_{ij})}{\beta} \quad .$$

Further, we assume free entry and free exit. Therefore, the profit of each existing firm is forced to zero in equilibrium. Hence, in equilibrium, we have

$$(9) \quad \pi_{ik} = \sum_{j=1}^{M} \frac{P_{ij}}{1+t_{ij}} C_{ij} - [W_k F + W_k m (\sum_{j=1}^{M} C_{ij})] = 0 \quad .$$

The demand for labor input by the i-th producer (l_i) is obtained as

$$(10) \quad l_i = F + m \sum_{j=1}^{M} C_{ij} \quad .$$

The domestic labor supply is assumed to be constant, i.e., there are no wage-leisure tradeoffs. Therefore, the sum of labor input in all firms in country k is equal to the amount of the domestic labor supply in that country (L_k).

$$(11) \quad \sum_{i=1}^{N_k} l_i = L_k$$

where N_k is the number of firms in country k.

The tariff revenue accrued to the government is assumed to be distributed to domestic consumers in a lump-sum fashion. Since there is no profit in equilibrium, the national income consists of factor payments and tariff revenues.

$$(12) \quad W_k L_k + \sum_{i=N_{k-1}}^{N} \frac{t_{ik}}{1+t_{ik}} P_{ik} C_{ik} = Y_k$$

The above model is complete, and the above specification gives equilibrium conditions for a representative country k. We can solve the model which consists of M countries, once the values of the parameters (m, F, β, t_{ik}, L_k, M, and N) are identified. Note that this general model can accommodate any number of countries (M) and commodities (N) as well as the differences in country sizes L_k.

2. Implications of the Assumption of Constant Elasticity

Here we present a variant of the Krugman model in which all products are differentiated, although in Sections III and IV we use a simpler version of the product differentiation model, based on Armington (1969), in which products produced in the same location are assumed to be perfect substitutes, and products produced in different locations are differentiated.

We use the Krugman model for the following reasons. First, the effect of economic integration under constant returns to scale, such as in the Heckscher-Ohlin-Samuelson (HOS) model, has been extensively studied since Viner (1950), though its impact on the rest of the world has been relatively neglected. Moreover, it seems, in the real world, that the role of increasing returns to scale is extremely important, and that the new trade theory, with increasing returns and monopolistic competition, seems to grasp the reality of trade in manufactured goods fairly well.

As mentioned above, we assume the number of the firms to be large enough to justify the constant elasticity of the demand function. Because of this assumption, even though the decreasing cost plays an important role in determining the equilibrium, the

resulting scale of production and the equilibrium average cost are not changed by the existence of trade. Suppose that the utility function and the production function of the *i*-th producer are characterized, respectively, by

$$(13) \quad U_k = [\sum_{i=1}^{N} C_{ik}^{\beta}]^{\frac{1}{\beta}}, \qquad 0 < \beta < 1$$

and

$$(14) \quad x_i = f(l_i) \quad .$$

Then, the amount of factor input (l_i) and the amount of output (x_i) is completely determined by the following conditions (see Gros (1987) for a proof):

$$(15) \quad \frac{df(l_i)}{dl_i} \cdot \frac{l_i}{f(l_i)} = \frac{1}{\beta} \quad .$$

The left-hand-side of equation (15) can be interpreted as the *degree of economy of scale* in production, while the right-hand-side can be interpreted as the *degree of product differentiation* from the consumers' viewpoint.

Applying this relationship to the model developed in subsection II.1, we know that the amount of production of the *i*-th firm (x_i) and the number of firms in country *k* (N_k) are invariant and expressed as follows:

$$(16) \quad x_i = \frac{F\beta}{m(1-\beta)} \quad ,$$

and

$$(17) \quad N_k = \frac{1-\beta}{F} L_k \quad .$$

Therefore, the total amount of production of differentiated products in country *k* becomes the following.

$$(18) \quad x_i N_k = \frac{F\beta}{m(1-\beta)} \frac{1-\beta}{F} L_k = \frac{\beta}{m} L_k$$

Therefore, by the choice of units, the total amount of production in country k (and that of every country under symmetry) can be normalized as unity. Thus, the specification in Section III and Section IV below, where each country is assumed to produce *one unit of the differentiated product*, is essentially equivalent to the general specification above under the assumption of constant elasticity. However, even if the production sides are not affected, the country's welfare is affected by the regional economic integration through the change in the demand side; that is, through the effect that consumers can consume more balanced bundles of goods under freer trade. This will be discussed in detail in the following sections.

III. The Effects of Asymmetric Integration

In this section we examine the impact of progress toward regional integration on the welfare of each country in the world. Although our analysis extends Krugman's analysis, it differs distinctively from his in the three respects, as discussed previously: (i) we assume *constant tariffs* rather than optimal tariffs; (ii) we carry our *theoretical analysis* to the boundary where simulation is absolutely necessary; and (iii) we examine the effect of *asymmetric regional integration* where only some of the countries form a FTA while others are left out of any FTA.

1. The Model

The basic assumptions in this section are similar to those in Section II above. The only difference here is that the world consists of a large number of N identical

provinces, of which n provinces form a FTA while the other (N-n) provinces are left out. Trades within the FTA are subject to no tariffs, while other trades are subject to a constant tariff t. Each province specializes in the production of a type of differentiated products. Since all provinces are assumed to be identical, without loss of generality, each province is assumed to produce one unit of a type of differentiated products.

In what follows, we utilize the indirect utility function to simplify the algebra. In the model here, consumers in the representative province (or country) in the FTA are characterized by the indirect utility function

$$(19) \qquad V_F(P, Y_F) = [\sum_{i=1}^{N} P_{iF}^r]^{-1/r} Y_F$$

$$\text{where} \quad r \equiv \frac{\beta}{\beta - 1}, \quad 0 < \beta < 1 \quad ,$$

where V_F and Y_F are the utility and income of the representative country in the FTA. P_{iF} is the consumer price of a good produced in country i which is consumed in the representative country in the FTA. Since the producer price of the rest of the world (ROW) good is set to unity, and since the producer price of the FTA good is P, the consumer prices of the FTA good and the ROW good in the representative country of the FTA are, respectively, P and $(1+t)$. Further, there are n countries in the FTA and (N-n) countries in the ROW. Therefore, the indirect utility function of the representative province in the FTA can be expressed as

$$(20) \qquad V_F(P, Y_F) = [nP^r + (N-n)(1+t)^r]^{-1/r} Y_F \quad .$$

Further, since income consists of the value of own output and tariff revenues, we have

$$(21) \quad Y_F = nPC_{FF} + (N-n)(1+t)C_{RF} = P + t(N-n)C_{RF} \quad .$$

Here C_{FF} and C_{RF} are, respectively, the amounts of consumption of each type of FTA good and ROW good in the representative province in the FTA.

Applying Roy's identity, we obtain the demand functions as

$$(22) \quad C_{FF} = \frac{P^{r-1}}{nP^r + (N-n)(1+t)^r} Y_F \quad ,$$

and

$$(23) \quad C_{RF} = \frac{(1+t)^{r-1}}{nP^r + (N-n)(1+t)^r} Y_F \quad .$$

Similarly, the indirect utility function of consumers of the representative province in the rest of the world is expressed by

$$(24) \quad V_R(P, Y_R) = [n(1+t)^r P^r + (N-n-1)(1+t)^r + 1]^{-1/r} Y_R \quad .$$

The income of the representative province in the ROW is expressed by

$$(25) \quad \begin{aligned} Y_R &= n(1+t)PC_{FR} + (N-n-1)(1+t)C_{fR} + C_{hR} \\ &= 1 + tnC_{FR} + t(N-n-1)C_{fR} \quad , \end{aligned}$$

where C_{FR} is the amount of consumption of each type of FTA good in the representative province in the FTA. C_{fR} is the imported amount of each type of ROW good, and C_{hR} is the amount of the home good consumed in the representative province in the ROW.

Applying Roy's identity, we obtain the demand functions as

$$(26) \quad C_{FR} = \frac{(1+t)^{r-1}P^{r-1}}{n(1+t)^r P^r + (N-n-1)(1+t)^r + 1} Y_R \quad ,$$

$$(27) \quad C_{fR} = \frac{(1+t)^{r-1}}{n(1+t)^r P^r + (N-n-1)(1+t)^r + 1} Y_R \quad ,$$

and

$$(28)\quad C_{hR} = \frac{1}{n(1+t)^{r}P^{r} + (N-n-1)(1+t)^{r} + 1} Y_R \quad .$$

The trade has to be balanced in equilibrium, i.e.,

$$(29)\quad PC_{FR} = C_{RF} \quad .$$

By Walrus's law, one of the above eleven equations is redundant. So, ten independent equations determine ten endogenous variables (V_F, V_R, Y_F, Y_R, C_{FF}, C_{RF}, C_{FR}, C_{fR}, C_{hR} and P). In what follows, we examine the impact of an increase in n (i.e., creation and/or expansion of an FTA[3]) on the welfare of ROW as well as FTA countries.

2. The Effects on Relative Price (Terms of Trade)

Before going into the welfare analysis of the FTA, let us examine, as a preliminary step, the impact of the increase in the number of countries in the FTA (n) on the relative price or terms of trade (P). After repeated substitution of variables in the above equilibrium conditions and rearrangement, we obtain the following implicit relationship between P and n:

$$(30)\quad nP + [(N-n-1) + (1+t)^{\sigma}]P^{\sigma} - n(1+t)^{\sigma}P^{1-\sigma} - N + n = 0$$

$$where \quad \sigma \equiv \frac{1}{1-\beta} \quad .$$

From equation (30), it is clear that, for a given n, the left-hand-side (LHS) of the equation is an increasing function of P (note that σ is greater than one). Substituting P=1 into the LHS, we obtain the following.

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[3]When n increases from one to two, we can regard this change as the creation of an FTA since two countries unite together. When n increases further, we can regard this change as an expansion of the FTA.

(31) $LHS\,|_{P=1} = (n-1)[1-(1+t)^{\sigma}]$

Since both σ and $(1+t)$ are greater than one, the LHS in equation (31) is equal to zero *only if* n is unity. Otherwise the LHS in equation (31) is negative. Since the LHS in equation (30) is an increasing function of P for a given n, in order to satisfy equation (30), P must be greater than unity whenever n is greater than unity. In other words, we obtain

(32) $1 < P \quad if \; 1 < n \quad .$

Thus, the following proposition is proved.

(Proposition 1) *The terms of trade of the member country of any size of the FTA is better than that of the nonmember.*

Then what is the impact of the creation and/or expansion of the FTA on the terms of trade or the value of $\partial P/\partial n$. Rearranging equation (30), we obtain

(33) $$n = -\frac{(P^{\sigma}-1)N + [(1+t)^{\sigma}-1]P^{\sigma}}{P-P^{\sigma}-(1+t)^{\sigma}P^{1-\sigma}+1} \quad .$$

Since n is positive and the numerator of the right-hand-side (RHS) is positive, the denominator of the RHS of equation (33) must be negative. Applying the implicit function rule of differentiation to equation (30), we obtain the following:

(34) $$\frac{dP}{dn} = -\frac{P-P^{\sigma}-(1+t)^{\sigma}P^{1-\sigma}+1}{n+\sigma[(N-n-1)+(1+t)^{\sigma}]P^{\sigma-1}+(\sigma-1)(1+t)^{\sigma}nP^{-\sigma}}$$

Note that the denominator of the RHS of equation (34) is positive and that the numerator is negative (see equation (33)). Therefore, the derivative of P with respect to n is positive.

(35) $\frac{dP}{dn} > 0$

Thus, the following proposition is proved.

(Proposition 2) *When an FTA is created or enlarged, the terms of trade of member countries against the rest of the world is always improving; in other words, the creation or expansion of the FTA always worsens the terms of trade of outside countries.*

Then, how far does P increase as the size of FTA expands? When $n=N$ (i.e., free trade prevails all over the world), the terms of trade of any country return to one just as in the case of a totally fragmented world. Therefore, we consider the situation only up to $n=N$-1. From (35), P is the largest when $n=N$-1, and the LHS of equation (30) is a monotonically increasing function of P for a given n. Substituting $P=(1+t)$ and $n=N$-1, into the LHS of equation (30) and rearranging, we obtain

(36) $LHS\,|_{P=1+t} = (1+t)^{2\sigma}-1$.

Clearly, the LHS of (36), i.e., at $P=(1+t)$ and $n=N$-1 is positive. Therefore, the maximum value of P (i.e., at $n=N$-1) must be smaller than $(1+t)$ if (30) is to hold with equality. From this, we obtain the following[4]:

(37) $P < (1+t)$

Note that the tariff-inclusive price of the ROW good and the price of the FTA good are, respectively, $(1+t)$ and P. Thus, the following proposition is proved.

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[4]In fact, we can show that, in the limit when N goes to infinity, the maximum value of P is $(1+t)$.

(Proposition 3) *In the FTA, the consumer price of an imported FTA good is always cheaper than that of a good imported from the ROW.*

From Proposition 3 and equations (22) and (23), the following proposition is obvious.

(Proposition 4) *In the representative country in the FTA the amount of consumption of a type of FTA good is always larger than that of a type imported from the ROW.*

3. The Effect of on the Welfare of Outside Countries

In the analysis based upon the optimal tariff,[5] it is suggested that, as the FTA is created or expanded, the welfare of outside countries worsens because the market power of the expanded FTA becomes stronger than before so that it can impose a higher optimal tariff against outside countries. As mentioned above, such an increase in the external tariff is explicitly prohibited by Article XXIV of the GATT and such an increase of external barriers after the creation or expansion of the FTA has been rarely observed in the real world. However, we can show below that even if Article XXIV of the GATT is strictly enforced, the third country will be still worse off as the result of the creation or expansion of the outside FTA.

As shown in equation (24), the welfare of the representative country in the rest of the world is expressed by the following indirect utility function:

$$(24)' \qquad V_R = \lambda_R \, Y_R$$

[5] See Yi (1995), for example.

where $\lambda_R = [n(1+t)^r P^r + (N-n-1)(1+t)^r + 1]^{-1/r}$

Equation (24)' implies that the change in the utility (V_R) can be decomposed into the price effect (i.e., the change in λ_R) and the income effect (the change in Y_R). We will examine the two effects in turn.

A. Price Effect -- negative

Differentiating λ_R in (24)' with respect to n, and rearranging, we obtain

$$(38) \quad \frac{d\lambda_R}{dn} = -\frac{1}{r}\lambda_R^{-1}\left[rn(1+t)^r P^{r-1}\frac{dP}{dn} + ((1+t)^r P^r - (1+t)^r)\right] .$$

Since r is negative, the term outside of the square bracket [ ] of the RHS is positive, and, therefore, the sign of the derivative depends only on the sign of [ ]. Since it is easy to check that both of the terms in the bracket [ ] are negative, the combined price effect is also negative. These two subeffects can be interpreted as follows:

(i) Price hike of FTA good -- negative (the first term).

As already shown, the relative price of an FTA good (P) increases as n increases. Therefore, when n increases due to the creation or expansion of an outside FTA, the third country has to pay more for each unit of imports from the FTA, which would contribute to the decline in their welfare.

(ii) Price hike of switching-country good -- negative (the second term)

When the FTA expands, some of the countries in the ROW are included in the FTA as its new members. For the consumers in the still-left-out countries, the price of the goods imported from the switching country increases from $(1+t)$ to $P(1+t)$. Such a price increase would contribute to the decline in the welfare of the outside country.

B. Income Effect -- Negative

The income effect (i.e., the change in Y_R induced by the increase in n) can also be decomposed into several subeffects. Differentiating Y_R in (25) with respect to n, we obtain (39)

$$(39)\quad \frac{dY_R}{dn} = t\,(PC_{FR} - C_{fR}) + t\,n\,(C_{FR}\frac{dP}{dn} + P\frac{dC_{FR}}{dn}) + t\,(N-n-1)\frac{dC_{fR}}{dn} \quad .$$

Note that, since the producer price of the ROW good is set to unity, the value of the output in the representative country in the ROW is still one, and, therefore, *all of the income effect is coming from the change in tariff revenue.*

(i) Decline in tariff revenue from switching-country good -- negative (the first term)

When some countries join the FTA, the value of the imports from such a country decreases (Note that we can show $PC_{FR} < C_{fR}$.) Therefore, the tariff revenue from such imports also declines. The decline in the tariff revenue from the imports of the switching-country goods contributes to the decline in welfare.

(ii) Change in tariff revenue from the FTA good -- ambiguous (the second terms)

Since we already know that $dP/dn>0$, the first term in parenthesis is positive. If the quantity of imports from an old FTA country were the same, the tariff revenue from FTA would increase. But, when the FTA expands, the quantity of goods imported from an FTA country (C_{FR}) may increase or decrease depending on the values of parameters in the model (β, t, N, and n). Thus, the welfare impact resulting from the change in

tariff revenue from FTA good is ambiguous, although, according to simulation, this effect is negative in most cases.

(iii) Increase in tariff revenue from the ROW good -- positive (the third term)

Since we can show that C_{fR} increases as n increases, the third term is a positive subeffect. When the FTA expands, imports to the representative ROW country from other ROW countries increase, and therefore, the tariff revenue from such an import increases. This would contribute to the increase in the welfare of the representative ROW country.

(iv) Overall income effect -- negative

Although the income effect for the ROW can be decomposed into the three conflicting subeffects above, the overall income effect, which combines the three subeffects, turns out to be negative. This can be shown as follows: by repeated substitution of equilibrium conditions and rearrangement, we obtain

$$(40) \quad Y_R = \frac{1}{1 - \dfrac{t(1+t)^{r-1}}{(1+t)^r + \dfrac{1}{A}}},$$

where $A \equiv nP^r + (N - n - 1)$.

Differentiating A with respect to n, we obtain

$$(41) \quad \frac{dA}{dn} = (P^r - 1) + rnP^{r-1}\frac{dP}{dn} < 0 \quad .$$

The inequality holds because $r < 0$, $1 < P$, and $dP/dn > 0$. From equation (40) Y_R is a monotonically increasing function of A. Therefore, we know that Y_R decreases as n

increases. Thus, it is proved that the overall income effect is also negative.

$$(42) \qquad \frac{dY_R}{dn} < 0$$

The above analysis can be summarized into the following proposition.

(Proposition 5) *The impact of regional integration on the welfare of the third country can be decomposed into the following subeffects.*

A. Price Effect (negative)

(i) Price hike of FTA good (negative)

(ii) Price hike of switching-country good (negative)

B. Income Effect (negative)

(i) Decline in tariff revenue from switching-country good (negative)

(ii) Change in tariff revenue from FTA good (ambiguous)

(iii) Increase in tariff revenue from ROW good (positive)

Since, in the outside country, both the price effects and income effects are negative, the overall welfare effect is also negative

$$(43) \qquad \frac{dV_R}{dn} < 0$$

Thus, the following important proposition is proved.

(Proposition 6) *Even if external tariffs of the FTA remain the same, as Article XXIV of the GATT requires, the welfare of the third country which is left out of the FTA unambiguously declines.*

Proposition 6 suggests that Article XXIV of the GATT is not a sufficient safeguard against the welfare loss of the third countries. Note that the above proposition is analytically proved, and therefore, it does not depend on the parameter values of the model.

4. The Effect on the Welfare of Existing FTA Members

What then is the impact of an expansion of the FTA on the welfare of the existing FTA member countries? Although the welfare of the newly switched member certainly improves, the impact on the welfare of the old FTA member is not straightforward because various conflicting subeffects are working. In fact, the impact of the expansion of the FTA on the welfare of the old members is ambiguous and depends on the parameters of the model. However, in most reasonable cases, as the FTA expands, the welfare of the existing FTA member improves at first, but when the size of the FTA becomes large, their welfare begins to decrease. In other words, when the FTA becomes very large, an incentive emerges among old members to reject the admission of new members.

As shown in equation (20), the welfare of the representative existing member of the FTA can be expressed by the indirect utility function

(20)' $V_F = \lambda_F Y_F$,

where $\lambda_F = [nP^r + (N-n)(1+t)^r]^{-1/r}$.

Equation (20)' implies that the change in the utility (V_F) can be decomposed into the price effect (i.e., the change in λ_F) and the income effect (the change in Y_F), as is the case for ROW welfare.

A. Price Effect

While in the case of the ROW's welfare the price effect was unambiguously negative, it is more complicated here. Differentiating λ_F with respect to n, and rearranging, we obtain

$$(44) \quad \frac{d\lambda_F}{dn} = -\frac{1}{r}\lambda_F^{-1}\left[rnP^{r-1}\frac{dP}{dn} + (P^r-(1+t)^r)\right] .$$

Since r is negative, the term outside of the square bracket [ ] of the RHS is positive, and, therefore, the sign of the derivative depends on the sign of [ ]. Although the first term in the bracket [ ] is negative, the second one is positive, and, therefore, the combined price effect is ambiguous. However, a closer look at equation (44) gives us some insights into the mechanism of the welfare impact of the expansion of the FTA. The two terms in the bracket can be interpreted as follows:

(i) Price hike of FTA good -- negative (the first term)

Since we already know $dP/dn>0$ and $r < 0$, the first term in [ ] of equation (44) is negative. In other words, when the FTA expands, consumers in the FTA have to pay more for each unit of FTA goods, which would contribute to the decline of their welfare.

The old members of the FTA, as well as the ROW countries, suffer from this negative welfare effect resulting from the more expensive FTA goods after the expansion of the FTA.

(ii) Price reduction of switching-country good -- positive (the second term)

Since r is negative and P is smaller than $(1+t)$, the second term in [ ] is positive. When the FTA expands, some of the countries in the ROW are brought into the FTA as its new members. For the consumers in the FTA, the price of the goods imported from those switching countries deceases from $(1+t)$ to P. Such price reductions would contribute to the increase of their welfare.

B. Income Effect

The income effect (i.e., the change in Y_F induced by the increase in n) can also be decomposed into a few subeffects. Differentiating Y_F in (21) with respect to n, we obtain

$$(45) \qquad \frac{dY_F}{dn} = \frac{dP}{dn} - t\,C_{RF} + t\,(N-n)\frac{dC_{RF}}{dn} \quad .$$

Note that since the producer price of the FTA *(P)* good changes, the income effect consists of the *change in the market value of the output* and the *change in tariff revenues*. In equation (45), the second term and the third terms of the RHS show the income effect resulting from the change in tariff revenues. The three terms in the RHS of equation (45) can be interpreted as follows.

(i) Increased value of own output -- positive (the first term)

The first term of the RHS is clearly positive. When P is increased by the expansion of the FTA, the market values of the domestic output in the representative country in the FTA increases, which make it richer than before. The increase in the market value of their own output would contribute to the improvement in the welfare of the old FTA members.

(ii) Loss of tariff revenue from switching-country good -- negative (the second term)

The second term of the RHS is clearly negative. Note that tC_{RF} is the tariff revenue from the import from a ROW country. When one of the previous ROW countries is admitted as a new member of the FTA, the tariff revenue from that country becomes zero although it used to be tC_{RF} before the admission. In other words, even when the quantity C_{RF} does not change, the tariff revenue decreases because the number of ROW countries on which the tariff is imposed by the FTA members declines. Such a decline in tariff revenues would contribute to the decrease in the welfare of the existing FTA members.

(iii) Change in tariff revenue from the ROW good -- ambiguous (the third term)

When the FTA expands, the quantity of imports from each ROW country, and the tariff revenue arising from the imports, would change. C_{RF} may increase or decrease, depending on the values of parameters in the model. Such quantity change affects the tariff revenue, and thereby the welfare, of the old members in the FTA.

The above analysis can be summarized into the following proposition.

(Proposition 7) *The impact of regional integration on the welfare of the old FTA member can be decomposed into the following subeffects, although the overall effect is ambiguous.*

A. Price Effect

(i) Price hike of the FTA good (negative)

(ii) Price reduction of switching-country good (positive)

B. Income Effect

(i) Increased value of own output (positive)

(ii) Loss of tariff revenue from switching-country good (negative)

(iii) Change in tariff revenue from the ROW good (ambiguous)

C. Overall Welfare Effect -- A Simulation

Although we proved analytically that third countries are worse off when the outside FTA expands, even if Article XXIV of the GATT is strictly enforced, it is ambiguous whether existing members of the FTA are worse off or better off because a few conflicting factors affect the welfare level of the existing members.

In order to determine the most likely effect on the existing members' welfare of the expansion of an FTA, we conducted a simulation using the above model. The results are summarized in Figure 1. Each panel of Figure 1 shows the simulation result using certain values for β and t. The welfare of the existing member is plotted on the vertical axis while the number of countries in the FTA (n) is plotted on the horizontal axis. On the horizontal axis, n is plotted from one to N-1. We found that except for Case 2, where the values of both β and t are unbelievably high (in this case, the elasticity of

substitution among differentiated products is ten, and the tariff rate is as high as a hundred percent), the patterns of the overall welfare effect are surprisingly similar to each other: *Welfare first increases with the expansion of an FTA, but when about half of the world is united into the FTA, welfare begins to decrease with the further expansion of the FTA.*

The implication of this simulation for the real world would be as follows. When some countries form an FTA, their welfare improves at first (at the expense of the third countries), and therefore, they are motivated to expand the FTA. This may explain why North American or European countries are eager to be united into an FTA (e.g., NAFTA) or to strengthen the existing form of integration (e.g., EC92 and beyond). However, when the size of the FTA reaches a certain point (i.e., about a half of the world economy), further expansion is welfare-worsening for the old FTA members. This constitutes a disincentive for admitting new members[6]. Hence, it is possible for the enlarged EU or NAFTA members to be reluctant to admit small Asian countries.

Furthermore, it can be shown, using a similar model, that when counterintegration among ROW countries occurs, the welfare of the members of the original FTA declines (See Goto-Hamada (1994) for a detailed discussion of this point). This may explain why the United States was so strongly against the initiative toward integration in Asia from which it was excluded, for example, the EAEC.

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[6]In view of this finding, it is interesting to note that the combined share of the EU and the NAFTA in the world economy is 58 percent, as discussed in Section IV below.

IV. Regionalism and Asian Countries -- Simulation

1. An Overview

The world is now under the influence of a new regionalism. After the progress toward the EU and the NAFTA, various movements toward economic integration in Asia have been observed. Some of the attempts are to form an exclusive regional FTA, as exemplified by the plan of the EAEC proposed by Premier Mahathir of Malaysia, while others are to form a more open regional agreement such as the APEC, which has been endorsed by the United States. In order to assess the economic incentives and political economy underlying these moves, we conducted simulation exercises using the model developed above. However, the simulation model in this section is more sophisticated than the analytical model in the previous section in that the model here is able to capture the reality that there are multiple FTAs in the world (e.g., EU, NAFTA, AFTA, etc.) In the model of Section III, n countries are assumed to form the FTA, and the rest of the world (N-n countries) is assumed to be totally fragmented. However, the simulation model in this section allows plural FTAs, where, for example, n_1 countries form the European Union, n_2 countries the NAFTA, n_3 countries the AFTA, and so forth.

Using the plural FTA model, we calibrated the welfare level of each player (country) for various configurations of the regional integration in the world. As discussed in detail below, our simulation results suggest that Asian developing countries incur substantial welfare loss after the two major blocs (EU and NAFTA) are formed.

However, if they are united into, say, the "EAEC,"[7] or the APEC, their welfare improves dramatically. Such a pattern of welfare change would help explain why small Asian countries are eager to be united into a free trade area. Further, our simulation results suggest that the welfare level of the United States is increased somewhat by the formation of the NAFTA, but if Asia is united into a countervailing exclusive FTA such as the "EAEC", the U.S. welfare level is reduced to a level lower than that of the pre-NAFTA level. This might explain why the United States has adamantly opposed the "EAEC" which excludes it and why it enthusiastically endorses the APEC free trade area which includes it. The APEC may be a politically feasible configuration in the world because it substantially increases the welfare level of major participants.

Moreover, the worldwide FTA does not seem to be the best regime, at least for the major countries in the world, e.g., the United States. In fact, the welfare level of the large country (or countries in the large bloc) is higher in the various configurations of the FTA than it would be in worldwide free trade. This would suggest that the major countries may well be reluctant to move toward complete world free trade.

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[7]Since the actual EAEC has a controversial nature, we use the quote-and-quote "EAEC" as an example of Asian economic integration. Our "EAEC" does not have other non-economic connotations except for the fact that it is a name for an Asian economic union.

2. Method of Simulation

A. Differences in Country Size

As seen in Section III, our model assumes that the world consists of many identical 'provinces'. Differences in the size of the 'country' can be incorporated by simply assuming that the larger country has more provinces in it than the smaller country. For example, the United States is considered to consist of a larger number of provinces than a smaller country, say, Jamaica, and therefore, the former produces a greater variety of differentiated products while the latter produces only a limited number of types of differentiated products (coffee?).

Table 1 summarizes the method we used to incorporate country-size differences into the simulation model. As shown in the table, the U.S. GDP is more than a hundred times larger than that of the average developing country. By normalizing the GDP of the average developing country (forty billion U.S. dollars), the world is considered to consist of 560 provinces, i.e., the total world GDP is 560 times higher than the GDP of an average LDC. Therefore, as seen in the table, the United States and Japan, for example, consist of 137 provinces and 74 provinces, respectively, among which free trade prevails, while an average LDC consists of one province.

When we compiled Table 1, we omitted countries whose GDP was less than one billion dollars in order to prevent the size of an average LDC from becoming too small. The number of countries in the world, therefore, was reduced from the actual listing in the UNCTAD (164 countries) to 137. We assume that the size of each LDC is represented by the average of all LDCs, and that the size of each EU member is also

represented by the average of all EU members[8]. The memo item at the bottom of the table shows selected countries whose GDP is similar to the LDC average (forty billion dollars). These countries include Colombia, Egypt, Nigeria, Malaysia, Philippines, Singapore, Pakistan, and Myanmar, among others. Thus, the size of an average LDC in the model is not so much different from what we think of as an average developing country.

B. Identification of t and β

After having identified the number of provinces in the model (i.e., N=560), we needed to identify the values of t (tariff plus tariff equivalency of nontariff barriers) and β in the utility function. We borrowed the values of these parameters from previously existing estimates. The World Bank (1995) gives, as its data for trade-weighted average tariff rates, 6.2 percent for developed countries and 15 percent for developing countries. By weighting these figures by value of trade for DCs and LDCs, we obtained an average world tariff rate of 9.1 percent. For the tariff equivalency of nontariff barriers (NTBs), we used the estimates of Laird and Yeats (1990) and Low and Yeats (1995). Adjusted for the coverage of the NTBs, we obtained an average world tariff equivalency of the NTBs of 7.12 percent. Therefore, t is calculated as 0.17; in other words, due to the tariffs and NTBs, the consumer price of imported goods is 17 percent higher on average

[8]Of course, the alternative specification is conceptually possible where the size of each of 137 countries is different according to its actual GDP size. However, if we tried to incorporate the size difference of all 137 countries, we would have (137x137=18,769) elements for each set like C and P. The simulation model that incorporates so many elements would be too large to be solved by the computer software at hand.

than the producer price in the exporting country.

The value for β in the utility function is not so straightforward. But note that since the elasticity of substitution between the differentiated products is equal to $1 / (1 - \beta)$, the value of β can be calculated from the estimated value of the elasticity of substitution among the products made in different countries. Richardson (1972), quoted by Stern and Schumacher (1976), reported that the elasticity of substitution between U.S. goods and German goods was estimated to be 2.52; from this we obtained $\beta = 0.603$.

C. Seven Cases for Simulation Exercise

Now that we have all the necessary parameter values, i.e., N=560, t=0.17, and β=0.6, we can calibrate the welfare level of each player for various FTA configurations which are characterized by the values of n_1, n_2, ... We report here the calibration results for seven different configurations as shown in Figure 2.[9]

CASE 1 (Totally Fragmented World) : This is an imaginary configuration where the world is totally fragmented into 560 independent provinces. Needless to say, such a fragmented configuration has never existed, and some countries, like the United States, are very large even before any FTA formation. So, the simulation result in Case 1 is reported only to give an idea how much the larger countries are benefitted by their size even before any regional integration.

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[9] Of course, the above identification of t and β is not decisive. Therefore, we conducted the sensitivity analysis using various values for t (0.1, 0.17, and 0.3) and β (0.5, 0.6, and 0.7). The results of this analysis are available on request. The results of these simulations are very insensitive to the parameter values. Hence, the results reported here are robust and hold for a wide range of parameter values.

CASE 2 (Before EU) : Here, we introduce the difference in the size of each country. In this case (before EU) the European countries are considered to be separated from each other. Hence, the world is characterized by five different players, i.e., an average European country, Canada, the United States, Japan, and an average LDC. As shown in Figure 2, even in this case without any FTA, the shares of the U.S. and Japan in the world economy are very large at, respectively, 24.5 percent and 13.2 percent.

CASE 3 (EU Only) : In this case fifteen European countries are united into the European Union, whose share in the world economy is almost 30 percent, which is larger than that of the United States (24.5 percent). Further, the EU is the only FTA in the world.

CASE 4 (EU and NAFTA) : In this case the United States, Canada, and Mexico are united into the NAFTA, whose share in the world economy is 28 percent. As a result, there are two big trading blocs in the world, the EU and NAFTA, which comprise about 60 percent of the world economy. Note that the United States is much larger than the other two NAFTA members. Hence, as discussed in detail below, the benefit from forming the NAFTA seems to be larger for the two smaller partners than for the United States.

CASE 5 (EU, NAFTA, and "EAEC") : As discussed above, faced with the two big trading blocs of the EU and NAFTA, the "EAEC" was proposed by Asian countries as a way to form their own countervailing trading bloc. Case 5 captures the situation in which such a countervailing bloc is realized and all Asian countries, including Japan, are joined in the hypothetical "EAEC". When all Asian countries (excluding West Asia and

Oceania) are united, its world share becomes 20.4 percent. In other words, in this case there are three major trading blocs of similar size in the world.

CASE 6 (EU and APEC) : The initiative of the United States, in recent years, has produced remarkable progress toward the APEC free trade area. As indicated in the communiqué of the APEC Summit Meeting held in Indonesia in 1994, the advanced countries and developing countries in the APEC agreed to realize free trade by the years 2010 and 2020, respectively. Case 6 illustrates such a situation, and the share of the APEC countries would be almost half of the world economy.

CASE 7 (World Free Trade) : This is the situation in which all countries in the world abolish all tariffs and NTBs, and thereby free international movement of goods is realized. This is probably also a fairly imaginary case as was true for Case 1.

3. Results of Simulation

Using the model and parameter values discussed above, we conducted simulations for the seven cases. The results of the simulation are summarized in Figure 3, which is fairly self-explanatory. In the figure, the level of welfare of each of the six types of players, i.e., an average European country, Canada, U.S.A., Japan, an average Asian LDC, and an average country in the rest of the world, are plotted on the vertical axis for the seven configurations.

First, look at the welfare of each player in Case 2, where no FTA exists in the world. Note that, even without any FTA agreement, the consumers in the larger economies like the U.S. and Japan are better off than those in the smaller LDCs.

Second, when European countries are united into a single FTA, the EU, their welfare improves very much while other players incur a substantial loss (see Case 3). Such welfare loss outside of the EU would prompt the formation of other countervailing FTAs like NAFTA.

Third, when NAFTA is formed (Case 4), the welfare of the NAFTA members improves while that of the non-NAFTA countries worsens. The welfare impact of the NAFTA is much stronger on the smaller members, i.e., Canada and Mexico, than on the United States. The welfare of Mexico increases from the level of the ROW in Case 3 to the level of United States in Case 4. This asymmetric impact is due to the fact that, when the NAFTA is formed, the market for the producers in Canada and Mexico dramatically expands because now they have free access to the huge U.S. market, while for the U.S. producers the size of expanded markets in Canada and Mexico is smaller relative to the home market.

Fourth, when Asian LDCs and Japan are united into the single FTA that is hypothetically called "EAEC" (Case 5), the world is characterized by three trading blocs of similar size. The welfare of an Asian LDC improves substantially while the favorable effect for Japan is relatively small because the smaller Asian countries now have free access to the huge Japanese market. Note that the welfare level of the United States under this countervailing FTA in Asia is below that of the pre-NAFTA configuration. This would explain, to some extent, the anti-"EAEC" sentiment of the United States.

Fifth, when all of the APEC countries in Asia, Pacific, and America are united into the single FTA, its impact on the Asian LDCs is dramatic. In addition, the impact

on larger members like the United States and Japan is also remarkable. Thus, the formation of the APEC is very much welfare-improving for all major participants, e.g., the U.S., Japan, and the Asian LDCs. In other words, the formation of the APEC free trade area seems politically feasible because it substantially increases the welfare of all major members. However, it is important to note that the welfare of the rest of the world, e.g., African countries, consistently declines as the world becomes more integrated from Case 2 through Case 6.

Sixth, when there is completely free world trade (Case 7), the welfare levels of the member countries of the major FTAs substantially decline although the welfare of the rest of the world, which had previously been left out of any FTA, is dramatically improved by the worldwide free trade. The decline of the welfare of the major countries suggests that the realization of the world free trade is difficult. In fact, the welfare level of the largest economy in the world, the United States, in Case 7 is the lowest among her welfare levels in various FTA configurations. Moreover, the welfare level of the second largest economy, Japan, in Case 7 is lower than her welfare in Case 2 (without any FTA in the world). Namely, major countries in the world may be motivated to oppose worldwide free trade because they would be worse off under this senario than under various configurations of the trading blocs.

Finally, in order to evaluate the welfare change of the world as a whole for various FTA configurations, we calculated the level of world welfare as the weighted average of the welfare levels of all countries. The results are shown in Figure 4. Although the major countries like the United States and Japan are benefited from

various configuration of regional integration, the welfare of the world as a whole consistently declines as the FTA configuration moves from Case 2 through Case 6. This suggests that if some kind of side payments are feasible, world free trade may be realized in spite of the discussion above.

V. Concluding Remarks

By using a simple trade model of product differentiation, we have analyzed the impact of various configurations of regional economic integration on outside countries as well as member countries under the realistic assumptions of constant external tariffs and asymmetric formation of the FTA. In spite of some rigidities in the model, for example the invariance of the production side to tariffs, this model facilitates our understanding of the effect of the regional blocs because the welfare impact is decomposed into several subeffects, each of which has distinct economic implications.

In addition, it has been shown that economic integration may benefit the participating countries but *definitely worsens the welfare of the rest of the world even if the external tariffs of the FTA remain constant* as Article XXIV of the GATT requires. This suggests that the present provision of the GATT (and WTO) is not sufficient. Article XXIV may well be strengthened in order to avoid the situation in which the formation of one regional bloc leads to another bloc, and consequently results in a world economy that is a collection of blocs each with strong protectionism.

According to the simulation to calibrate the model to reflect the regional integration in the real world, we find it natural for smaller Asian countries to have tried

to form a counter bloc, faced with the formation of two big blocs outside, i.e., EU and NAFTA. We also find it natural for the United States to oppose the formation of a bloc that would exclude it and to propose instead a wider union like the APEC that would include it. Further, since the APEC is expected to increase substantially the welfare levels of smaller Asian countries as well as those of large members like the United States and Japan, the APEC can be regarded as a feasible configuration of future regional integration. Further, our simulation result suggests a pessimistic conclusion that world-wide free trade may not be easily achieved because when completely free world trade is realized, the welfare levels of the major players *decline* from those achieved under various configurations of FTAs.

In spite of the addition of various new realities to the model, we are aware that our analysis still depends on many simplifying assumptions, and, therefore, further studies are needed to understand the impact of regional integration more precisely. First, as was done by Krugman, Gros, and Frankel, Stein, and Wei, we have neglected the effect of increasing returns to scale though varying elasticities of demand. Presumably, this effect is strong if the number of countries or provinces is small. While the major conclusion of our paper seems to be intact due to the existence of the large number of countries in the world, further studies are needed. By incorporating the real thrust of increasing returns, we would be able to evaluate the impact of regional integration more comprehensively.[10] Second, the effect of location, distance or could be

[10] However, our preliminary simulation which includes the *real thrust of increasing returns* suggests that the impact of the inclusion is relatively small.

incorporated into our asymmetric model. By doing so, we may be able to understand why regional blocs are formed among countries with geographical proximity and cultural similarity. Third, it would be important also to analyze the effect of regional integration in a traditional model like Heckcsher-Ohlin model, to take account of the differences in factor endowment as pointed out by Srinivasan (1993).

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TABLE 1

SIZE OF COUNTRIES (GDP WEIGHT)

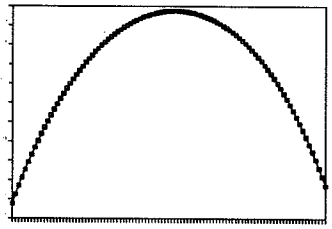
(1990)

	GDP ($BILLION)	NUMBER OF COUNTRIES	AVERAGE GDP ($BILLION)	NUMBER OF PROVINCES	SHARE (%)
EU 15	6,547	15	436	165	29.5
CANADA	567	1	567	14	2.5
USA	5,465	1	5,465	137	24.5
JAPAN	2,940	1	2,940	74	13.2
ASIA LDC	1,591	31	51	40	7.1
OTHER	5,230	88	59	131	23.4
WORLD	22,340	137	163	560	100.0
LDC	4,272	107	40	107	19.1
(MEMO ITEM) COUNTRIES OF SIMILAR SIZE OF AVERAGE LDC GDP					
COLOMBIA		40			
EGYPT		51			
NIGERIA		32			
MALAYSIA		42			
PHILIPPINES		44			
SINGAPORE		35			
PAKISTAN		40			
MYANMAR		23			

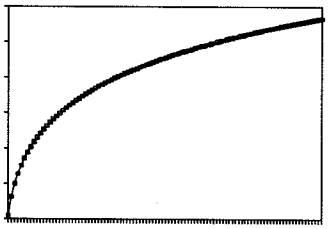
(SOURCE)
GDP: UNCTAD (1992), Handbook of International Trade and Development Statistics.
Number of Provinces: Author's calculation, see main text for details.

FIGURE 1
EXPANSION OF FTA AND WELFARE OF OLD MEMBERS

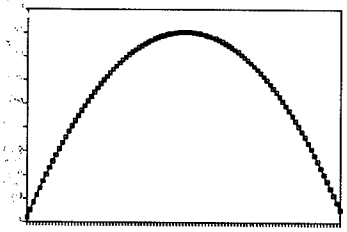
Case 1 (medium β and medium t)



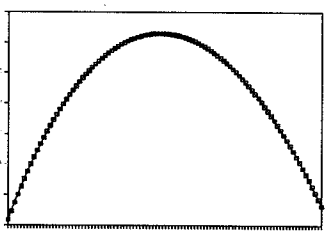
Case 2 (high β and high t)



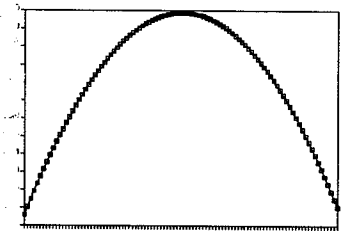
Case 3 (high β and low t)



Case 4 (low β and high t)



Case 5 (low β and low t)

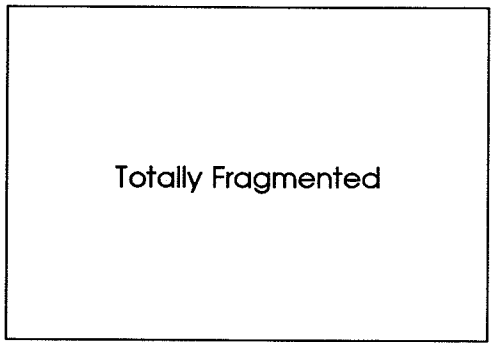


Note: β: high: 0.9 medium: 0.6 low: 0.3
t: high: 100% medium: 20% low: 1%

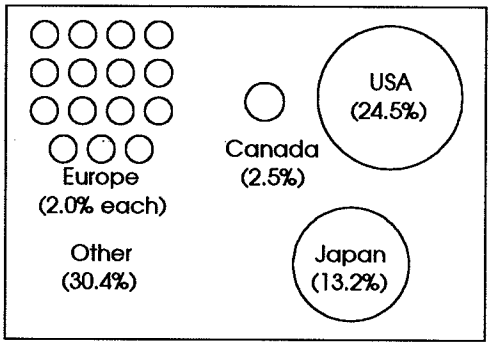
FIGURE 2

VARIOUS FTA CONFIGURATIONS

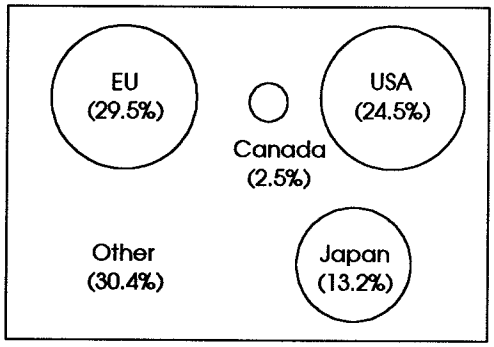
(CASE 1) Totally Fragmented



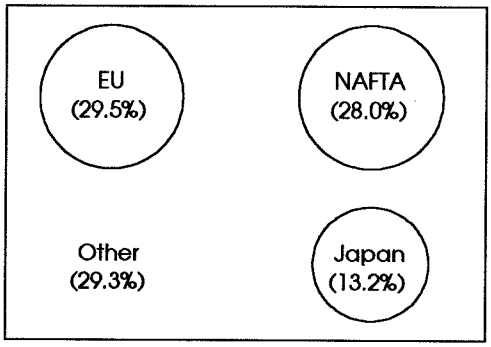
(CASE 2) Before EU



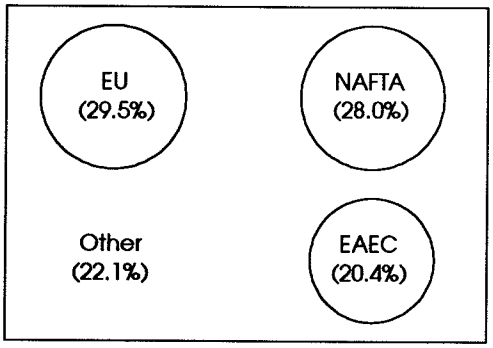
(CASE 3) EU only



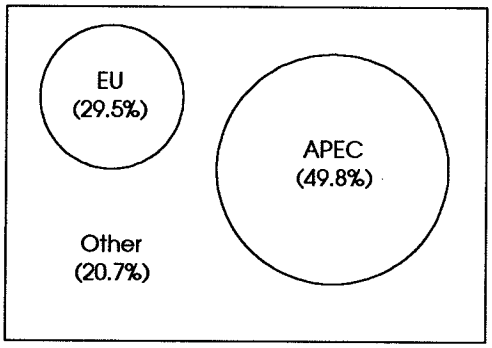
(CASE 4) EU and NAFTA



(CASE 5) EU, NAFTA, EAEC



(CASE 6) EU and APEC



(CASE 7) World Free Trade

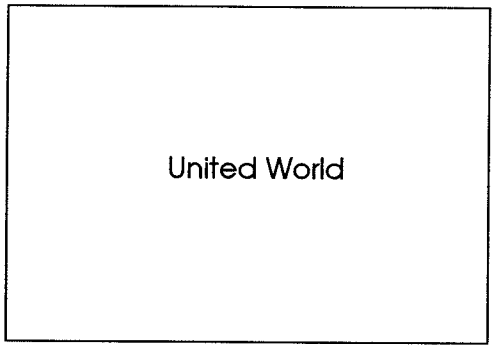
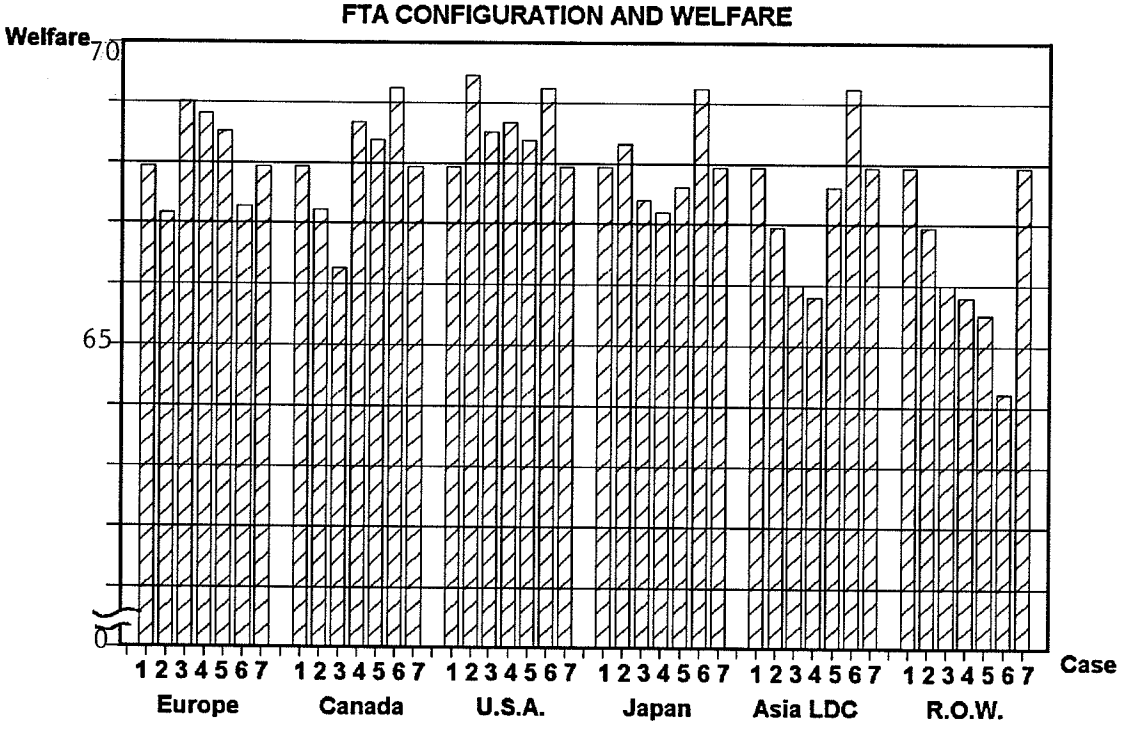


FIGURE 3

FTA CONFIGURATION AND WELFARE



(NOTE)

CASE 1 : Totally Fragmented World (Hypothetical)

CASE 2 : Before EU with Actual Country Size

CASE 3 : EU Only

CASE 4 : EU and NAFTA

CASE 5 : EU, NAFTA, EAEC

CASE 6 : EU and APEC

CASE 7 : World Free Trade

FIGURE 4

CHANGE IN WORLD WELFARE