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Journal of Asian Economics 16 (2005) 443–463
JOURNAL OF ASIAN ECONOMICS

A reversal of ‘‘competitive advantage’’ pattern: Heterogenization versus homogenization

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Accepted 19 April 2005

Abstract

Two dissimilar types of ‘‘competitive advantage (CA)’’ patterns are constructed. D-type is an upward-sloping CA line for labor-abundant developing countries, while A-type is a downward-sloping CA line for capital-abundant advanced countries. A reversal of CA pattern (a switch from D-type to A-type) occurs, depending on whether the capital/labor and wage/rental ratios are smaller or larger than 1. This reversal phenomenon derives from two fundamental Heckscher–Ohlin theorems. This new model is useful to analyze the different patterns of trade between the North and the South and trade within each bloc, patterns that are affected by productivity growth, exchange rate changes, and innovations.

JEL classification: F11; F13

Keywords: Competitive-advantage; Heckscher–Ohlin theorem; Homogenization; Heterogenization; Agreed-specialization

1. Introduction

A factor proportions theory of trade or the so-called Heckscher–Ohlin (H–O) theory has been so well formalized that it is applicable to a wide range of international trade issues. The theory systematically identifies the determinants of Ricardo’s comparative costs (Heckscher, 1919 [1949]; Ohlin, 1933 [1967]). It led to the international factor–price

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1049-0078/$ – see front matter
doi:10.1016/j.asieco.2005.04.006

equalization theorem (Samuelson, 1948, 1949), the ''Leontief Paradox'' (Leontief, 1953), and the theory of tariff-induced income redistribution (Stolper & Samuelson, 1941). Many empirical studies have been so far carried out extensively (for a survey, see Leamer & Levinsohn, 1995).

Now, I would like to add a new analytical dimension to the H–O theory—that is, to introduce what may be called ''a reversal of competitive advantage pattern''.[1] This concept has long been uncovered but it will be useful to analyze the structure of world trade in which the divide between the North and the South exists. In short, this new framework (the Kojima Theorem) points out, that the competitive advantage pattern differs between the South group and the North group—and within each group. In other words, the pattern's reversal occurs at a certain critical value of relative factor price or per capita national income level. And this reversal condition corresponds to two kinds of H–O theorem.

In Section 2, we inquire: (i) the reasons why a reversal of comparative costs of the pattern of occurs within the framework of the H–O theory, (ii) a critical value of the reversal, and (iii) how to draw a competitive advantage (CA) line for low-income developing countries (D-type) and for high-income advanced countries (A-type), respectively.

In Section 3, by using the two types of CA lines, we examine various features of the world trade structure pertaining to the Asia-Pacific region, and propose a number of policy measures. Thus, we reach a brief conclusion in Section 4.

2. Competitive advantage pattern reversal

2.1. New discovery

A few years ago, a thought occurred to me while looking at the conventional unit-isoquant map shown in Fig. 1. *X*, *Y*, and *Z* curves are the isoquants of unit production cost

[1] The comparative costs (or comparative advantages) in the two-country–two-commodity Ricardian barter model means that comparative real (labor) cost ratio in one country (i.e., a_X/a_Y) is compared to that of other country (i.e., a_x^*/a_y^*) as such a formula of ''the ratio of the ratios'' as $(a_x/a_y)/(a_x^*/a_y^*) \gtreqless 1$ (where a is an unit labor requirement), where X and Y being commodities, and no superscript means home country, while a superscript indicates foreign country.

This comparative costs formula is quite useful to show incentives for international trade and gains from ''*relative* competition'' without introducing money costs (or prices). But, if commodity, country and factors of production, respectively, increase its number to more than 2, the comparative costs formula becomes difficult to set. Thus, by introducing money as an accounting unit, the cost (and price) of many commodities, i, be expressed in such a way as P_A, P_B, ..., P_Z, and $P_A^*, P_B^*, \ldots, P_Z^*$, in terms of respective country's currency unit. Then, by introducing an exchange rate, price series in two (or many) countries are expressed with a common denominator, for example, in terms of US dollar. Such process applies also to factor markets (see Ohlin, 1967, Appendix I, pp. 297–304). The modification or modernization of the classical barter model is necessary and makes it possible to analyze an *absolute* price competition in commodity market (and factor market), which is a more realistic approach. In such case, I would like to call ''*competitive* advantages'' instead of ''comparative costs'' (see Porter, 1990).

It should be remembered, however, the shift to absolute price comparison from the comparative approach creates an important issue in trade theory and policy such that the absolute price competition results in a hegemony system by neglecting the importance of relative competition (see Kojima, 2004, chap. 2).

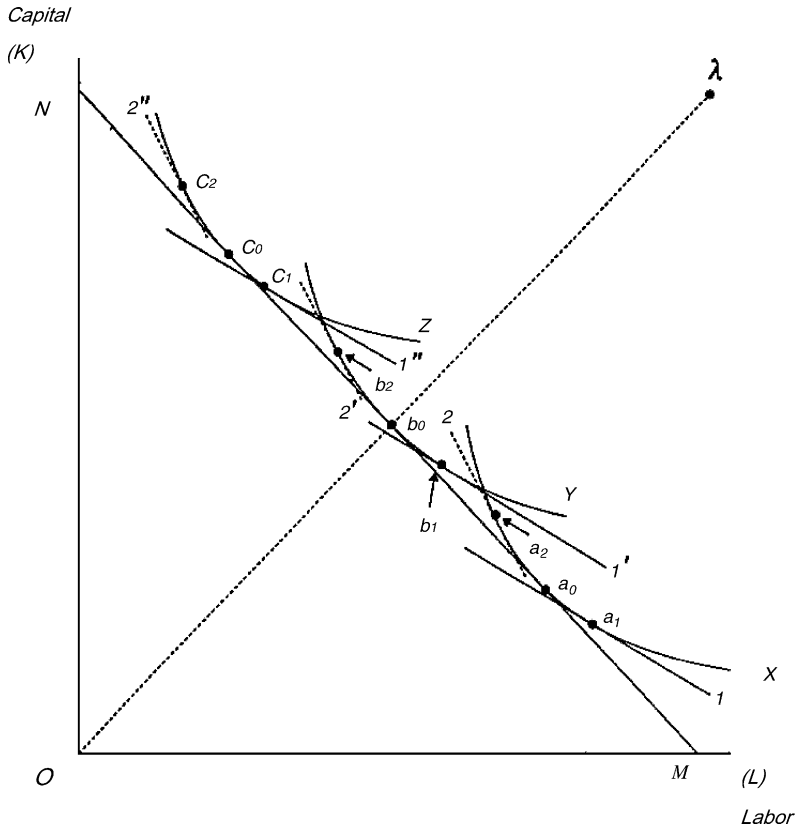

Fig. 1. Isoquants map.

for respective goods. They intersect each other only once, avoiding a factor-intensity reversal. Under any relative factor prices, X-goods always require more labor-intensive (or less capital intensive) inputs than Y-goods, which in turn require more labor-intensive inputs than Z-goods, namely, $K_X/L_X < K_Y/L_Y < K_Z/L_Z$. Point λ shows the total factor endowments of capital ($\bar{K}$) and labor ($\bar{L}$) of this economy (country). This map illustrates an optimum allocation of resources to various industries.

A slope of line *MN* indicates a numerical exchange rate between capital and labor, or *K*/*L*. Its inverse is equivalent to relative price of labor or wage, *W*, to that of capital, or rental *R*. When the line *MN* (-45° line) is given, where $W/R = 1$, *X*-isoquant is tangent to the line at a_0, *Y*-isoquant at b_0, and *Z*-isoquant at c_0. This is a required equilibrium condition for production and resource allocation. Since a_0, b_0, and c_0 lie on the same *MN* line, three goods are produced at the same unit cost or price, i.e., $P_X = P_Y = P_Z = 1$. This is an *iso-cost case*. An equilibrium factor intensity (K_i/L_i) is shown by the slope of Oa_0, Ob_0 and Oc_0, respectively (which are not drawn in Fig. 1).

Now, suppose the relative factor price becomes to be *1*, *1′* and *1″*, which is flatter than the line for $W/R = 1$. In other words, wages become relatively cheaper than capital price.

Points a_1, b_1, and c_1 are determined, respectively, to be new equilibrium production. This brings about $P_X < P_Y < P_Z$, that is, if labor becomes relatively cheaper, the more labor-intensive goods are produced at cheaper costs.

In contrast, if the relative factor price becomes *2*, *2′* and *2″*, steeper than the line for $W/R = 1$. Then, equilibrium production at a_2, b_2, and c_2 results in $P_X > P_Y > P_Z$. Reduction of rental, R, increases W/R to be greater than 1. The cheaper the rental, the more capital-intensive goods will be produced at lower cost.

As shown in Fig. 1, we now can see that the comparative costs (or competitive advantages) pattern is reversed with $W/R < 1$ in one case, and $W/R > 1$ in the other case. This finding is of great importance, though it has so far been overlooked in trade theory.[2]

2.2. Two types of H–O theorem

The ‘‘competitive advantage pattern reversal’’ model is solidly based on the H–O theory.

> ‘‘In brief, commodities containing a large proportion of dear factors are imported, and those containing a large proportion of cheap factors are exported.’’ (Ohlin, 1967, revised ed., p. 19).

This is an overall or integrated version of the factor proportions theory. However, there is a more detailed analysis:

> ‘‘(Region) A will be able to produce cheaply those commodities that require for their production a large quantity of cheap factors, but the other commodities will be relatively dear if produced in that region. In B, where the factors scarce in A are relatively abundant, the cost of production of commodities requiring large quantities of B’s abundant factors will be comparatively low. Other goods will be relatively dear.’’ (Ohlin, ibid., p. 12).

[2] The famous theorem of ‘‘factor intensity reversal’’ deals with a quite different issue from my ‘‘competitive advantage pattern reversal’’, although there is some similarity in geometrical analysis. In Fig. 1, let us draw *X*-isoquant of milder curvature upon *Y*-isoquant, having a common tangency point at b_0. In the right-side area below Ob_0 line, with $W/R < 1$, equilibrium production of X and Y goods gives rise $K_X/L_X < K_Y/L_Y$ and $P_X < P_Y$, that is X-goods are more labor intensive and cheaper than Y-goods. While in the left-side area above Ob_0 line, with $W/R > 1$, $K_X/L_X > K_Y/L_Y$ and $P_X > P_Y$, or X-goods are more capital intensive and dearer than Y-goods. Thus, factor intensity and relative price of goods are reversed in the two cases.

However, the reversal is not proved geometrically, but it is done through an alternative method. In a diagram, taking relative price of labor (W/R) on horizontal axis and capital/labor ratio (K_i/L_i) on vertical axis, let us draw an increasing cost curve for X- and Y-goods. The *X*-curve starts below the *Y*-curve but at a certain W/R, both curves cross each other, and then the former runs above the latter. This means that $K_X/L_X < K_Y/L_Y$ changes to $K_X/L_X > K_Y/L_Y$. According to this, $P_X < P_Y$ turns to be $P_X > P_Y$. These changes may occur not only once but many times (see Johnson, 1958, chap. 1.)

Markusen, Melvin, Kaempher, and Markus (1995) systematically treats almost all aspects of the Heckscher–Ohlin model including the factor intensity reversal case, but does not realize the importance of the competitive advantage pattern reversal.

Let us suppose that for country (instead of region) A, its abundant factor is labor and the wage is low, while for country B, its abundant factor is capital and the rental is low. Then, it is possible to derive, from the above second quotation, two types of H–O theorem:

H–O Theorem I. *Country A will be able to produce cheaply those commodities that require for their production a large quantity of labor, which is abundant and cheap there. More capital-intensive commodities, however, will be relatively dear if produced there.*

H–O Theorem II. *Country B will be able to produce cheaply those commodities that require for their production a large quantity of capital, which is abundant and cheap there. More labor-intensive commodities, however, will be relatively dear if produced there.*

The two theorems are contrasting and dissimilar to each other. The reason of the contrast between the two H–O theorems should be inquired. The key must be the predominant factor, either labor or capital, for determining a pattern of competitive advantage.

P_{ij} denotes price or cost, in terms of each country's currency, of goods i in country j (where i = goods A, B, ..., Z and j = countries A, B, ..., Z).

$$P_{ij} = W_j L_i + R_j K_i \tag{1}$$

where W_j and R_j are, respectively, the rate of wage and rental in country j, and L_i and K_i are labor input and capital input required to produce i-goods. The production function for each commodity is supposed to be identical to all countries.

Since P_{ij} is a unit cost, L_i and K_i must satisfy

$$1 = F_i(L_i, K_i) \tag{2}$$

where F_i is the production function of the ith industry to produce the ith goods, assuming that $F'_i > 0$, $F''_i < 0$, and constant returns to scale.

Let us consider the effect of infinitesimal changes in W_j and R_j, $\mathrm{d}W_j$ and $\mathrm{d}R_j$, on P_{ij}. The unit cost P_{ij} is changed not only directly by changes in W_j and R_j, $\mathrm{d}W_j$ and $\mathrm{d}R_j$, but also indirectly through the changes in L_i and K_i, $\mathrm{d}L_i$ and $\mathrm{d}K_i$, which are caused by changes in W_j and R_j. In view of (1), then,

$$\mathrm{d}P_{ij} = W_j\,\mathrm{d}L_i + R_j\,\mathrm{d}K_i + L_i\,\mathrm{d}W_j + K_i\,\mathrm{d}R_j \tag{3}$$

where $\mathrm{d}P_{ij}$ is the change in the unit-cost of the ith goods caused directly and indirectly by the changes in wage and rental.

Since the labor and capital inputs, L_i and K_i, must satisfy (2), however, we have

$$\left(\frac{\partial F_i}{\partial L_i}\right)\mathrm{d}L_i + \left(\frac{\partial F_i}{\partial K_i}\right)\mathrm{d}K_i = 0 \tag{4}$$

where $(\partial F_i/\partial L_i)$ and $(\partial F_i/\partial K_i)$ are, the marginal product of labor and that of capital, respectively.

Since the marginal product of labor (capital) is equal to wage (rental),

$$\left(\frac{\partial F_i}{\partial L_i}\right) = W_j \qquad \left(\frac{\partial F_i}{\partial K_i}\right) = R_j \tag{5}$$

or

$$\frac{\partial F_i/\partial L_i}{\partial F_i/\partial K_i} = \frac{W_j}{R_j} \quad \text{or} \quad \frac{\partial K_i}{\partial L_i} = \frac{W_j}{R_j} \tag{5′}$$

We have from (3), by substituting (4) and (5),

$$\mathrm{d}P_{ij} = L_i\,\mathrm{d}W_j + K_i\,\mathrm{d}R_j \tag{6}$$

In other words, we can estimate the changes in the unit cost, assuming as if the inputs of labor and capital do not change (see Negishi, 2001, pp. 127–128). Using these production functions, total factors endowed ($\bar{L}$ and $\bar{K}$) are allocated optimally to various productions so as to maintain full employment, or

$$\sum_i L_i = \bar{L}, \quad \sum_i K_i = \bar{K} \tag{7}$$

The production functions are shown by unit-cost isoquants and Eq. (5′) is a necessary condition for equilibrium production, as already mentioned in connection with Fig. 1.

The above model shows a country's equilibrium production (or supply) system based solely upon 'supply-side conditions'. P_{ij} is country j's autarky costs indicating its competitive advantage (CA) pattern. The world prices, P_{iw}, are 1 US dollar for all commodities everywhere throughout the world, representing the world-wide equilibrium price system. When international trade opens up, goods $P_{ij} < P_{iw}$ are exported while goods $P_{ij} > P_{iw}$ are imported both at world price, but goods $P_{ij} = P_{iw}$ are non-traded, which is called marginal CA (MCA) goods. This is how a country's trade is determined by supply-side conditions. However, this may not necessarily bring about an equilibrium trade balance determined by 'demand-side conditions'. In that case, the MCA goods must be adjusted.

In addition, it is found that a reversal of CA pattern occurs from upward sloping (D-type) to downward sloping (A-type), depending on whether wage/rental ratio is smaller or larger than 1.

Now, let us draw Fig. 2. On the horizontal axis, commodity-specific capital intensity, K_i/L_i, is scaled in an order from the lowest to higher ones, or, from the most labor-intensive industry to less labor-intensive (i.e., more capital intensive) ones. In addition, on the same horizontal axis, $w_j = W_j/R_j$, country-specific relative factor prices are scaled. In practice, different W_j/R_j ratios are represented by different per capita income levels in terms of common US dollars. The scale of incomes from the lowest to higher ones corresponds to the order of factor intensity, since $K_i/L_i = 1/(R_j/W_j) = W_j/R_j$.

On the vertical axis, the prices (or costs) of i-goods in country j are scaled in terms of US dollars. The W–W' line shows ''world prices'', at which all commodities are sold and purchased in the world market at 1 US dollar for one physical unit of

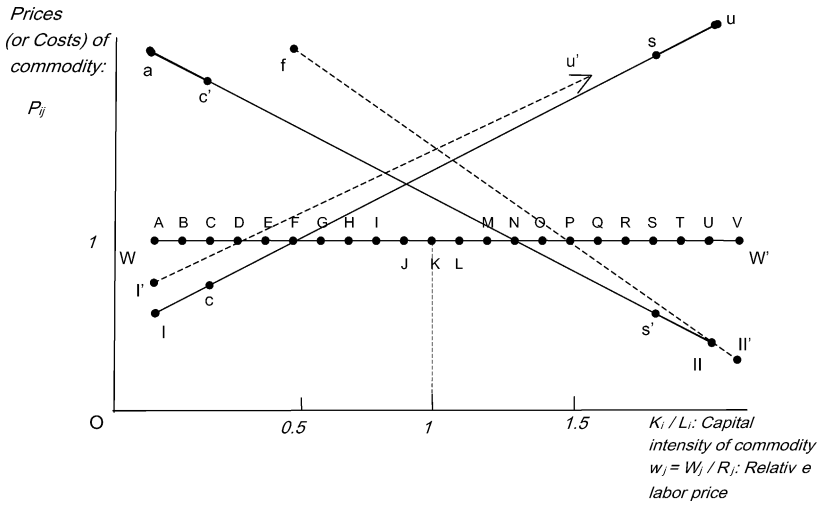

Fig. 2. Competitive advantage line.

commodity. We assume that free competition prevails in the world market, making the 'one price for one commodity' condition everywhere throughout the world, and, at that price, the world demand for and supply of each commodity are equalized.

Let us draw an upward sloping line *I–u*, which shows a CA pattern for country *I*. The line runs through point *F*, which represents an MCA good,[3] where $\partial K_F/\partial L_F = K_F/L_F = W_F/R_F$, producing a unit of such a good at 1 US dollar.

The CA line is upward sloping since P_{ij} is an increasing function of W_j/R_j here. Look at point *c* in the *I–u* line. The cost there, P_C, will be cheaper than MCA, P_F, since while $W_F/R_F = 0.5$ is determined at point *F*, K_C/L_C (=0.3) $< K_F/L_F$ (=0.5).

Next, look at point *s*. The cost there, P_S, will be dearer than P_F, since while W_F/R_F remains at 0.5, K_S/L_S (=1.8) $> K_F/L_F$ (=0.5). Hence a CA line is drawn to be upward sloping. The reason is that a lower wage reduces the cost of more labor-intensive production.

Point *F*, representing MCA goods in Fig. 2 corresponds to point b_1 in Fig. 1, whereas for non-MCA goods, point *c* to point a_1, and point *s* to point c_1. In Fig. 1, W_j/R_j—line is less than unity, and equilibrium production for X-goods at a_1 becomes more labor intensive than for Y-goods (MCA-goods) at b_1, and that for Z-goods at c_1 becomes more capital intensive, that is, $(K_X/L_X) < (K_Y/L_Y) < (K_Z/L_Z)$, (according to the strong factor intensity assumption), resulting in $P_X < P_Y < P_Z$. Here, X and Z are *non-MCA goods*, which satisfy only $\partial K_i/\partial L_i = W_j/R_j$, or tangency condition.

[3] Dornbusch, Fisher, and Samuelson (1977, p. 824) formalize Ricardo's labor cost model for a multi-goods case, and introduce an important concept, "a borderline commodity," which is equivalent to Kojima's "marginal competitive advantage (MCA) good."

For other countries, the CA line is drawn in a similar way (in Fig. 2). For example, if a country's $W_H/R_H = 0.7$, an upward sloping line is drawn through point H, but it becomes flatter than the former case, since $W_F/R_F < W_H/R_H$ in so far as both being less than 1.

This upward sloping CA line satisfies H–O Theorem I. In other words, a country where labor is abundant and wages are relatively low, produces more cheaply the labor-intensive commodities. And let us call this the D-(developing country) type competitive advantage pattern (D-type).

2.3. Iso-cost case

When a country's W_j/R_j equals 1, point K (in Fig. 2), where K_i/L_i also equals 1, represents the MCA good, since its equilibrium cost is unity and the same as the world price. The $W_j/R_j = 1$ prevails inside the country and the cost of all other non-MCA goods production results in unity. The cost of labor-intensive goods will be, for example, at point F, while capital-intensive goods at point S. Then, the competitive advantage pattern of the country becomes a horizontal line coinciding with the world price line, W–W'. This conforms to an iso-cost case in Fig. 1. Point K in Fig. 2 corresponds to point b_0 in Fig. 1, point F to point a_0, and point S to point c_0, respectively, showing that all cost is unity.

Theoretically, the country's trade vis-à-vis the world market will become impossible. When two countries' income levels, $w_j = W_j/R_j$, are the same, having identical horizontal CA lines, no bilateral trade of the iso-cost type occurs. This is a dilemma brought about from homogenization of economies. How to overcome this dilemma is an important issue that will be discussed later.

2.4. Reversal of the CA pattern

Now, point K involves another critical value for ''switching'' of CA line from upward to downward sloping. According to Eq. (6),

$$\mathrm{d}P_{ij} = L_i\,\mathrm{d}W_j + K_i\,\mathrm{d}R_j,$$

P_{ij} increases if W_j increases, while P_{ij} decreases if R_j decreases, both making W_j/R_j to increase along the horizontal axis. The former brings about an upward sloping CA line (D-type), whereas the latter a downward sloping one (A-[advanced country] type). The predominant factor in determining the CA pattern is low wages in D-type, while it is low capital rentals in A-type.

Through point N, a downward a–II line is drawn showing country II's CA pattern (A-type). First, point N is the MCA good, which satisfies the conditions for $\partial K_N/\partial L_N = K_N/L_N = W_N/R_N$, and $P_N = 1$ US dollar. At s', P_S becomes cheaper than P_N, given $W_N/R_N\,(>1)$, since good S is more capital intensive than the MCA good. In contrast, at c', the less-capital-intensive (or more-labor-intensive) good C is produced at a dearer cost. The reason is obvious, a low capital rental makes more capital-intensive goods cheaper. These points s', N, and c' correspond, respectively, to points c_2, b_2 and a_2 in Fig. 1, showing that capital-intensive goods are cheaper than labor-intensive ones, as far as the relative capital price is cheaper than 1.

This results in a downward sloping (A-type) CA line for country II, conforming to the H–O Theorem II.

Point K is the ''switching value'' of the CA line from upward to downward sloping. The criteria for a relative abundance (or scarcity) of factors should naturally be $\bar{K}_j/\bar{L}_j$ (factor endowments) equals 1, and the criteria for cheap (or dear) relative factor prices be $W_j/R_j = 1$. Therefore, the CA line becomes upward sloping (D-type), if $\bar{K}_j/\bar{L}_j = W_j/R_j < 1$. In contrast, if $\bar{K}_j/\bar{L}_j = W_j/R_j > 1$, the CA line becomes downward sloping (A-type). Thus, the switching value is point K, where $W_j/R_j = 1$. In practice, we may suppose the switching value is roughly US $10,000.

Thus, a national economy's upward sloping CA line is drawn like *I–u* (Fig. 2) in its early development stage, but in the second stage, it moves to the right and becomes flatter. In the third stage, the CA line becomes horizontal, and then turns downward sloping in the fourth stage, like *a–II*, which becomes steeper pari passu economic growth.

We can similarly perceive that these sequential shifts in CA line resulted in a divide between low and high-income countries in today's world.

2.5. Accumulation of capital

It is unrealistic to suppose that the switching will take place suddenly at one critical value, like point K, for example, at US $10,000. The switching may start at point F, or US $5,000, at a quasi-advanced country level, and end at point P, or US $15,000, at a matured advanced country level. In other words, the switching takes place gradually and evolutionally.

There is another reason for this gradual switching. A critical value commodity like K is ''non-traded'' since its cost is equal to the world price. The non-traded goods, in practice, consist of a wide range of goods such as F to P, because of the existence of various transaction costs, including transportation costs, tariffs and other barriers to trade.[4]

Historically, any underdeveloped country in the world pursues at economic development (or growth) through accumulation of capital, innovations, foreign direct investment (FDI), absorption of technology and other dynamic inputs. This makes it possible to diversify (or multiplicate) and upgrade industries away from labor-intensive product, to more capital-intensive ones. A developing country's CA pattern eventually changes from D-type to A-type at a certain development stage. Such a process of evolution is explained by Kojima's ''The Flying-Geese Theory of Economic Development'' (see Kojima, 2000 (in English), and 2003, 2004 (in Japanese)).

Nowadays, the world economy consists of low-income developing countries (the South group) and high-income advanced countries (the North group). The structure of world trade must therefore be analyzed within the South group, within the North group and between the South and the North. This is explored in detail in Section 3.

[4] How to treat theoretically these trade impediments is a problem, since they distort the ''one price for one commodity'' principle or the *W–W* 'line in our figures. The *W–W*' may not be a line but a band bounded by a lower limit with transportation and other transaction costs and by a upper limit with import tariffs and other trade barriers. This band varies for pairs of different countries and brings about different ranges of non-traded goods.

For example, because of the divergence from the general price equilibrium regime, Ohlin (1967), projects to establish his trade theory system in the direction of German ''location'' theory and ''gravity model''.

2.6. Marginal competitive advantage good

The concepts of a competitive advantage (CA) line and a marginal (MCA) good play various important roles, as illustrated in the following.

2.6.1. Balance of trade

In *I–u* line (D-type), F is an MCA good and non-traded (Fig. 2). Goods A to E are produced more cheaply than the world price. Those goods have competitive advantages and are exportable. While the potential costs of G to U goods, if produced, are dearer than the world price, and, having competitive disadvantages, are importable. Thus, it is possible to analyze a developing country's (country I's) trade vis-à-vis the world only by looking at commodity-specific differences in costs and prices between *I–u* line and *W–W′* line, without considering a world demand function.

However, an advanced country's (trade partner's) downward-sloping CA line, like *N–a* line, can be compared to the *I–u* line. For example, the developing country's initial offer price is at *c* and the partner's is at *c′*. The exchange reaches an agreement at *C* with its world price. The country I's export volume will be larger, if the larger is the offer price difference between *c* and *c′* is larger because it provides larger profits (that is, trade gains) to both sides. This process is similarly valid for the developing country's importables (partner's exportables) on the right-side of the Fig. 2. In this way, bilateral trade can be investigated.

The MCA good, like F, demarcates the range (number) of exportables and importables. If it moves to the right, the range of exportables (and value of exports) increases, while that of importables (and value of imports) decreases. The value of exports needs to be equal to that of imports (that is, a balance of trade constraint). Therefore, the MCA good should also be adjusted so as to establish a trade balance equilibrium.

A process for getting an agreement of commodity-wise trade is examined further. In Fig. 2, country I's MCA good is F, and goods A–E are produced and some of them are exported, while F-good is non-traded and produced entirely for domestic use. A non-MCA good like C is produced at *c* with the prevailing $W_F/R_F < 1$, which is determined by MCA good, F. An autarky cost at *c* is cheaper than the world price at point *C*. This difference between cost and price yields an extra-profit for a producer/exporter, who is encouraged to increase the volume of export and total production. Since C-good is labor intensive, demand for labor increases, which is relative to capital and wage rises more than rental until new W_c/R_c equals K_c/L_c. Then the cost of this commodity becomes equal to world price. The marginal profit is zero, but the total profit is maximized. In such a case, a worldwide 'one price for one commodity' system will be established.

Furthermore, supply must meet demand,—hence, commodity-wise equilibrium depends upon demand for domestic use and the partner's import demand.

Now, let us consider country I's import. When the MCA-good is F, goods G–U are competitively disadvantaged and importables. Take, for example, commodity *S*. Its cost in autarky is *s*, which is more expensive than its world price. A producer/importer is willing to import by decreasing domestic production in order to earn an extra-profit. Since the commodity *S* is capital intensive (or less labor intensive), the relative demand for capital

decreases and the rental is relatively reduced, making W_S/R_S larger until it equals K_S/L_S. The cost of S-good will then be equal to the world price, while its marginal profit becomes zero, but the total profit is maximized.

Although total production volume is thus reduced, those competitively disadvantaged goods are produced (not abstained) at its world prices. Its domestic use and import are, however, determined by demand conditions.

We do not assume a complete specialization unlike Ricardo's classic model. Full employment of factors is maintained if the expanding sectors absorb all the freed factors from the contracting sectors. In that way, an optimum allocation of resources is achieved.[5]

When equilibrium productions both in exportables and importables occur at world prices, the international trade of country I stops. In order to expand these stationary state trades, some mechanism of adjustments becomes necessary, similar to the case of homogenization of economies.

Therefore, to determine how many commodities are exportable (or importable) is crucial. The key determinants are the marginal competitive advantage (MCA) goods. The larger the range of exportables (the smaller the range of importables), the bigger is the trade-surplus (or net export). To analyze a system of these aggregated variables is a task for macroeconomics of an open economy, and its main focus is how to adjust a trade balance (or balance of payments).

Although a trade balance equilibrium is affected by demand side elements, it is emphasized here that the trade balance must satisfy equilibrium conditions on the production (or supply) side as well.

In such a way, the I–u CA-line becomes horizontal coinciding with the W–W', due to the increase in W_F/R_F (which is smaller than 1) to the world-wide factor price ratio, W_K/R_K, which equals 1. The country's trade will reach a stationary state. (This rise in relative wage is the fruit of gains from trade.) Then, the iso-cost case mentioned earlier, is brought about. Under that situation, both commodity and factor prices will be equalized throughout the world.

The equalization of factor price ratio occurs for the production of traded goods, but not for the non-traded portion of national economic activity. In contrast, MCA production is determined by the national factor productivity, which affects not only traded but also non-traded productions. Such productivity all depends on dynamic elements, particularly an accumulation of capital.

As the national income (wage) rises, the MCA goods shift to the right (e.g., from F to G), along with its CA line. Trade is also an income-expanding activity. The MCA goods are, therefore, determined by the changing (rising) levels of national income (i.e., the rising overall factor ratios, capital/labor, of a country). Therefore, a low-income country has its MCA good, which is labor intensive, like point F in Fig. 2, whereas a high-income country has a capital-intensive MCA good, like point N. Then, different competitive advantage patterns emerge and trade occurs.

[5] How to optimally allocate resources ($\bar{K}$ and $\bar{L}$) is well explained in Figs. 1 and 2. At the MCA production point, corresponding to an increase in $\bar{K}/\bar{L}$and in W/R, the share of products, s_i = Output of i goods/GNP is diversified and upgraded to more capital-intensive industries. This is a goal of economic development and is explained in Kojima's Flying-Geese Theory (see Kojima, 2002).

If the MCA good thus determined does not assure a trade balance equilibrium, various adjustments, including a change of the MCA good, are called for.

2.6.2. Equilibrium exchange rate

At the MCA point, like F, j-country's price of i-goods, P_{ij}, should be equal to the world price, P_{iW} (=1). If the former is accounted by j's currency (say, Yen) and the latter by US dollar, the exchange rate should be P_{ij}/P_{iW} = Yen/US dollar, for example 100 yen per one dollar. This is an equilibrium exchange rate, which should, at the same time, assure an equilibrium trade balance.

At the MCA point, not only the exchange rates but also W_j/R_j or national wages (income levels), which reflect labor productivity, are determined. Both exchange rates and wage levels constitute the key links between national ''value systems''. A national economy is a distinct value system differing from other national economies. The national wage level can be considered as a consolidated index of the ''domestic'' system of factor endowments, technology, allocation of resources to various industries and demands, organization of firms, laws of regulation, government's policies, and other ''infrastructures'' for production, consumption and investment. Through changes in exchange rates, that is, external adjustments, and internal adjustments, such as changes in domestic variables, represented by wage levels, the trade balance (or balance of payments in a wider sense) needs to be maintained.[6]

2.6.3. Rise of wages

Now let us suppose that the nominal wage rate of home country is raised in accordance with the rise in money supply and general price level. The changes in the nominal wage rate and the exchange rates represent monetary factors. The CA line shifts up to I'–u' line, which becomes flatter and slopes upward through point D, for example, since the cost of more labor-intensive production rises as the wage goes up. A new MCA good is settled at D to the left of initial point F. This creates difficulty or dilemma for country I. Because it is a low-wage developing country (D-type), it aims at raising wages and upgrading its industry structure towards more capital-intensive (or less labor intensive) products. But any nominal wage increase moves the MCA good to the left, resulting in a decrease of exports and an increase of imports, and a lower income level than before, when measured in terms of US dollar.

An appreciation of the Yen (e.g., from 100 yen to 80 yen to the dollar) has the same effect as the wage increase. But, the new CA line, I'–u', becomes steeper than the initial I–u line, since the exchange rate appreciation proportionally raises the initial costs.

On the other hand, in country II, a high-income advanced economy (A-type), the rise of nominal wages will shift its CA line up to II'–f, which is steeper than II–a line and runs

[6] Thus, MCA good, exchange rates and wage levels all play important roles. On this point, we depart from Ohlin's view that regards exchange rates merely as the conversion media of currencies in order to establish a general (world wide) equilibrium price system of many commodities. Ohlin brings in an ''absolute competition system'', whereas we keep the comparative costs approach or ''relative competition'' principle. The reason is that, in order to attain a balance of trade, the exchange rate and wages level ought to be simultaneously determined. If it is done so, even an absolutely lower productivity country is able to export its competitive advantage goods, whose value equals that of imports. This is the relative competition principle.

through, for example, point *P*, since higher wages raise all the more the cost of more labor-intensive production. The new MCA good, P, decreases the range of exportables and increases that of importables, resulting in an unfavorable trade balance. This imbalance is easily overcome, however, if the country introduces a new commodity like *V*, which is more capital/knowledge intensive.

2.6.4. Rise in labor productivity

Let us suppose that national labor productivity increases and this is brought about by an improvement in education, social infrastructure and government policies, on one hand, innovational spread of ICT (information/communication technology) in business management, and inflows of foreign direct investment cum technology transfer, on the other hand. An increase in labor productivity yields a reduction of real wages. Therefore, the effect of the increase in national labor productivity is shown by a shift of CA line from I'–u' to *I*–*u*. Then, the MCA good moves to the right from D to F, bringing about an increase in income level (that is a rise of $w_j = W_j/R_j$). Moreover, the range of exportables increases, while that of importables decreases, improving the balance of trade. A depreciation of its currency, for example, from 100 yen to 125 yen per dollar, yields the same effect as an increase in labor productivity. This is the virtuous circle of development, deriving a successful process of catching-up towards more upgraded structure of industry and trade in low-income developing economies.

In contrast, in a high-income advanced country, its CA line shifts down from II'–*f* to *II*–*a*, due to the rise in labor productivity and moves the MCA good to the left from P to N. This results in a lowering of income level, while widening the range of exportable goods. (A depreciation of home currency, for example, from 0.8 dollar to 1 dollar per 100 yen, works in the same way as an increase in labor productivity.)

Therefore, for a high-income advanced country, an introduction of new industries is superior to labor productivity growth, while the latter is critically needed in low-income developing countries.

In short, low-income developing countries can endeavor to catch up with and grow up to high-income advanced economies, while the latter strives to move toward more upgraded capital/knowledge intensive industries.

3. Structure of world trade

3.1. World trade map

In Fig. 3, with the same design as in Fig. 2, we draw the CA lines of *I*–*g*, *II*–*m* and *III*–*q* for, country I (say, Vietnam), II (Thailand) and *III* (Korea), respectively, all of which belong to a low-income developing (D-type) group, and *IV*–*e* for country IV (say, Japan) and *V*–*f* for country V (U.S.A.), both belonging to the high-income advanced (A-type) group.[7] This is an Asia-Pacific trade map, which can be expanded to a wider world trade map if several

[7] The macroeconomic indicators of each economy in the Asia Pacific region are shown in Table 1.

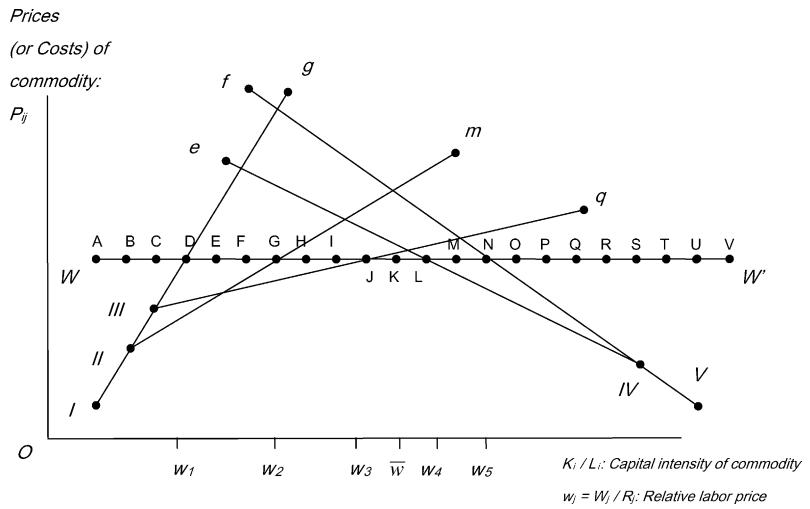

Fig. 3. World trade map.

CA lines for South economies are drawn in the left segment and various ones for North economies in the right segment.

(1) The MCA good and equilibrium income level are determined for each country: D-good and w_1, for country I, G-good and w_2 for country II, and so forth.
(2) The CA line switches from D-type to A-type at K-goods and $\bar{w}$ (say, US $10,000), although in practice the switching occurs gradually within a wider range.
(3) The length, or vector, of the CA line becomes larger according to the size of the economy or factor endowments, $\bar{K}$and $\bar{L}$. The CA line moves to the right in accordance with the rise in national income level, that is, $w_j = W_j/R_j$. At the same time, the CA line becomes flatter for the D-type, but it becomes steeper for the A-type, as explained earlier. Each country aims at moving its CA line toward the right by increasing capital

Table 1
Population, GDP, growth rate of GDP, and per-capita-GDP in 2002

	Population million	GDP current US $ billions	Growth rate of GDP (%)	Per-capita-GDP current US $
Vietnam	79.7	35	7.04	440
Indonesia	211.7	141	4.12	817
Philippines	81.8	78	4.43	953
China	1,285	1,266	8.00	986
Thailand	63.4	127	2.25	2,001
Malaysia	24.5	95	4.12	3,870
Korea	47.6	477	6.30	10,006
Taiwan	22.5	282	3.59	12,558
Hong Kong	6.8	162	2.26	23,802
Singapore	3.4	87	2.25	25,744
Japan	127.4	3,973	−0.35	31,171
U.S.A.	288.6	10,480	3.3	36,313

Source: ICSEAD (2004). *East Asian Economic Perspectives, 15*(1).

accumulation in order to raise the national income level and to upgrade the industry/trade product mix.

(4) A rightward movement of the CA lines is motivated by and corresponds to an upgrading in the demand pattern. National consumption patterns diversify and shift, in accordance with a rise in national income level, from foods to housing, clothing and leisure, and from coarse goods to sophisticated ones. Intermediate inputs become more sophisticated and require more capital/knowledge intensive production. Then, country V, the most advanced economy, for example, does not demand low-end goods, such as A∼E, but innovates high-end goods, such as T and U (see Fig. 3).

(5) Now, how does the Chinese economy fit in the map? It seems better to treat China as if its economy consisted of three big districts which have different CA lines such as *I–g*, *II–m* and *III–q*. There is a big difference in wages (or income levels)[8] between the three districts, with different competitive advantages. They not only trade domestically with each other, but China as a whole also can export simultaneously low-end products as well as middle and high end manufactures.

(6) Hong Kong and Singapore in East Asia, for example, are the outliers on our world trade map, since each economy is too small, with less than 10 million people to follow ordinary Flying-Geese development. Rather, they play an important role as an international center of business and finance.

Now, each country, either D-type or A-type, exports its competitive advantage goods to the world market in so far as its cost is cheaper than world prices, and can import an equal value of disadvantage goods from the world market so long as its potential cost is dearer than world prices. This leads to multilateral trade of each country vis-à-vis the world. Such multilateral trade, both in exporting and importing, becomes highly competitive, instead of complementary, among countries that belong to the same group, either D-type or A-type.

What will happen, then, in bilateral trade?

3.2. Bilateral trade

In addition to world trade for a country, we can investigate various patterns of bilateral trade by using our Fig. 3, which demonstrates the analytical usefulness of the above model.

We can consider: (i) bilateral trade within the South group, which consists of D-type economies, I, II and III, (ii) bilateral trade within the North group, which consists of A-type economies, IV and V, and (iii) bilateral trade between the North and the South countries. When economy I grows and successfully catches up with economy II, its CA line *I–g* becomes similar to *II–m*, and the latter, in turn, becomes similar *III–q*. This is called

[8] We may suppose that *I–g* line for underdeveloped Western district in China, *II–m* line for Shenzhen and other export process districts and *III–q* line for Shanghai and Beijing high-tech cluster. Although China's average nominal per capita income is about US $1,000, in 2000, it is very low in Western district (perhaps less than US $400) and it is as high as US $4,500 in Shanghai.

''homogenization'', creating a similar structure of industry and trade (see Akamatsu, 1961). Bilateral trade among homogenized economies leads to competitive relations and conflict.[9]

In Fig. 3, *I–g*, *II–m*, and *III–q* lines are drawn as upward-sloping, since they belong to a homogeneous D-type group. In country I, goods A∼C are exportables, D is the MCA good and non-traded, while E∼G are importables. Whereas in country II, goods B∼F are exportables, G is the MCA good and non-traded, while H∼M are importables. Now, in bilateral relations between countries I and II, both are *competitive* in exporting A∼D goods to the world market, and there is no import-demand of country II for country I's exportables. For goods E∼G, which are exportables of country II (and III), there exists import-demand from country I. Bilateral trade, therefore, is complementary only in these goods.[10] Similarly, we can examine bilateral trade between II and III (and between I and III). In this case, bilateral trade between two countries within the South group is almost *competitive*, while the complementary range is limited. This is brought about by the homogenized industry/trade structure in each country, with similar upward sloping CA lines.

Competitive bilateral trade creates difficulties and a lot of trade conflicts. How to overcome the trouble and how to expand bilateral trade within the South group are the critical problems that need to be resolved.

Over the time, a late-comer catches up with earlier developing economies by moving its CA line to the right. This intensifies the homogeneity and economic development of the South group. Although this homogenization creates some difficulty, economic development is what is needed for the South group. Such simultaneous development of the region (say, East Asia) as a whole enlarges its capacity to trade with the rest of the world market, especially with the North.

Since the world demand curve is unknown, but North's CA lines are known in Fig. 3, let us focus on North-South bilateral trade. When the *I–g* line moves to *II–m*, and then to *III–q*, the South's exportables increase from goods A∼D to A∼J (including non-traded), and its importables increase from goods E∼G to E∼Q. This shows diversification/upgrading in trade capacity. Since the CA line of the North (i.e., *IV–e* and *V–f*) is downward sloping, opposite to the South's, the South's exportables (E∼I goods) have an import demand schedule of the North, while the South's importables (M∼Q goods) have an export supply schedule of the North. In other words, bilateral trade between the South and the North is always *complementary*. Goods J, K and L are non-traded. A rightward movement and

[9] Leamer (1984) conducts an extensive research to identify the determinants of comparative costs (better to say, competitive advantages) within a factor endowments framework *à la* Heckscher–Ohlin, and a comprehensive survey on empirical studies in related fields.

It seems to me that Leamer is suggesting at least two different theories, one being a factor endowments theory for trade between heterogeneous economies (that is, North–South trade) and the other an increasing-returns-to-scale theory for trade among high-income advanced economies (that is North-North trade; see Leamer, 1993, p. 439). Recently, many empirical studies have been made with the use of the ''gravity equation'' model (e.g., Debaere, 2003; Evenett & Keller, 2002; Schott, 2003, 2004). And all these studies found supportive evidence for Leamer's suggestions.

[10] Country I cannot export any good to country II and III, but imports E∼G goods from them: therefore, its trade balance is in deficit in this bilateral trade. It is inevitable. Country I, however, should attain overall equilibrium in trade vis-à-vis the world.

extension of the North's CA line leads to *heterogenization* between the South and the North, and enlarges their trading frontiers.[11]

Bilateral trade among the North group is almost competitive and conflictive. If some economy in the South, say, country III (Korea), successfully joins the high-income advanced country type, homogenization in the North intensifies and the difficulty increases. Therefore, how to overcome the difficulty becomes a serious issue within the North group.

In fact, during the 1980s and the 1990s, Korea turned from *III–q* line of D-type to *III–e* line of A-type, whereas Japan had done exactly the same 20 years earlier. During the switching period, Korea's MCA good moved from J to K and then to L in accordance with increases in national income from w_3 to $\bar{w}$ and then to w_4. The costs of goods J, K and L are all unity and exactly the same as the world prices and as those in Japan. Consequently, these goods are non-traded. However, when Korea's labor endowment ratio is larger and its income level is lower than Japan's, Korea produces a relatively large volume of labor-intensive goods, while Japan has a relatively large volume of capital-intensive ones, even though the costs are identical in both countries. This difference in the relative volumes produced is the result of bilateral trade between Korea and Japan, trade that is determined by their different demand conditions. The extent of such bilateral trade, however, will be very limited, and furthermore, trade disputes (such as dumping charges and patent infringement lawsuits) may entail, since the cost competitiveness is equal—hence, more competition via non-price factors. The difficulty ought to be resolved by promoting agreed-specialization-cum-intraindustry trade, thereby promoting not only trade between the two countries but also their trade with the rest of the world.

3.3. Promoting agreed specialization-cum-intraindustry trade

Historically, European nations were, more or less, similar agriculture economies up to the mid-18th century. These homogeneous economies turned into a heterogenized group by the emergence of the Pax Britannica (1820–1914) built on the industrial revolution, new settlements in America, Australia and New Zealand, and the gold standard. Through catching-up industrialization in France, German, U.S.A., Russia and Japan, however, the world economy became gradually homogenized again. And in the inter-War period (1920–1940), conflictive competition among the big powers brought about a number of serious world crises (such as the great depression (1929–1932), tariff wars, competitive exchange devaluations), and resulted in the World War II, which was a disastrous outcome indeed. World leaders and economists could not find a solution to overcome these difficulties brought about by the homogenization in the world economy.

The United States built the Pax Americana (1945–1971), which initially started out with a re-heterogenized world led by the hegemonic power (military, political, as well as economic) and followed by the war-devastated countries. It created the golden age of world economic development, in which liberalization of international trade was promoted and foreign direct investment surged.

[11] Entry of new developing country, like India, to East Asian group will also enlarge their trading frontiers.

After the breakdown of Bretton Woods system in 1971, however, the world economy became unstable and stagnant because of re-homogenization due to the recovery of Europe and Japan, and the emergence of newly developing economies. Unfortunately, the re-homogenization has been accompanied by the difficulties of conflictive competition. We should not repeat the great folly of the 1930s.

Is there any way to avoid a possible disaster and to open new frontiers for world trade expansion? I would like to propose that we should promote what may be called ''agreed specialization-cum-intra-industry trade (IIT)''. ''Agreed specialization'' means, in brief,[12] the following.

Let us suppose that country I's A-firm produces initially both *X*- and *Y*-varieties of a commodity with a mode of production, which attains limited economies of scale, and country II's B-firm does the same. Now, the two firms reach an agreement such that firm A specializes in producing a variety *Y* with a larger scale for satisfying a total demand of the two countries combined, while firm B does the same to produce *X*-variety. Then, each firm can expand a scale of specialized production, shifting to a superior mode of production, which yields greater economies of scale and a reduction of costs (and prices).

Such an ''agreement'' or ''concord'' in the spirit that ''you may specialize in *X*-variety, then I shall do so in *Y*-variety'' is necessary. The reason is that a difference in comparative costs (or competitive advantages) is created only after the division of labor has taken place due to increasing returns to scale. The agreement implies a reciprocal offer of demand or market, which makes possible a larger scale production on each side.

Agreed specialization may be implemented by MNCs (multi-national corporations) through their foreign direct investments.

(1) Mutual sales of differentiated or brand goods are, in one sense, one type of agreed specialization cum IIT (intra-industry trade), which satisfies people's ''love of variety'' and enhances their welfare. It may also be achieved through OEM (original equipment manufacturing) contracts.
(2) Out (or offshore)-sourcing of parts or assembling operation based on agreed specialization also results in IITs. This depends upon MNCs' internalization policy. The MNC locates its specialized production unit of labor-intensive production in low wage places while retaining capital/knowledge intensive process at home, thus building an efficient production network across a number of countries.

Regional integration, such as EU, facilitates greatly the operation of agreed specialization-cum-IIT. A liberalization of regional trade (or a tariff reduction in particular) means mutual opening of market, which enhances reciprocal exchanges of intermediate goods. Facilitating foreign direct investment and business travels will promote agreed specialization as well as IIT.

[12] The concept of ''agreed specialization'' is originally addressed in my 1970 paper, and developed further in my 1987 and 1992 papers.

In fact, EU has successfully achieved rapid growth through the promotion of agreed specialization-cum-IIT.[13] The American hemisphere is trying the same via NAFTA. The East Asian region (ASEAN + Japan, China and Korea) has to follow suit.

To sum up, promoting agreed specialization/IIT is the best measure to overcome the homogenization dilemma, and to achieve a higher degree of heterogenization for further development of the world economy. Moreover, if two economies deepen their mutual interdependence through agreed specialization/IIT, both cannot separate from each other anymore, and therefore, are not likely to wage war. Thus, our agreed specialization principle should play a crucial role in promoting economic development and peace throughout the world.

The target of agreed specialization should be a variety of a given commodity, which can be produced in two economies simultaneously without a large difference in costs (as mentioned earlier in connection with Fig. 3). Even a variety may cause trade disputes; for example, American imports from Japan of specialized steel, China's exports to Japan of some agricultural products, or Korean exports to Japan of new DRAMs in the recent past. Under the WTO rule, importers often levy tariffs and exporters retaliate. This is not the right solution, since it invites trade war. Instead, our agreed specialization principle should be applied so that one partner could increase its export of a given variety and the other partner could increase its export of a different variety reciprocally. A pilot case of agreed specialization emerged when on the occasion of Former President Bush Senior's visit to Tokyo in January 1992, a large purchase of automobile parts and components was promoted by Japanese firms, while American firms reciprocated such a purchase. There remains a big room to expand such agreed specialization cum IIT within the South group, within the North group and between the North and the South.

4. Conclusion

We have conceived the two dissimilar patterns of *competitive* advantages (which are better terminology than *comparative* costs in multi-country/multi-commodity model). In the D-type, the labor-intensive-commodities are produced at cheaper costs when the relative price of labor (the wage, W) is lower, and the competitive advantage (CA) line becomes upward sloping. In contrast, in the type A, capital-intensive-commodities are produced at cheaper costs when the relative price of capital (rental, R) is lower, and the CA line becomes downward sloping. The switching occurs, depending on whether factor intensity, K_i/L_i and relative factor prices, W_j/R_j are smaller than 1 (D type) or greater than 1 (A type). In practice, the switching value may be US $10,000 of national income level.

Thus, the reversal of CA patterns occurs, and the two types of the CA pattern correspond to the two Heckscher–Ohlin theorems. If P_{ij}, the price (or cost) of country j's commodity i, is cheaper than the world price (which is taken to be 1), commodity i has a competitive advantage and is exportable, while if P_{ij} is dearer than the world price, it has a competitive disadvantage and is importable.

[13] A rapid development of intra-industry trade is examined by Fontagnè and Freudenberg (2002) for the original European Union (EU), and by Ishida (2003) for Japan.

The MCA (marginal competitive advantage) good determines the ranges of exportables and importables and even the equilibrium exchange rate. A rise in W_j/R_j due to the accumulation of capital induces country j to shift its MCA good to a more capital-intensive industry (i.e., a higher K_i/L_i product). This is the very essence of economic development to diversify and upgrade the product/trade structure toward a more capital-intensive product mix.

We can draw a world trade map, putting a number of the D-type CA lines for low income developing countries (or the South group) and the A-type CA lines for high-income advanced countries (or the North group). Bilateral trade among homogeneous economies, either within the South or within the North, encounters the difficulty of conflictive competition. Only North-South trade is complementary, but it will also become competitive when the South catches up.

How to overcome the difficulty that homogenization brings about is a crucially important issue for the world. Promoting agreed specialization-cum-intraindustry trade must be one of the best solutions.

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