Japanese Direct Foreign Investment in Developing Countries: An Analysis and Extension of the Kojima Hypothesis*

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Introduction

During the 1960's the major thrust of research on direct foreign investment (hereafter DFI) was directed at probing the theoretical and empirical link of DFI to the study of market imperfections *vis-a-vis* industrial organization (Calvet, 1981).[1] In the 1970's DFI research spearheaded by Johnson (1970), was shifted to a global discussion of the effects of DFI on foreign investment within the context of welfare efficiency. While the international welfare criteria in the study of DFI raised many intriguing questions, the prevalence of market imperfections in the real world confounded researchers in developing analytical models which would reasonably satisfy the Pareto efficiency criteria. Welfare analysis has become more or less a collateral issue in the study of DFI, and the emphasis currently is on the behavior of the institution making DFI within the theory of a multinational enterprise. This shift in the emphasis has given rise to the global theory of the multinational firm, and in a curious way, the analytical emphasis has come back full circle to the theory of firm and the market imperfection paradigms.

Drawing on the Japanese experience with DFI in the 1960's, Kojima (1973, 1977) has advanced an intriguing but controversial theory regarding the two dichotomous DFI models: the Japanese model, which he labeled as "trade-oriented" DFI, and the American model, which he characterized as being "anti-trade-oriented" DFI. According to him, Japanese DFI, which takes advantage of the host country's comparative advantage of factor-

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1. A good synthesis of DFI theories and the theories of multinational firm is found in Calvet (1981). Dunning (1979) provides a recent survey on DFI.

endownment, will not only facilitate the structure adjustment of both countries but also promote trade between developed and developing nations as the capital-labor ratios of the developing countries move closer to those of industrialized countries.

Experiences have shown that, in general, U. S. DFI is dominated by large oligopolistic firms in technology-intensive industries or in consumer goods industries with product differentiation. Most of American DFI in manufacturing was made in developed countries and in the form of wholly owned subsidaries. In the early 1970's, over 80 percent of American DFI in manufacturing was in Europe and Canada with the balance scattered around in developing countries (Yoshino, 1976, p. 61).

In contrast, most Japanese DFI in manufacturing in the mid 1970's was in Asia in industries whose technologies involved were defused and which had little barriers against entry. Approximately 75 percent of the total value of Japanese DFI in manufacturing was made in developing countries and more importantly, 42 percent of the number of Japanese DFI was undertaken by small and medium-sized firms whose products were fairly well standardized. Significantly, "the more competitive the industry is, the greater the incidence of Japanese DFI in manufacturing in developing Asian countries: textile, electrical appliances, and sundries account for 63.5 percent of Japanese manufacturing investment in Asia." The Japanese tend to invest as a group, which includes trading companies, and are more dependent on outside funding, including equity investment from local investors (Ozawa, 1979, pp. 74-75).[2]

According to Kojima, Japanese DFI in manufacturing is concentrated in industries in which she was losing her comparative advantages which the developing host countries were gaining. Thus, he argues that the Japanese DFI model promotes "structural adjustment in Japan and opens wider markets for products from the developing countries." As to the American model, Kojima points to the concentration of U. S. DFI in industries which rank at the top of her technological innovation and in oligopolistic industries. He concludes that such DFI is generally not condusive to transfer technology suitable to the local factor proportion of developing countries (Kojima, 1977, pp. 78-80).

Arndt (1974) and Roemer (1976) have since challenged the Kojima theory in general and particularly his characterizations regarding "the sagacity"

2. The typical distribution of equity ownership can be seen from the example of Japanese DFI in the textile industry: 20 to 30 percent of the ownership by fiber manufacturers, 15 to 25 percent by trading companies, 5 to 10 percent by a Keiretsu firm, and 35 to 60 percent by local joint venture investors. A Keiretsu is middleman who obtains raw materials from large manufacturers and credit from trading companies for small manufacturers (Yoshino, 1976, p. 70).

of Japanese DFI and "evilistic" American DFI. Lee (1979) has found inferential evidence in U.S. and Japanese DFI in Korea that partially corroborated the Kojima hypothesis, while Yoo (1981) has uncovered statistical evidence in U.S. DFI in Korea that diverged from Kojima's contention regarding the American DFI model. Taguchi (1982, pp. 45-49) cited results of a survey on Japanese DFI in Indonesia which were also incongruous with the Kojima thesis on the Japanese DFI model.

This paper will not attempt to reopen the argument or discussions which have been already elucidated in the aforementioned studies. Instead it will focus on Kojima's pioneering efforts in enunciating the new approach to DFI with a view toward expanding the analytical horizons of his model. More specifically, the primary purposes of this paper are to show that:

a. Aside from Kojima's somewhat rigid and perhaps exaggerated taxonomy of the two models, his theory can be generalized for further observation and empirical testing to see if it can be applied to newly industrialized countries which follow Japan's lead.
b. An alternative model with a different approach can be developed, and this alternative model will yield theoretical results strikingly consistent with the original Kojima hypothesis.

The first two sections deal with the basic theoretical underpinning of the Kojima hypothesis and model. After reviewing his "correspondence principle between comparative cost and comparative profit," we move to the formulation of a new multinational investment model that is designed to be not only compatible with the Kojima model, but also more powerful. The next three sections elaborate on the analytical properties of the new model. The last section briefly discusses policy implications of certain corollary propositions of the Kojima theory relevant to DFI by firms from newly industrialized countries which may follow Japan's lead.

1. Foreign Direct Investment under Long Run Competitive Equilibrium

Kojima's theoretical elaboration is essentially a synthesis and integration of at least four well known theoretical models — the Heckscher-Ohlin model, the Rybczyinski theorem, Linder's hypothesis, and the Akamatsu-Vernon product cycle proposition, which is the cross-pollination of Akamatsu's "flying-geese-pattern"[3] postulate and Vernon's product cycle hypothesis.

3. The so called "flying geese pattern" of industrial development, which was developed by the late Kaname Akamatsu before World War II, refers to the "flying-geese-pattern" of the lead and follow relationship observed among different industries. Akamatsu's model describes the process of economic development in three consecutive phases: (a) import of products and industries from advanced coun-

Thus the Kojima model of DFI draws its comparative statics analysis from a factor endowment based theory on one hand and its dynamic dimension from the product cycle hypothesis on the other. It should be pointed out, however, that he has integrated these diverse and otherwise incompatible models in such a way that he was able to deduce a hypothesis alternative to the monopoly theory of DFI.

Largely based on American experience it is generally accepted that DFI takes place in foreign countries in response to certain market imperfections which enable multinational corporations with firm-specific attributes to earn some excess economic profits. The only question is whether the imperfections are transitory or pervasive. Another way of phrasing this question is: Do we have a competitive market equilibrium or monopolistic (oligopolistic) barriers to entry? If the answer is the latter, excess profits do exist which may be exploited by a multinational firm for a considerable period of time.

According to the basic tenet of Kojima's theory, the market imperfections and monopoly profits are not the necessary conditions for DFI. (As will be discussed in Section 6, he assumes average cost pricing by multinational firms in the host country.) The trade-oriented DFI "should follow the direction indicated by comparative investment profitabilities which in turn are a reflection of comparative advantage under competition. Thus DFI are not only complementary with trade but also an accelerator in reorganizing trade patterns in the direction of dynamic comparative advantage" (Kojima, 1977, p. 96).

Kojima regards DFI as an international capital movement in a Fisher-Johnson context — namely he considers DFI as the transmission to the recipient country of a package of capital, managerial skill, and technical knowledge. In other words he envisages DFI as a means to transfer "superior production functions which replace inferior ones in the host country" (Kojima, 1977, p. 109).

Kojima's basic thesis that DFI complements trade between an investing country and an investment receiving country is of a significance to the factor-endownment based trade theory. First, his thesis offers an alternative hypothesis to Mundell's substitution theorem regarding trade and factor movement: Mundell (1957) had demonstrated that when trade impediments such as prohibitive tariffs or quotas exist, a factor moves from a country where that factor is abundant to another country where the same factor is

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tries, (b) growth of domestic production due to increased demand, and (c) export of products and industries due to reduced production costs accompanied by mass production and mass merchandizing. Shinohara (1982, p. 12) integrated the model with Vernon's product cycle hypothesis and called the combined models the Akamatsu-Vernon cycle. See Giddy (1978) for his criticism of the product cycle theory.

less abundant and that the factor movement is a substitution for trade between the two countries. Kojima showed his complement theory in terms of the Rybczynski line that has opposite direction to the one employed by Mundell (Ozawa, 1979).

Secondly, Kojima's complement theory reconciles the contradiction in theoretical trade patterns that are deduced from the Heckscher-Ohlin theory and Linder's hypothesis. While the Heckscher-Ohlin theory yields the conclusion that the trade volume will be greatest between countries with dissimilar capital-labor output ratios, Linder's hypothesis (Linder, 1961) leads to the opposite conclusion; namely, a greater trade volume between countries with similar capital-labor ratios.

Kojima (1977, Ch. 2), like many other students of trade, was cognizant of the growing share of intra-industry trade volume in the world trade amongst industrialized countries. His so called "trade oriented" DFI was his visualization of growing intra-manufacturing trade between developed and developing countries as the capital-labor output ratios of developing countries move closer to those of industrialized countries. In this sense, the analytical exposition of his DFI models in their entirety is a dynamic theory of comparative advantage based on the importance of scale economies, technological change, and product differentiation,[4] all of which are assumed interact to produce a predictable pattern described in the product cycle hypothesis.

2. A Simplified Kojima Model: Correspondence Principle

The focal point of Kojima's proposition regarding what he termed trade-oriented DFI is based on what he called "the correspondence principle between comparative costs and comparative profit" (Kojima, 1977, p. 98). Without losing its essentiality, the principle can be summerized as follows:

Denoting P as price, η the average unit profits, θ the profit margin on total sales, and subscripts x and y meaning goods X and Y for the variables for the home and foreign countries before trade as

$$(1.1)\quad (P_x/P_y) = (\eta_x/\eta_y)\ (\theta_y/\theta_x)$$

$$(1.2)\quad (P_x^*/P_y^*) = (\eta_x^*/\eta_y^*)\ (\theta_y^*/\theta_x^*)$$

where * represents variables for foreign country.

4. See Grubel and Lloyd (1975, p. 14). Grubel and Lloyd (Ch. 2) support in part Kojima's complement thesis in intra-industry trade. A formal intra-industry complement theorem in the context of a factor-endownment model is found in Ethier (1982), while the similar theorem in the context of monoplistic competition is shown in Lancaster (1980). Both Ethier and Lancaster showed that intra-industry trade is basically complementary to international factor mobility.

When $(P_x/P_y) > (P_x^*/P_y^*)$, the relationship in eqs. (1.1) and (1.2) become

$$(1.3)\quad (\eta_x/\eta_y)\,(\theta_y/\theta_x) > (\eta_x^*/\eta_y^*)\,(\theta_y^*/\theta_x^*).$$

When it is assumed that $(\eta_x/\eta_y) = (\eta_x^*/\eta_y^*)$, we have

$$(1.4)\quad (\theta_x/\theta_y) < (\theta_x^*/\theta_y^*).$$

In the Kojima paradigm, "comparative costs such as $(P_x/P_y) > (P_x^*/P_y^*)$ correspond to the comparative profit ratios on total sales such as $(\theta_x/\theta_y) < (\theta_x^*/\theta_y^*)$, "which means that a country's profit rate on total sales is relatively higher in an industry in which it has comparative advantage" (p. 98). Thus DFI "should follow the direction indicated by comparative investment profitabilities which in turn are a reflection of comparative advantage under competitive conditions" (p. 96). This kind of DFI is what Kojima termed trade-oriented DFI, which not only complements international trade but also facilitates the development of new trade patterns in the direction of changing comparative advantage in a dynamic world setting (p. 97).

3. A Multinational Investment Model

a. Orientation to the Model

Batra and Ramachandran (1980, hereinafter B-R) have developed a multinational investment model within the framework of a general equilibrium. The model is specifically designed to evaluate the implications of taxes and tariffs for resource allocation and international capital movement in a comparative static setting. It is essentially a two-sector and two-factor analysis, even though it has the specification of a third factor labeled as "X-efficiency."[5] B-R treated the factor as a "state-variable," which can take a form of an index so that its marginal product is zero (p. 279). Consequently in the B-R model, the third factor is not functionally defined as a shift parameter of the production functions.

In our model presented below, the specification of B-R's X-efficiency factor is modified so that the factor input includes not only the multinational firm's cumulative expenditures on its development of patent, technology, management, and marketing expertise but also other expenses related to the implementation of DFI including tutorial costs of the firm's local personnel. This new specification is compatible with the two conceptual variables, M and T, in Kojima's production function (Kojima 1977, p. 93). In our model, this factor is called "technology and resource" — "T-R" factor for short. It is assumed that T-R may be empirically measured, its marginal product is positive, and it can be specified as a shift parameter in a production

5. See Shen (1984) for alternative measures of X-inefficiency.

function.

Although these assumptions regarding the T-R varable is not novel in a theoretical analysis, the variable may pose difficulty in the empirical evaluation of our model. However, the measurement and collection of data for the variable in usuable quality are by no means insurmountable tasks for insiders of a multinational firm for their internal uses. It should be pointed out that these assumptions actually enhance the versatility of the model when it is applied to evaluate DFI made by a multinational company from a newly industrialized country, such as Korea. The reasons are: (a) the technology content of DFI by a newly developed country is most likely relatively low, (b) the cumulative expenditures on the T-R factor may be identified and quantified with relative ease by corporate insiders for their internal use, and (c) multinational firms from a newly industrialized country may have to pay other firms fees and royalties for the T-R variable the firm may use in its DFI.

It should be also pointed out that the B-R model is based on the assumption that the multinational company possesses oligopolistic control over its use of X-efficiency factor in a foreign country, and the firm is able to reap excess economic profit from a DFI it makes. In our model this assumption is relaxed so that the degree of excess profit ranging from zero to some positive value can be determined and controlled by pricing policies of the firm.

With these modifications, our model enables us to examine and expand the analytical attributes of the original Kojima model in such a manner that theoretical and empirical implications of the Kojima hypothesis in general and those of his conceptual variable relating to the T-R factor in particular can be illuminated.

It is assumed, as in the B-R model (p. 279), that: (a) there are two countries, a home country and a foreign country where the home country's multinational enterprise has a direct investment, and two sectors, one in which the multinational firm competes; (b) Labor is the only non-specific factor, and capital is specific to both sectors; the production function of the multinational firm also contains the management and technology factor that represents accumulated proprietary factors such as research, development, and technical, managerial, and organizational expertise in managing DFI; and (c) all other assumptions of the Heckscher-Ohlin model are retained, such as full employment, inelastic factor supplies, and the relative product prices of the two countries which are price takers in the world market.

b. The Model

The aggregate production functions of the two sectors, X and Y, in the home and foreign countries are of a Cobb-Douglas type as follows:

$$(1)\ X = L_x^{\alpha} K_x^{\beta} S^{\gamma} \qquad \alpha + \beta + \gamma = 1,$$

$$(2)\ Y + L_y^{\alpha} K_y^{\beta} \qquad \alpha + \beta = 1, \qquad \left.\begin{matrix} \\ \\ \end{matrix}\right\} \alpha, \beta, \gamma \geqslant 0$$

$$(3)\ X^* = L_{x^*}^{\alpha^*} K_{x^*}^{\beta^*} S^{r^*} \qquad \alpha^* + \beta^* + \gamma^* = 1 \left.\begin{matrix} \\ \\ \end{matrix}\right\} \alpha^*, \beta^*, \gamma^* \geqslant 0$$

$$(4)\ Y^* = L_{y^*}^{\alpha^*} K_{y^*}^{\beta^*} \qquad \alpha^* + \beta^* = 1,$$

where L is the quantity of labor employed
K is the quantity of capital used
S is the quantity of "technology-resource" used and is specific to X, and subscripts, x and y represent the amount of L and K used to produce X and Y
* denotes foreign variable.

The four production functions are obviously of linear homogeneous which yield positive marginal products of L, K, S, L*, K*, and S* and strictly concave curves. It is assumed in our analysis that the factor S is initially unique to the home country and becomes available in the foreign country when the multinational firm makes a direct investment. It is also assumed that there are certain expenses common to the firm's inputs of the T-R factor at home and abroad (e.g., research and development expenses), which are to be apportioned, and to be recovered jointly.

Expressing P and P* as the relative prices of X in terms of Y and of X* in terms of Y*, respectively, and omitting for brevity the parameter notations, $\alpha, \beta, \gamma, \alpha^*, \beta^*$, and γ^* from eqs. (1) – (4), the multinational firm's profit functions are:

$$(5)\ \pi = PX - w_x L_x - r_x K_x - avS$$

$$(6)\ \pi^* = P^* X^* - w_x^* K_x^* - r_x^* K_x^* - a^* v^* S^* - R,$$

where $0 < a, a^* < 1$, and the constants, a and a*, are the proportions of S and S* to be apportioned for X and X*, respectively. R is an adjustment value that equates P* to the firm's average cost of X*. The necessary conditions for maximizing profit by the multinational firms are:

$$(7)\ \frac{\partial \pi}{\partial L_x} = 0,\ P \frac{\partial X}{\partial L_x} = w_x \qquad (7a)\ \frac{\partial \pi^*}{\partial L_x^*} = 0,\ P^* \frac{\partial X^*}{\partial L_x^*} = w_x^*$$

$$(8)\ \frac{\partial \pi}{\partial K_x} = 0,\ P \frac{\partial X}{\partial K_x} = r_x \qquad (8a)\ \frac{\partial \pi^*}{\partial L_k^*} = 0,\ P^* \frac{\partial X^*}{\partial K_x^*} = r_x^*$$

$$(9)\ \frac{\partial \pi}{\partial S} = 0,\ P\frac{\partial X}{\partial S} = v \qquad (9a)\ \frac{\partial \pi^*}{\partial S^*} = 0,\ P^*\frac{\partial X^*}{\partial S^*} = v^*$$

where w, w* are wages; rand r* are costs of capital; v and v* discount rates (when the risk-adjusted rate is applied to foreign investment, $v < v^*$); and subscripts x and y designate appropriate factor prices for X and Y respectively.

It should be noted that in this model the factor prices of v and v* are assumed to have a specific value, while no value for these prices are assigned in the B-R model.[6]

The necessary conditions for profit maximization by producers of Y and Y* are[7]

$$(10)\ \frac{\partial Y}{\partial L_y} = w_y,\ \frac{\partial Y}{\partial K_y} = r_y\ ;\ \frac{\partial Y^*}{\partial L_y^*} = w_y^*,\ \frac{\partial Y^*}{\partial K_y^*} = r_y^*$$

The assumptions regarding the factors equalization leads to

$$(11)\ w = w_x = w_y,\ w^* = w_x^* = w_y^*$$

$$(12)\ r_x = r_x^*.$$

The conditions regarding the full employment of L and L* for X, Y, X*, Y*, and the allocative constraints of the firm of K and S in the production of X and X* are assumed satisfied.

Substituting eqs. (7) – (9) and (7a) – (9a) into eqs. (5) and (6), respectively, and invoking Euler's theorem, the multinational company's total profit becomes[8]

$$(13)\ \Pi = \pi + \pi^* = P\frac{\partial X}{\partial S}S(1-a) + P^*\frac{\partial X^*}{\partial S^*}S^*(1-a^*) - R.$$

It should be noted from eq. (13) that the firm has to recover R, which is an excess economic profit. As shown in Sections 5 and 6 of this paper, this specification can be changed so that the firm recovers only normal profit even if the firm is assumed to be an obligopoly. If the firm's price is equal to its average cost, R needs not be an excess profit. Under competitive equilibrium, π^* becomes zero in the long run. If the firm prices X based

6. The profit function in the B-R model approaches zero when their S and S* are explicitly defined in terms of v and v*. See B-R footnote 9, p. 281.
7. These conditions are shown to complete the equilibrium model specifications.
8. From Euler's theorem,

$$X = \frac{\partial X}{\partial L_x}L_x + \frac{\partial X}{\partial L_x}K_x + \frac{\partial X}{\partial S}S \quad \text{and} \quad X^* = \frac{\partial X^*}{\partial L_x^*}L^* + \frac{\partial X^*}{\partial K_x^*}K_x^* + \frac{\partial X^*}{\partial S^*}S^*.$$

on its average-cost and if it tries to recover the entire R in the foreign country, eq. (6) can be expressed by setting $\pi^* = 0$ so that

$$(14)\quad R = P^* X^* - w_x^* L_x^* - r_x^* K_x^* - a^* v^* S^*.$$

Dividing both sides of eq. (14) by X^*, we obtain

$$(15)\quad (R/X^*) = (P^* X^* - w_x^* L_x^* - w_x^* K_x^* - a^* v^* S^*)/X^* = \bar{R}$$

where $\bar{R}$ is normal long run profit per unit of X^* at a given output level.

4. Comparisons Between the Two Models

In the Kojima model, when $(P_x/P_y) > (P_x^*/P_y^*)$, meaning that the home country has comparative advantage in X, the comparative profit ratios on total sales are higher in the foreign country; that is $(\theta_x/\theta_y) < (\theta_x^*/\theta_y^*)$ as was shown in eq. (1.4) of this paper. The condition that $(\theta_x/\theta_y) < (\theta_x^*/\theta_y^*)$ was obtained based on the assumption that "the profit per dollar's worth of total sales is the same in all commodities in both countries" (Kojima p. 99).

The application of this assumption in our model yields the same conclusion. When $(P_x/P_y) > (P_x^*/P_y^*)$, the relative profit rate is higher in the foreign country than in the home country. To show this, we rewrite eq. (13) as

$$(16)\quad P\frac{\partial X}{\partial S}S(1-a) = P^*\frac{\partial X^*}{\partial S^*}(1-a^*) - R.$$

Dividing both sides of eq. (16) by P^*, we obtain

$$(17)\quad \frac{P}{P^*}\frac{\partial X}{\partial S}S(1-a) = \frac{\partial X^*}{\partial S^*}(1-a^*) - \frac{R}{P^*}$$

If the home country has comparative advantage in X so that $(P_x/P_y) > (P_x^*/P_y^*)$, P and P^* in our model gives: $(P/P^*) > 1$. Eq. (17) shows that when $(P/P^*) > 1$,

$$(18)\quad \frac{P}{P^*}\frac{\partial X}{\partial S}S(1-a) > \frac{\partial X}{\partial S}S(1-a),$$

which means from eq. (17) that

$$(19)\quad \frac{\partial X^*}{\partial S}S^*(1-a^*) - \frac{R}{P^*} > \frac{\partial X}{\partial S}S(1-a)$$

$$(20)\quad \frac{\partial X^*}{\partial S^*} S^*(1-a^*) > \frac{\partial X}{\partial S} S(1-a) + \frac{R}{P^*} > \frac{\partial X}{\partial S} S(1-a).$$

From eq. (20), it is inferred that due to the higher marginal product of the T-R factor in foreign country, the profit is higher in the foreign country than in the home country by at least

$$(21)\quad \frac{\partial X^*}{\partial S^*} S^* > \frac{\partial X}{\partial S} S.$$

It should be noted from eqs. (17) – (20) that differences between the values of the constants, a and a*, will not alter our conclusions as long as (a, a*) > 0.

In order to evaluate the conditions shown in eq. (21) in terms of the production functions shown in eqs. (1) and (3), we differentiate eq. (1) partially with respect to S and eq. (3) partially with respect to S* and multiply the individual derivatives by the factors S and S*, respectively. We obtain

$$(22)\quad \frac{\partial X}{\partial S} S = \gamma L_x^{\alpha} K_x^{\beta} S^{\gamma} = \gamma X$$

$$(23)\quad \frac{\partial X^*}{\partial S^*} S^* = \gamma^* L_{x^*}^{\alpha^*} K_{x^*}^{\beta^*} S^{\gamma^*} = \gamma^* X^*.$$

From eqs. (22) and (23)

$$(24)\quad \frac{\partial X^*}{\partial S^*} S^* > \frac{\partial X}{\partial S} S, \text{ If } \gamma^* X^* > \gamma X.$$

Eq. (24) is same as the result obtained in eq. (21) independent of any assumption regarding the size of R. Eq. (24) implies that γ^*, the parameter of the T-R factor, must be higher in the foreign country than in the home country in order to have the higher T-R productivity abroad than at home.

It should be pointed out that the conditions shown in eq. (24) hold when the scale parameters in the production functions shown in eqs. (1) and (3) are altered so that the functions display increasing returns to scale; namely, the parameters for eqs. (1) and (3) have the properties: $\alpha + \beta + \gamma$, $\alpha^* + \beta^* + \gamma^* > 1$. Under increasing returns to scale, some input factors will be paid less than the social value contributed by each toward the production of X and X*. The important point here is that the marginal product of the foreign T-R factor is higher than the marginal product of the home T-R factor, if $\gamma^* X^* > \gamma X$. This is true regardless of the particular specification

of the scale parameter of the production function.

5. The Kojima Attributes in the Multinational Investment Model

It was shown in the preceding section that the relative profit ratio was higher abroad than in the home country. More specifically it was shown in eq. (19) that when $(P/P^*) > 1$, the relative profit measured by the technology-resource input was higher for the firm's foreign operations by

$$(19)\ \frac{\partial X^*}{\partial S^*} S^* (1-a^*) - \frac{R}{P^*} > \frac{\partial X}{\partial S} S(1-a).$$

The conditions shown in eq. (19) help illuminate the essence of Kojima's "trade-oriented" vs. "anti-trade-oriented" DFI arguments, which in part says that the smaller are the technological difference between the investing and host countries, the easier it is to transfer and improve the technology in the latter (Kojima, 1977, p. 110).

It should be recalled that the size of R in our model signifies a cost adjustment value that the multinational firm assigns to make its price equal to its average cost. Eq. (19) reveals that with a given P^*, the value of R is positively related to the marginal product of T-R; the higher the marginal product of T-R, the larger the value of R will be. This means that a DFI with relatively high technology content enables the firm's management to assign a proportionally high R value and vice versa. A similar inference can also be made from the empirical relationship widely observed between the size of DFI and the firm's obligopolistic position in the industry of the investment receiving country: Namely, the larger the size of DFI, the greater is the firm's dominance in the industry, because as Kemp (1969, p. 156) and Ethier (1982) have shown, the larger the size of a dominant oligopolistic firm, the higher the elasticity of its output to the industry's total output.

It was shown in eq. (24) that the marginal product of T-R is higher in the host country than in the investing country, if the parameter γ in the production of the host country is larger than that of the investing country, namely,

$$(24)\ \frac{\partial X^*}{\partial S^*} S^* > \frac{\partial X}{\partial S} S, \text{ If } \gamma^* X^* > \gamma X.$$

These straightforward conditions portrary the essential analytical elements that support Kojima's "anti-trade" DFI. Implication of eq. (24) is that under a comparative statics setting, the higher productivity (thus the higher profit rate) of T-R in the host country comes from neither a greater division of

labor nor a more intensive use of capital but from a more technology intensive production process. This is obviously inconsistent with Kojima's "trade oriented" DFI. The higher marginal product of T-R in the host country's production function may signify a superior production technology, but the superior production process may conflict with the host country's resource allocation based on comparative advantage. This is the contradiction to which Kojima referred, when he discussed anti-trade American DFI.

The major problem in this particular characterization of American DFI is that the diverse investment behavior of multinational firms worldwide in many instances cannot be dichotomized along the Kojima doctrine. Multinational firms of one nation undertake DFI whenever they possess net comparative advantages over firms of other countries which can best be exploited by DFI, and how well the firms can internalize market imperfections for their advantage determine what, where, and how they will produce and market their products overseas (Dunning, 1979). Japanese DFI is not an exception to this dictum. Tsurumi (1979, p. 187) reported instances of Japanese DFI in developing countries which used more capital-intensive production process as a means of compensating for the lack of experienced and skilled workers in those countries. More specifically, a Japanese plant in Korea was more capital-intensive than the "home" plant in Japan[9] while a Japanese investment in Indonesia employed automated, machine paced production processes even when labor-intensive production methods were feasible.

6. Importance of Average Cost Pricing

Kojima's model assumed that a firm uses average-cost pricing — that is, "the firm sells product at an average cost per unit of products *plus* a certain profit or 'make-up'" (Kojima, 1977, p. 97). Since the long run equilibrium price under perfect competition leaves no room for a new entrant, the most plausible circumstance under which his "trade-oriented" DFI can take place is in a country where foreign investment can establish a new long run equilibrium price, which is lower than the one existing in that country prior to the foreign investment. This means that the foreign

9. Mechanized processes were substituted for labor process to a greater degree for the Korean plant than for the Japanese plant. As a result, the Korean plant experienced greater economies of scale and a larger elasticity of technical substitution than the Japanese plant (Tsurumi, 1979, p. 187). A study by Hong (1979, ch. 9) suggested that indigenous manufacturers in Korea also prefered more capital intensive production process because of biased factor substitution induced by the government subsidies. Chung and Lee (1980) reported that there was no statistically significant difference in production techniques used by foreign and local firms in Korea. In indonesia, locally owned businesses also preferred automated, machine paced production methods (Tsurumi, p. 187).

firm can most likely reduce the product's local price through improved technology, economies of scale, or even product differentiation, and that the foreign firm's new price contains only normal long run average profit, which will deter potential entrants. Under this scenario, the relative size of the foreign producer in the local industry and his ability to deter new entrants to the industry become the focal point of interest for economic analysis.

It is true that the typical size of Japanese DFI in manufacturing was small, and the Japanese DFI was concentrated in the 1960's and 70's at least in industries whose products were in the mature stage of the product cycle. It is also true that many Japanese DFI in manufacturing, particularly those made in Southeast Asia, lost their price advantage in the local industry in a relatively short time. The low discretionary income and the small market size in the region often frustrated the Japanese efforts to maintain the markets through product differentiation (Yoshino, 1976, p. 88). Nevertheless, the situation does confirm Kojima's conclusion that Japanese DFI in manufacturing promoted the rapid adjustment of the host countries' industrial structure along the line of the country's comparative advantage, thus promoting trade. A corollary conclusion one may draw, as did Kojima, is that since American DFI in general is opposite to the Japanese DFI in size and the stage of product life, it works against the structure of comparative advantage.

This corollary conclusion was subject to serious question as shown by Roemer (1976) with statistical examples and Arndt (1974) in general terms. However, there is one crucial point on which Kojima based his corollary conclusion that has not been brought into light; that is, his implied assumption that American DFI makes excess economic profit.[10] This assumption may be reasonably valid and empirically tenable. However, its validity can be challenged on theoretical ground by invoking Modigliani's "limit price concept", which is essentially the same as the average cost price concept which Kojima assumed in his trade-oriented DFI model. Modigliani (1958) demonstrated that an oligopolistic price leader could and might set price equal to the minimum long run average cost, which is the lowest sustainable price, to deter potential entrants to the market.[11] This "limit price" is

10. Kojima (1977, Ch. 4) cites the work of Stephen Hymer (1976), whose thesis on DFI emphasizes its negative impacts. In particular he quotes Hymer, who said: "The (multinational) firm must find it more profitable to exploit the foreign advantage through direct investment. ... One must also explain why technology is not sold like other commodities. The answer lies usually in the marketing characteristics of the advantage, that is, the difficulty of extracting full quasi-rent where markets are imperfect." (Kojima, 1977, p. 81).

11. This average cost pricing is different from Chamberlain's equilibrium price under monopolistic competition. On this point and on Modigliani's oligopolistic equilibrium price, see Carroll (1982, pp. 490-492).

somewhat higher than a competitive equilibrium price. However, the theoretical significance of market equilibrium with "limit price" is that all firms in the industry, larger or small alike, make only normal profit. As Helpman (1981) and Helpman and Razin (1983) have shown, all DFI models tend to minimize welfare gains in the host country from DFI, if that country exhibits in its firms the characteristic of increasing returns to scale or monopolistic competition. In the world economic environment that has prevailed since World War II, it is difficult to point to DFI by American firms as having monopolized marginal cost pricing policies to collect excess economic profits.

7. Policy Implications for Newly Industrialized Countries

There are two propositions in the Kojima's "trade-oriented" model that have profound significance in both the theory and practice of DFI. First, DFI need not be the exclusive domain of large firms that have monopolistic or oligopolistic controls on some aspect of their product market through patent, scale economies or product differentiation. Japanese DFI in other Asian countries has demonstrated that the typical oligopolistic behavior assumed prevalent by firms engaging in DFI is also found in firms in competitive industries in which DFI is made. Secondly, Kojima's contention that the relatively small technological gap between Japan and the developing countries constitutes an advantage for Japan to invest in the latter is an interesting proposition as it is a view quite opposite to the requirement of "advantage emphasized in the monopolistic theory of DFI" (Ozawa, 1979, p. 80).

These two propositions have very important and practical policy implications for newly industrialized countries (NIC's) like Korea. DFI should be considered as a policy variable by firms in NICs which produce relatively homogeneous goods (e.g., textile, apparel, electric applicances, etc.) under a relatively competitive environment. Even small firms can exploit for themselves certain market imperfections such as tariff protection, and investment subsidies in tax or financing. FDI made by NIC's in developing countries will complement trade, particularly intra-industry trade between the investing and investment-receiving countries, so that FDI tends to promote economies of scale and international division of labor. Countries such as Korea should not emphasize ownership control of DFI. Emphasis should be on transfers of "package" of capital managerial skill and technical know-how.

Declining industries in the home country should be encouraged to invest abroad in the same industry by means of investment guarantees and subsidies, e.g., tax exemptions on machinery exported and preferential treatment on income earned from DFI. If domestic industries are not encouraged

to look abroad for DFI opportunities in the same industry, many firms in the domestic industry will end up entering other product lines at home which would cause long run relocation and adjustment costs which is expensive from the standpoint of society.

8. Concluding Remarks

By skillfully integrating various strands of trade theories, Kojima developed a theoretical hypothesis alternative to the prevailing theories of DFI that have almost exclusively evolved from the experience of American multinational firms engaged in DFI. In a large sense his hypothesis is a substitute to the monopoly theory of DFI. The experience of Japanese with DFI in developing countries in the 1960's and 70's may have not been the consequence of conscious and rational strategies pursued by Japanese businesses, as theorized by Kojima. It may in reality reflect, as suggested by Tsurumi (1979, p. 99), the result of ad hoc response of Japanese businesses to market distortions created by government policies of developing countries, such as import-substitution policies, during the period. The significance of Kojima's treaty on "trade-oriented" DFI model lies in his propositions that the market imperfections and monopoly profits are not crucial determinants for DFI, and that DFI complements trade under the Heckscher-Ohlin theory.

An attempt was made to develop a model within the framework of a general equilibrium which will be compatible with Kojima's model. By defining the "technology-resource" factor as the third parameter in a linear homogeneous production function, we derived a multinational investment model that not only is compatible with the Kojima model but also provides a more powerful tool for analysis and prediction. The new model, together with certain derivative propositions from the Kojima theory, lends itself as a useful tool for the analysis of corporate strategies involving overseas direct investment.

Kojima's characterization of American DFI as being "anti-trade-oriented" is supported neither by theory nor by fact. Even casual empiricism refutes his characterization of American DFI. The U.S. has been the largest trader and the leader of the Western block and has backed the world economic system including many post-World War II reconstruction programs. The economic success of Japan, West Germany, and many NIC's such as Korea is in large part a culmination of successful American efforts in spearheading free trade among nations (Green and Lutz, 1978). The U.S. is not necessarily suffering from her misguided past DFI as Kojima argued. There are many other reasons why she has current trade problems. If, for the sake of argument, she does feel pain from the aftermath of her past DFI, then the U.S. is suffering, as Shinohara (1982, p. 64) observed, the consequence of the

technological know-how she herself exported to the world, including Japan.

Undoubtably some Japanese DFI will not fit the description of "trade-oriented" DFI, as was pointed out in this study. In practice, technology embodied in DFI often does not complement the local factor supply, and DFI tends to minimize welfare gains of the local economy when it is undertaken under increasing returns to scale or monopolistic competition. Following the Akamatsu-Vernon product cycle theory, Kojima assumes an irreversible pattern of product standardization and a stable technology — an assumption that may affect the versatility of his model.

A pioneering work such as the one Kojima performed is often incomplete and cannot be expected to handle all situations well. What is important is that his central exposition of the generalized complementary relationship between DFI and trade in the absense of monopolistic elements is sound, and his theory,combined with the model developed in this paper, offers a testable proposition for newly industrialized countries that may follow Japan's lead.

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