Foreign Direct Investment and Exports of Manufacturing ; The Case of South Korean's Electronics

Nargess Kayhani*

Introduction

The economic growth of south Korea since 1962 has been remarkable. Despite a low natural resource base, by relying on its abundant supply of skilled and well-trained labor, and foreign capital and technology, this country provides an example of a successful experience in industrialization.

Given the limitations of the Korean economy in availability of physical capital and technology, the Foreign Direct Investment (FDI) had a major impact on the industrialization and development of South Korea. Between 1960-75, a huge amount of foreign investment was allowed to flow into this country. Prior to that period (during the 1950s), Korea received a significant amount of foreign assistance which was essential to the improvement of her infrastructure. As described later in this paper, most of FDI in Korea was a response to the country's Export Promotion (EP) policies and to its export performance.

United states' and Japan's Multinational Corporation (MNCs) are the largest investors in South Korea. Other large investors are Netherlands, Hong Kong, West Germany, United Kingdom and Panama (Table 1).

Due to the vast amount of these FDIs in different sectors of Korean economy (particularly in manufacturing sectors), the contribution of MNCs in the production and export of those sectors is of great importance. This is especially the case for the dynamic industries such as electronics.

This paper examines the determinant factors of U.S. MNC's FDI and exports and the dynamic interdependence between the two variables in case of South Korea's electronics industry. This industry is chosen because of (a) the existance of a substantial

* Assistant Prefessor of Economics, Mount Saint Vincent University, Halifax, Nova Scotia, Canada

Table 1. FDI by Major Investors in Korea, 1962-82 (In Thousands of $US)

Year	Total	U.S.	Japan	Panama	West Germany	Hong Kong	Netherlands	U.K.
1962–66	22,999	21,871	693	102	289	—	—	—
1967–71	72,673	12,443	40,759	1,400	2,442	258	6,258	256
1972–76	565,239	67,924	376,940	19,136	2,798	3,467	58,726	2,692
1977–82	775,534	315,735	257,523	702	18,527	41,374	40,356	19,025
1962–82	1,436,445	417,973	675,915	22,340	24,056	45,099	105,340	21,973

Source: Major Statistics of Korean Economy, Economic Planning Board, Korea (1983), p. 241.

U.S. FDI. (b) the presence of a few multi-product U.S. MNCs, and (c) the importance of sector in Korean's economy. The analysis covers the period of 1968-80.

Ⅰ. South Korea's Electronics Industry

Electronic industry is one of the most dynamic export-oriented industries in Korea. Although this industry in Korea has grown significantiy during the past 15 years, the nature of this technical progress deviates from the advancement of the industry in developed countries. The electronics industry in general is divided into four segments, namely : consumer electronics, industrial equipment, parts and components, and software. Therefore, the production process in eletronics can be highly technological or labor intensive (Hang & Krueger, 1975). In Korea the industry has grown mostly because of the expansion in the labor-intensive process (consumer electronics, assembly of parts and components).

Perhaps one of the most important contributions to the growth of the elctronics industry in Korea has been the establishment of a favorable climate by the government to attract foreign investment. One example is the extensive use of industrialization incentive regimes in the form of EP policies including a series of tax privileges and the duty-free import of equipment and raw material (especially during 1967-73). In addition, access to the cheap and trained labor force was a major incentive in attracting MNCs' investment. However, the increase in labor costs during the 1970s forced these multinationals to consider other options in Southeast Asian countries such as Taiwan and Hong Kong (World Bank, 1984).

By taking advantage of the export incentive programs and the lower cost of labor the MNCs were able to establish plants for assmebling the duty-free imported parts and components, and expand this Korean industry. However, as mentioned earlier, this expansion, to a large extent has occurred in the production and exprots of the more labor-intensive products ; namely consumer electronics. In addition, without a heavily imported technology Korea can not have a clear advantage in production of industrial equipment and other highly technology intensive products and compoents (World Bank, 1984).

The largest foreign firms in this Korean industry are either American or Japanese. The first foreign investment was made by Motorola (U.S. company). Signets, Control Data, Applied Magnetics, and Fairchild Semiconductor are the other large U.S. multinationals who operate in this country. Toshiba, Sam Sung-Sanyo, Crown Radio,

and Gold Star Alps Electronics are the largest Japanese MNCs in Korea. The largest Korean local firms are : Gold Star Tele Electronic, Tai Han Wire Co., Gold Star, Ho Nam Electric, and Dong Nam. Most of the Korean local firms are small-scale while foreign firms are usually large.

To proceed with the objectives of this paper after an overview of the performance of South Korea's electronics industry, an analysis of interdependence between U.S. MNC's FDI and exprots of manufacturing is presented in Section Ⅲ. This section contains the methodology of the paper in which seven models of interdependence between the underlying variables are developed. Section Ⅳ performs such an analysis in case of South Korea's electronics. According to the informations provided in this section, Models Ⅳ.A and Ⅳ.B are applied to the relevant U.S.–Korea data. This is done by a graphic approach in which the actual sequential patterns of U.S. FDI and exports in this industry (relevant data) are compared with the predicted patterns of these variables by the relevant models. The reasons for any deviation are then explained. Finally Section V contains the concluding remarks.

Ⅱ. Analysis of Interdependence between U.S. MNCs' FDI and Exports of Manufactures

Once the U.S. firms within an industry have developed a foreign market by exporting particular manufactured products, an expansion of that market can be achieved by international production (Foreign Direct Investment ; FDI) and / or further exports. To elaborate this point, let us assume that the multiproduct U.S. firms in an industry produce finished goods A, B, and C at home. Exports of A to a foreign country can penetrate that market and make the foreign production of A, B, and C possible, where B and C refer to other product lines or components. If A was a semifinished product sent abroad for assembly, the results would be similar. Therefore, in these cases, FDI follows initial exports.

However, the foreign production of a commodity may lead to subsequent increases in exprots. Let us assume that as result of FDI for producing good A in a particular market, the need for related product lines and components (which are not produced abroad) leads to the U.S. exports of those products to that market. Thus in this case exports follow initial FDI. Aharoni (1966) sees the process as a chain reaction. When a particular product is made abroad, name familiarity will lead to buy other products of the same manufacturer.

Lipsey and Weiss (1984) refer to the situation in which a multiproduct industry or firm, by setting up a manufacturing operation abroad for one of its products, can raise the exports of other finished goods and components in that market. They also extend their argument by stating that production of finished commodities abroad could be associated with high levels of exports in intermediate products—even if this substitutes for the parent country's exports of finished products of the same industry.

While all of the above examples tend to confirm a positive relationship between U.S. FDI and the exports of manufactured products in particular industries and foreign markets, a generalization of this proposition is not necessarily true, for many reasons such as : if a U.S. industry or the firms within an industry are producing only a single product either at home or abroad, that means that exports and FDI in that case are substitutable for each other. For these firms the choice between the two options is based upon the comparative costs and/or the trade and investment regimes of the host country. For example, if the government of the host country enforces an Import Substitution Industrializaition (ISI) policy, then the only penetration option open to the U.S. firm would be foreign production. In the single product case, the only way in which exports and FDI of these firms could be positively related is through an increase in the demand for the product in that foreign market.

Therefore, even if no other variables were to affect the patterns of U.S. FDI and exports of manufactures within an industry, one must look for more than a simple positive or negative correlation in attempting to explain the dynamic interdependence between the two. In addition, to provide a comprehensive exposition of their interrelationship, many other factors must also be carefully analyzed. In fact, the decision of a particular MNC in choosing the best alternative to serve a foreign market may be influenced by many factors. Among the many examples of these factors are : the host government's attitudes toward FDI and free trade, the importance of presence in a foreign market, oligopolistic reaction of MNCs, access to least-cost locations, fear of losing a market, the nature of different products. especially differentiated products and/or commodities that require significant changes in models from time to time, and the political stability of the host country.

Taking all these factors into consideration, no single theory or model can explain the many diverse aspects of U.S. MNCs' engagement in international activities (Dunning, 1973). Therefore, in the present study, an attempt is made to organize systematically the different possible relationships of interdependence between U.S. MNCs' exports and FDI. The possible relationships are classified as Models I. II.A, II.B, III.B, IV.

A, and Ⅳ.B.

In this type of classification the crucial assumption is that the decision-making of a particular MNC in choosing the best alternative for penetrating a foreign market is influenced by many factors, in particular host-country specifics and firm specifics. In these models the host-goverment policies of import substitution and export promotion (ISI and EP) and the variations in emphasis on such policies, are recognized as host-country specifics. In addition, the MNCs' motivations for access to the least-cost foreign locations are categorized as firm specifics. Therefore, in organizing these models it is assumed that the MNCs will choose between exports and FDI for two distinct reasons : one is the implementation of and variations in host-government policies or ISI and EP (or a combination of the two), and the other is the structural characteristics of the host country with respect to the accessibility of a relatively lower cost of labor (compared to that in the parent country).

However, what is of great importance in such classifications is the fact that not only the two sets of assumptions can be independent, but also that they can *both together* influence the decision-making process of the MNCs in choosing from among different penetration options. In other words, the host country specifics and firm specifics can both exist at the same time, and thereby they can assert *cumulative affects* on MNCs' exports and FDI. Table 2 presents a taxonomy that summarizes the above discussion of possible relationships of interdepnedence.

In Table 2, Models Ⅰ, Ⅱ.A, and Ⅱ.B refer to situations in which the host country's industrialization incentive policies (ISI and EP) are the main determinants of the decision-making process of the MNCs. On the other hand, Models Ⅲ.A and Ⅲ.B describe the situation in which the reduction in the cost of production of the intermediate and final products (respectively) are the main factors in MNCs' decision-making. Models Ⅳ.A and Ⅳ.B refer to another possibility, that is, situaitons in which the host-government policies of ISI and EP, and the cost minimization considerations *together*, are the determinant factors of MNCs' motivations in choosing among exprots and FDI. Description of the models are given in the following sections.

Ⅲ. The Models

Model Ⅰ : This model refers to the situation in which a U.S. MNC that originally served a foreign market by exports of a final product adjusts its penetration policy to an (ISI) policy imposed by the host country. To elaborate this point, consider the

Table 2. Taxonomy of the Possible (Predicted) Relationships of Interdependence Between MNCs', FDI and Exports of Manufacturing (Within a Particular Industry)

	Country Specifics				Firm Specifics				Country Specific Plus Firm Specific										
	Model I	Model II				Model III				Model IV									
		II.A		II.B		III.A		III.B		IV.A						IV.B			
		EP Policies with focus on		A Prior ISI with Subsequent ES Policies with focus on				MNC's Decision to Reduce Prod, Cost by Transferring to Host the Production of: Models I and III.A		Models II.A and III.A: EP Policies with focus on		Models II.B and III.A: A Prior ISI with EP Policies focus on		A Prior ISI with Models I and III.B		Models II.A and III.B: EP Policies with focus on		Models II.B and III.B: A Prior ISI with EP Policies focus on	
	ISI Policies	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods	Interm Goods	Final Goods
X^{FG}_{US-H}	→	↑	→	↑↓	↑	↑	↑	↑	↑↓	↑	↑↓	↑	↑↓	↑↓	→	↑↓	→	↑↓	→
FDI_{US-H}	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	←
X^{P}_{US-H}	↑	↑	↑	↑	↑	↑*	↑	↑	↑	↑*	↑	↑	↑	↑	↑	↑	↑	↑	←
X^{FG}_{H-US}		↑	←	↑	←	↑	←	↑		↑		↑		↑		↑		↑	←
X^{P}_{H-US}	↑					↑		↑		↑		↑		↑					
X^{FG}_{H-W}	←	↑	←	↑		←		←		←						↑		↑	←
X^{FG}_{US-W}	←	↑	→	←		↑	→	→		→		↑		↑		↑↓		↑↓	←
X^{FG+P}_{US-H}	→			↑↓		↑*		↑↓		↑*	↑↓	↑*		→		→		→	→

Notes to Table 2:

X=Exprots

FDI=Foreign Direct Investment

FG=Final Goods

P=Parts and Components (intermediate goods)

H=Host country

W=World

X^{FG}_{US-H} =U.S exports of final goods to the host country.

FDI_{US-H}=U.S. foreign Direct Investment (foreign production) in the host country.

X^{P}_{US-H}=U.S. exports of parts and components to the host country.

X^{FG}_{H-US}=Host country's exports of final goods to the U.S. (U.S. imports of final goods from the host country).

X^{P}_{H-US}=Host country's exports of parts and components to the U.S. (U.S. imports of parts and components from the host country).

X^{FG}_{H-W}=Host country's exports of final goods to the world.

X^{FG}_{US-W}=U.S. exports of final goods to the world.

X^{FG+P}_{US-H}=Total value of U.S. exports of final goods and parts to the host country.

↑ =Indicates an increase.

↓ =Indicates a decrease.

*=At firm discretion.

ISI=Import Substitution Industrialization Policies (of the host country).

EP=Export Promotion Policies (of th host country)

[a]The predictions with respect to the country-specifics models are based upon the expectations of the host country as to the MNCs' behavior, when it adopted the policies (ISI and EP). Notes to Table 2 contiued.

[b]The predictions with respect to the firm-specifics models are based upon the MNCs' cost minimization considerations.

[c]The predictions with respect to the country-specifics and firm-specifics are based upon the cumulative effects of (a) and (b) above.

[d]EP policies of the host government are considered to focus more heavily on the exports of intermediate and/or final goods.

In Model I it is anticipated that the MNCs' will respond to the import substitution policies of the host country, by decreasing X^{FG} to, and increasing FDI in that country. This may lead to a subsequent increase in MNCs' X^{P} to the host country.

In Model II.A it is anticipated that the MNCs' will react to the export-promotion policies (in the absence of a prior import substitution policy) of the host country, by increasing and/or decreasing X^{FG} to, increasing FDI in, and increasing X^{P} to that country. The increase or decrease in X^{FG} to the host country depends upon the focus of the export promotion policies on intermediate and/or final products.

In Model II.B it is anticipated that the MNCs' will respond to the export promotion policies (with a prior import substitution policy) of the host country, by increasing and/or decreasing X^{FG} to increasing FDI in, and increasing X^{P} to that country. The increase or decrease in X^{FG} to the host

initial exports of a manufactured product a foreign market at time T_1. The subsequent choice between exports and/or FDI at time T_2 will depend to a considerable degree on the host country's trade and foreign invements regimes. If the government of the host country decides to implement (ISI) policies (thus making it): impossible or at least not profitable to serve the market through U.S. exprots) the best alternative for a U.S. MNC would be to penetrate that market by FDI. However, foreign production (FDI) of the manufactured product leads to an increase in the U.S. exports of parts and components to the host country at time T_3.

In this model FDI is associated with a change in the composition of the MNC's exports to the host country from final goods to parts and components. In addition, such investment would probably cause a decrease in the value of the MNC's exports to the host (within the industry), since the value added of parts would be less than the value added of final goods. Actually, this Value added will be shifted from the U.S. to the host country. This model can be summarized in the following way :

Model I : U.S. MNC adjusts to ISI policy imposed by the host country

$T_1 : X^{FG}_{U.S.-H}$

$T_2 : X^{FG}_{U.S.-H} \rightarrow FDI_{U.S.-H}$(as a result of host country's ISI policies)

$T_3 : X^{FG}_{U.S.-H} \rightarrow FDI_{U.S.-H} \rightarrow X^{P}_{U.S.-H}$

Therefore, U.S. FDI is associated with

1. Change in the composition of U.S. exports to host country from X^{FG} to X^P.

2. Decrease in the value of U.S. exports to the host country (since the value added

continued country depends upon the focus of the export promotion policies on intermediate or final products.

In Model III.A the situation differs from Models I and II in that the decisions in Mo del III. A are made by MNCs in response to market conditions rather than in response to policy decisions by the host government. It is anticipated that MNCs will respond to perceive lower cost of production of the intermediate goods (in the host country) by increasing X^{FG} to, increasing FDI in, and increasing X^P to the host country.

In Model III.B the situation differs from Models I and II in that the decisions in Model III. B are made by MNCs in response to market conditions rather than in response to policy decisions by the host country. It is anticipated that MNCs will respond to perceive lower cost of production of the final goods (in the host country) by decreasing X^{FG} to, increasing FDI in, and increasing X^P to the host country.

Model IV (IV.A and IV.B) is strictly the results of accumulating the increases and decreases across the rows, such as X^{FG}, FDI, X^P, etc.

to the parts and components was less than the value added to the final goods), thereby shifting the value added from the United States to the host country.

Model II : Model II refers to a situation in which the host government implements an EP policy, thereby encouraging U.S. export-oriented MNCs to invest in that country. U.S. MNCs are motivated to invest in the host country because they can take advantage of the special privileges extended to the exporters from the host country. However, it is worth mentioning that such privileges can be assigned either to the exportation of intermediate products or to final products. This factor has been taken into consideration in Table 2. Examples of host-government EP policies are duty-free importation of machinery and services (necessary for production and exports) and various tax exemptions and credits. The so-called "local content requirement" is another example of a host country policy that favors U.S.FDI. This technique is designed to attract MNCs by tariff protection and restriction on imports so that, later, a substantial amount of MNCs' investment may be directed to key economic sectors of the host country (Behrman & Mikesell, 1980 ; Cave, 1982). Model II is divided into Model II.A and Model II.B

Model II.A : This model assumes that the host-country implements EP policies without having enforced any prior ISI regimes. This host-country was served primarily with U.S. exports of final products at T_1. In the presnece of EP policies, U.S. MNCs can take advantage of the host-government's export expansion incentives. Thus at times T_2 and T_3, U.S. FDI would flow into this country. If the host-country's EP policies focus more heavily on final products, then one would expect an increase in U.S. exports of parts and compoents to the host-country to follow. Nevertheless, the production of final goods in this foreign market would result in exprots of such commodities to other countries (including the United States).

In this model, U.S. FDI is associated with a possible change in the composition of U.S. exports by moving away from exports of final goods to the exports of parts. In addition, a *possible* reduction in total value of U.S. exports within the same industry is expected (because of a decline in value added that results from moving away from exports of final goods toward the exports of parts). Moreover, the increase in exportation of final products by the host-country *may* result in a replacement of U.S. exports of these commodities to other countries.

Model II.B : This model refers to the situation in which, in addition to the implementation of EP regimes, the host government has had a prior ISI policy. When this assumption is added, at time T_1 the sequence (see Model I) of initial U.S. exports of final goods,

FDI, and exports of parts to the host is in place. However, if the prior ISI policies were completely restrictive that is, if no imports of final goods were allowed into the host country at the end of the period, T_1, U.S. exports of final goods to the host-country would stop completely. On the other hand, when the assumption of a completely restrictive ISI policy is relaxed, one would expect further U.S. export of final prodcuts to this market. In fact, if during an ISI regime a host-country experiences a further increase in economic grwoth, that may result in an increase in demand for imported final goods. Therefore, in such a case ISI policies cannot be considered completely restrictive.

At time T_2, however, as a result of the introduction of an EP policy, the United states FDI in the host-country will increase. This increase in FDI is associated with an increase in U.S. exports of parts, unless these parts are also produced in the host country. Moreover, if during EP policies the tariff barriers are somehow reduced and/ or increases in population and national income in the host country have occurred, one should also expect to see an increase in U.S. exports of final goods to this market.

In addition, in Model II.B, U.S. exports of final goods to other countries may decline if they are replaced by exports of these products to other countries by the host country. Models II.A and II.B can be summarized in the following way:

In Model II, MNC adjusts to an export promotion (EP) policy of the host country. In Model II.A, host country had no prior ISI policy. Therefore at

T_1 : X^{FG}_{US-H}

$T_{2\&3}$: MNC takes advantage of EP incentives ; therefore

$X_{US-H} \rightarrow FDI$ may or/may not $X_{US-H} \rightarrow X^{FG}_{H-W}$

U.S. FDI in this model is associated with

1. possible change in X_{US-H} composition ($X^{FG} \rightarrow X^{P}$)
2. possible decrease in value of X^{FG+P}_{US-H} (since there is a possible change in X $_{US-H}$ composition).
3. possible decrease in X^{FG}_{US} to other countries, as X^{FG}_{H-W} replaces X^{FG}_{US-W}.

In Model II.B, the host government has had a prior ISI policy At T_2: U.S. FDI increases as a result of EP policies of the host country.

Therefore, an increase in U.S. FDI is associated with

1. an increase in X^P_{US-H} unless parts are produced in the host country.

2. a decline in X^{FG}_{US} to other countries if they are replaced by export at these products from the host country (X^{FG}_{H-W}).

Model III : Model III refers in general to the situation in which the U.S. MNCs respond to the advantages related to the cost of production in a foreign market, such as cheaper labor, lower transportation cost, and access to key raw materials. Therefore, exploiting the lower cost of production, U.S. FDI logically expands production of either the intermediate or final products. In this model, importation of intermediate products, parts and components, raw materials, and final goods by the United States from its own subsidiaries (in the host country) taken place.

However, if the extent of U.S. importation does not change significantly, it may imply that U.S. FDI (foreign production) has been directed to local consumption (in the host country) and/or to export to a third country.

Model III.A : Production of Intermediate Goods. This model refers to the situation at time T_1, when U.S. exports of final goods to the host country take place. Subsequently, because of the lower cost of production of intermediate goods in the host country, the U.S. MNCs (exporters at time T_1) consider the host country to be an attractive foreign location for further expansion. In fact, the penetration of this foreign market at time T_2 in the form of FDI (foreign production), is primarily aimed at cost minimization. As a result, at times T_2, and T_3, the U.S. MNCs within the same industry benefit from an increase in exports of final goods and related products to the host (and other) countries at the same time that U.S. importation of intermediate products from this foreign market takes place. Such an increase in U.S. exports of final goods and parts results from the increase in U.S. competitiveness which in turn results from reductions in production costs.

Model III.B : Production of Final Goods. This model considers U.S. exports by MNCs of final goods to the host country at time T_1. Subsequently, at time T_2, these U.S. MNCs consider the host country to be a suitable foreign location for investment (foreign production). Penetration of this foreign market at time T_2 in the form of FDI is primarily for lower cost of production (compare to the United States). In this model, a lower cost of production of *final goods* in the host country is the main motive for U.S. MNCs' penetration of the market, unlike the situation in Model III.A, in which the cost advantage lies in the production of intermediate goods.

As a consequence, U.S. foreign production of final goods may become a substitute

for earlier U.S. exports fo these products. In fact, as the host country's exports of final prodcuts to the world (including the United States) increase, U.S. exports of these commodities to the host country may decline. More importantly, the United States will become a major importer of the final product from this foreign market. However, exports of parts and components to the host country would still remain an option for U.S. multinationals.

Models III.A and III.B may be summarized in the following way:

In Model III, U.S. MNCs seek a lower cost of production abroad.

In Model III.A, the focus of U.S. MNCs is on the production of intermediate goods.

$T_1 : X^{FG}_{US-W}$(including to the host country)

$T_2 : FDI_{US-H} \rightarrow X^P_{US-H} \rightarrow X^P_{H-US}$

$T_3 :$ further X^{FG}_{US-H}, X^P_{US-H}, and X^{FG}_{US-W}

Therefore, U.S. FDI is associated with

1. increase in X^{FG}_{US-H} as U.S. becomes comptitive because of lower production costs of intermediate goods.
2. increase in X^P_{H-US}

Model III.B, the focus of U.S. MNCs is on the production of final goods.

$T_1 : X^{FG}_{US-W}$ (including the host country)

$T_2 : FDI_{US-H} \rightarrow X^{FG}_{H-US}$ and X^{FG}_{H-W}

Therefore, U.S. FDI is associated with

1. decrease in X^{FG}_{US-H} and X^{FG}_{US-W}
2. decrease in X^{FG}_{H-US}
3. an additional $FDI \rightarrow X^P_{US-H}$ sequence could be added to scenario.

Model IV : IV.A and IV.B : This model (divided into Models IV.A and IV.B for reasons explained earlier in this paper) refers to the situation in which not only the alternative host-government ISI and EP policies influence the decision-making process of MNCs in choosing among exports and FDI, but also to the MNCs response to any advantages that may exist in the host country, such as a lower cost of labor.

Therefore, the MNCs' decision wth respect to FDI (foreign production) in the host country is *cumulative*, reflecting ISI, EP, and/or both, on one hand, and a lowered cost of production on the other. It is important to note once more that although the situation presented in Models I, II.A, II.B, III.A, and III.B can occur independently of each other, it is also possible that both firm-specific and country-specific advantages will be prensent. When that occurs, there will be a *cumulative impact* of both factors on trends of U.S. FDI, exports, and imports. Movement of the underlying variables under the various cumulative conditions described in Models I, II.A, II.B, III.A, and III.B are shown in Table 2.

Analysis of Interdependence Between U.S. MNCs' Exports and FDI in the Korean Electronic Industry

Analysis of the interdependence between U.S. MNCs exports and FDI in South Korea's electronics requires information on the value exports, imports, and foreign production of these U.S. multinationals. The following tables present the values of consumer electronic products, industrial equipment, and eletronics parts and components exported by the U.S. to Korea (Table 3), and imported by the United States from Koera (Table 4) during 1968-80. These values are presented in current thousands of U.S. dollars, at a disaggregated level for each category of electronics products and parts.

Table 5, on the other hand, presents the value of total foreign production of electronic products and parts by the U.S. MNCs in Korea during the same period. These values are presented in current thousands of U.S. dollars. Since a great deal of U.S. multinationals' investments in Korea are in the form of joint ventures, the values of total foreign production (last column in Table 5), present the combined values of U.S. joint ventures and U.S. firms' production in Koera. To analyze the dynamic interdependence between U.S. MNCs' exports and FDI in the Korean electronics industry, a comparison among the annual figures of U.S. exports, imports, and FDI (from Tables 3, 4 and 5) is required. However, it must be assumed that most of the U.S. exports to and imports of electronic products from Korea are by U.S. multinationals in this industry. This is not an unrealistic assumption, since most U.S. MNCs are also the largest exporters within a particular industry.

In spite of this assumption, comparision of the fluctuations in annual values of U.S. foreign production (FDI), exports, and imports in current U.S. dollars does not

Table 3. Value of U.S. Exports of Electronic Products and Parts to Korea, by Commodity Groups, 1968-80 (In Current Thousands of $US)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Consumer Electronics	458	605	350	318	215	335	318	604	2,330	3,333	3,506	5,121	4,634
Radio Broadcast Receiver	1	14	167	135	57	1	3	141	25	270	115	29	393
Television Receiver	130	93	18	4	4	7	43	9	23	50	247	196	474
Domestic Electrical Equip. incl. refrigerators, washing machines, etc.	327	498	165	179	154	327	272	454	2,282	3,013	–	–	–
Other Household Type Electronics	–	–	–	–	–	–	–	–	–	–	1,221	2,033	1,653
Gramphones, Dictating, Sound Recorder, etc.	–	–	–	–	–	–	–	–	–	–	923	2,863	2,114
Industrial Equipment	10,763	18,115	19,226	22,010	16,786	16,183	24,661	39,356	74,935	84,776	113,619	99,401	131,855
Electric Power Machinery and Parts	5,992	4,954	9,252	12,073	8,265	7,126	10,580	25,470	16,062	13,334	13,492	15,630	19,893
Equipment for Distributing Electricity	–	558	1,420	390	198	215	2,059	938	3,334	1,121	3,316	3,942	4,960
Electric Apparatus for Medical Purposes	–	1,456	676	1,384	839	429	733	919	868	2,645	13,485	9,798	9,819
Telecommunication Equipment and Parts	–	11,147	7,878	8,163	7,484	8,413	11,289	12,029	54,671	67,676	83,326	70,031	97,183
Components and Parts	14,723	23,064	32,365	31,868	40,773	78,015	117,742	90,433	168,929	171,694	86,376	101,435	118,030
Thierminics Valves, Tubes, Transistors, and Parts	–	23,064	32,365	31,868	40,774	78,015	117,742	90,433	168,929	171,694	69,253	84,554	97,624
Electric Apparatus such as Switches, Relays, Fuses, Plugs, etc.	–	–	–	–	–	–	–	–	–	–	17,123	16,881	20,406

Source: OECD Statistics on Foreign Trade by Country and Commodity, Series C, various issues.

Table 4. Value of U.S. Imports of Electronic Products and Parts from Korea by Commodity Groups, 1969-80 (In Current Thousands of $US)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Consumer Electronics	5,121	3,843	5,679	12,816	37,765	66,252	48,413	58,211	73,170	356,456	253,863	379,060
Radio Broadcast Receiver	5,121	3,843	3,788	7,741	20,731	36,460	30,053	58,211	73,170	256,978	197,440	148,219
Television Receiver	–	–	1,891	5,075	17,034	29,792	18,360	N/A	N/A	142,410	N/A	171,777
Other Household Type Electrontcs	–	–	–	–	–	–	–	–	–	10,353	9,884	20,909
Gramsphones, Dictating, Sound Recorders, etc.	–	–	–	–	–	–	–	–	–	46,715	46,539	38,155
Industrial Equipment	N/A	181	839	2,986	9,621	20,652	26,799	55,783	77,136	95,347	127,425	109,375
Electric Power Machinery and Parts	–	20	48	146	1,079	1,689	1,961	2,957	5,260	844	1,496	2,406
Equipment for Distributing Electricity	–	30	623	1,984	3,152	4,414	2,503	5,750	11,392	18,235	17,243	10,497
Electric Apparatus for Medical Purposes	–	.	–	–	–	4	35	–	49	–	–	–
Telecommunications Equipment and Parts	N/A	131	168	856	5,310	14,545	22,300	47,076	60,435	76,268	108,686	96,472
Components and Parts	20,143	26,124	34,324	51,907	94,187	154,983	109,025	169,815	235,123	285,548	328,602	298,589
Thermionics Valves, Tubes, Transistors, and Parts	20,143	26,124	34,324	51,907	94,187	148,703	104,522	165,792	226,130	232,081	266,845	249,970
Electric Apparatus such as switches, relays, fuses, plugs, etc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6,583	8,212	6,539
Electric Machinery and Apparatus, N.E.S.	N/A	N/A	N/A	N/A	N/A	8,280	4,503	4,023	8,993	46,884	53,545	42,080

Source: OECD Statistics on Foreign Trade by Country and Commodity, Series C, various issues.

provide an significant result, as the changes in these values partly result from fluctuations in price levels. To overcome this problem, a measure of the U.S. wholesale price index

Table 5. Values of U.S. MNCs' Foreign Production of Electronic Products and Parts in South Korea, 1968-80 (in Current Thousands of $US)

Year	U.S. Joint Ventures' Production in Korean Electronics Industry	U.S. Firms' Production in Korean Electronics Industry	Total Foreign Prod. by U.S. Firms and Joint Ventures in Korean Electronics
1968	410	2,600	3,010
1969	490	5,100	5,590
1970	460	5,500	5,960
1971	3,600	8,600	12,200
1972	4,900	8,500	13,400
1973	15,200	13,900	29,100
1974	21,000	38,000	59,000
1975	27,800	38,500	66,300
1976	37,200	57,200	94,400
1977	201,000	228,000	429,000
1978	260,000	248,000	508,000
1979	353,000	327,000	680,000

Sources: a) Major statistics of Korean Economy, Economic Planning Board, Korea (1983), p. 241.
         b) Korean Development Bank, various issues.

for electronics and parts is used for calculation of the constant U.S. dollar values.[1] In this way, any fluctuation in these values from year to year can be associated with changes in quantities. The constant U.S. dollar values are presented in Table 6, for the total values of U.S. exports of electronic products and parts to Korea, U.S. imports of the same products from Korea, and U.S. FDI in the Korean electronics industry during 1968-80. This table also summarizes the annual fluctuations in these values. Any increase or decrease in these magnitudes from year to year is shown by a positive or negative sign in front of the figures. Comparison of these trends can throw light on the question of interdependence between U.S. MNCs' exports and this FDI in the

1. Since the U.S. export value index includes all kinds of exported products (including agricultural products), a better choice would be the U.S. wholesale price index (1975=100) for electronics and parts.

Table 6. The Values of U.S. Exports to Korea, U.S. Imports from Korea, and U.S. Foreign Production in Korea, Electronics Industry, 1968-80 (In Constant Thousands of $US)

Year	Value of U.S. Exports of Electronic Products and Parts, into Korea, Thousand Constant US $				Value of the Foreign Prod. of US Affiliates of Electronics Prod. & Parts in Korea, Thous. Const. US $	Value of U.S. Imports of Electronic Products and Parts, from Korea, Thousand Constant US $			Total U.S. Imports of Electronics from Korea
	Consumer Electronics	Industrial Equipment	Components & Parts	Total US Exports		Consumer Electronics	Industrial Equipment	Components & Parts	
1968	637	14,969	20,477	36,083	4,186	7,005	N/A	27,555	34,560
1969	828 +	24,781 +	31,551 +	57,160 +	7,647 +	5,257 -	239	34,556 +	40,052 +
1970	463 -	25,431 +	42,811 +	68,705 +	7,883 +	7,299 +	1,078 +	44,118 +	52,495 +
1971	409 -	28,290 +	40,961 -	69,660 +	15,681 +	16,326 +	3,804 +	66,124 +	86,254 +
1972	274 -	21,383 -	51,940 +	73,597 +	17,070 +	47,265 +	12,041 +	117,881 +	177,187 +
1973	419 +	20,254 -	97,641 +	118,314 +	36,421 +	74,608 +	23,257 +	174,530 +	272,395 +
1974	358 -	27,771 +	132,592 +	160,721 +	66,442 +	48,413 -	26,799 +	109,025 -	184,237 -
1975	604 +	39,356 +	90,433 -	130,393 -	66,300 -	55,865 +	53,535 +	162,970 +	272,370 +
1976	2,236 +	71,915 +	162,120 +	234,035 +	90,595 +	66,822 +	70,637 +	225,646 +	363,105 +
1977	3,044 +	77,421 +	164,774 +	242,195 +	391,781 +	304,143 +	81,354 +	243,642 +	629,139 +
1978	2,991 -	96,945 +	73,700 -	173,636 -	433,497 +	199,734 -	100,256 +	258,538 +	558,528 -
1979	4,029 +	78,207 -	79,807 +	162,043 -	485,012 +	184,278 -	53,172 -	145,158 -	382,608 -
1980	2,253 -	64,101 -	57,380 -	123,734 -	N/A				

[a] U.S. exports, imports, and foreign production values in constant $US are calculated based on 1975 = 100.
[b] Positive and negative signs in front of each figure show annual fluctuations in the magnitudes.

Source: Tables 3, 4, and 5.

Korean electronics industry.

However, for a precise analysis of interdependence between U.S. MNCs' exports to and U.S. MNCs' FDI in the Korean electronics industry, an alternative procedure is provided in the following sections. This alternative procedure calls for choosing proper models of interdependence from among models presented earlier in this section. This implies the consistency of the assumptions with factors which, during the period of study, influenced the decision-making processes of U.S. MNCs' with respect to choosing among exports of electronics to and/or FDI in Korea. Among these factors, Korea's industrialization incentive policies (ISI and EP), variations in the degree of emphasis on ISI and EP policies by the Korean government, and relatively lower cost of labor in Korea are of the greatest importance. As mentioned earlier, the rapid expansion of the Korean electronics industry is attributable partly to the implementation of EP policies in that country, particularly during the late 1960s and 1970s. The various export incentives, such as tax-exemption privileges and duty-free imports for export activities, are among such incentives. U.S. multinationals were attracted into Korea partly for this reason. However, another major motivation for foreign production of U.S. MNCs in Korea was the relatively lower cost of labor (compared to the United States). U.S. subsidiaries were able to produce electronics final products and parts in Korea and export them to the United States and other parts of the world at a relatively lower cost. This motivation was intensified since, as exporters, the U.S. multinationals in Korea could take advantage of the privileges available through the EP policies of this host country.

This phenomenon is reelected in Table 6, which shows that in every single year during 1969-79 (except for 1975) the total value of U.S. imports of electronic products and parts from Korea shown an increase in value. However, as Table 6 indicates, a large proportion of U.S. importation from this industry in Korea consisted of electronics parts and components. An explanation for this phenomenon lies in the efforts by U.S. MNCs to minimize the cost of production by producing the intermediate products in Korea.

As previously stated, the production of electronic products can be technology-intensive or labor-intensive. The electronics industry in Korea has grown for the most part becasue of the avaliability of inexpensive and abundant skilled labor and therefore, through

expansion in labor-intensive processes.[2] U.S. MNCs were thus able to reduce their production costs by transferring labor-intensive processes to Korea while the technology-intensive process remained in United States.

Taking all these factors into consideration, Models IV.A, and IV.B are chosen. The predictions of these models are displayed in Figure 1. The actual trends of U. S. MNCs' exports and FDI in Korea (from Table 6), on the other hand, are illustrated in Figure 2. The predictions and actual trends (in Figures 1 and 2, respectively) are then compared, and the deviations between them are explained.

To make the time period of study (1968-80) accord with the variations in emphasis on EP and ISI policies by the Korean government, Figure 2 is divided into two subperiods : 1967-73 during which the Korean policy makers heavily emphasized EP policies, and 1973-80 during which the Korean government included moderate ISI policies along with its earlier EP policies. By proceeding in this way, not only is the significance of U.S. MNCs' propensity to minimize production costs revealed, but also the reflection

First, as the comparison reveals, during 1968-80 the actual trends of U.S. exports of electronic parts and components to Korea generally (except during 1974-75 and 1977-80) showed an increase which is consistent with the trends predicted for them by Model IV.

Second, during the entire period 1968-80 (except in 1975), U.S. foreign production (FDI) in the Korean electronics industry increased susbstantially which is also consistent with the predictions by Model IV.

Third, the actual trend of U.S. exports of electronic final products to Korea shows an increasing trend except during 1977-80. However, the increase in trend of U.S. exports of final products to Korea (during 1967-77), and the decrease (during 1977-80) are

---

2. The electronics industry in general is divided into four segments (a) consumer products, (b) industrial equipment (c) parts and components, and (d) software. This industry in Korea has grown significantly during the last 15 years. However, the nature of this progress is different from the advancement of the industry in developed countries. While foreign companies have made a major contribution to the growth of this industry in Korea, they were attracted to this area primarily because of the availability of cheap labor. By establishing plants for assembling the parts and components and home appliances from imported components, the MNCs were able to expand this Korean industry. In fact, this Korean industry does not have a clear advantage in the production of industrial equipment and advanced technology-intensive production of industrial equiment and advanced technology-intensive products. Threrfore, one would expect a major proportion of U.S. exports to Korea within the same industry to consist of industrial equipment and parts and components. For this reason the data on U.S. exports of industrial equipment is chosen for application.

FIGURE 1. The Predicted Sequential Patterns of U.S. MNC's Exports of Final Products and Parts, FDI, and U.S. Imports of Final Products and Parts, Model Ⅳ.
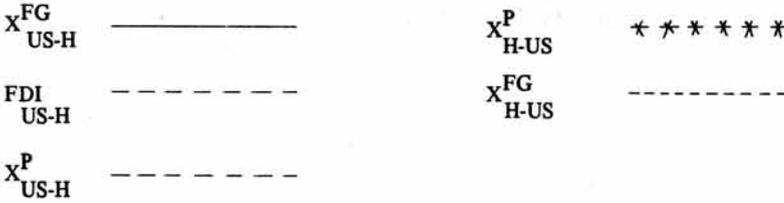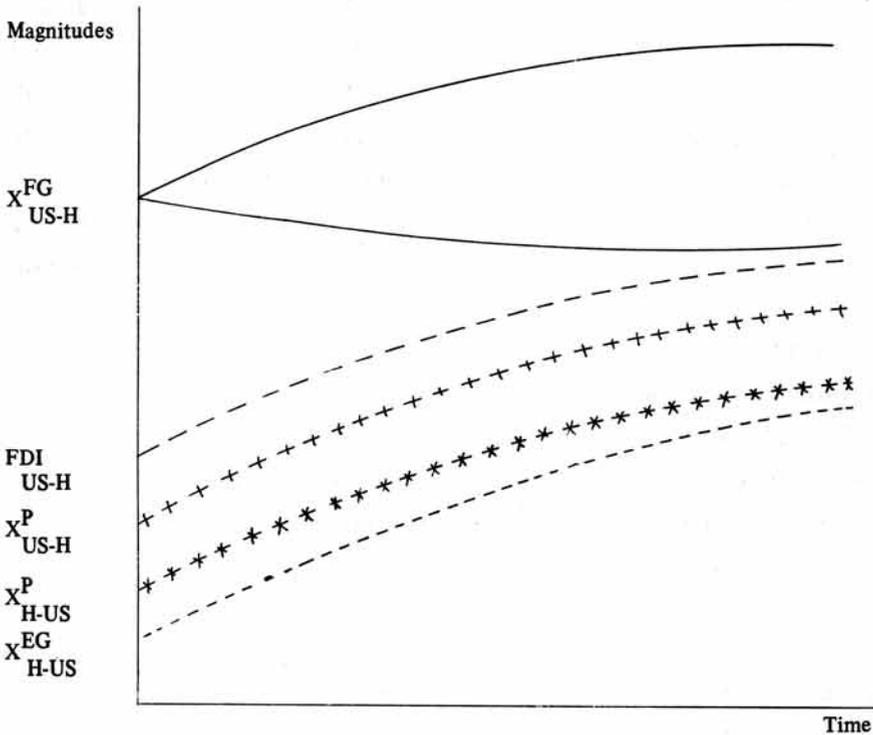
of any change in the degree of emphasis on EP and/or ISI policies (by Korean government) on the U.S. MNCs' propensity to minimize production costs are demonstrated.

The comparison between Figure 1 (predicted trends) and Figure 2 (actual trends) of the U.S. MNCs' exports of final products to Korea, U.S. MNCs' exports of parts and components to Korea, U.S. MNCs' FDI in Korea, Korea's exports of final products

FIGURE 2. The Sequential Patterns of U.S. Exports of Final Products, Parts and Components, FDI, and Korea's Export of Parts and Components: Korea's Electronics Industry, 1968-80.

During Korea's Extensive   During Korea's Moderate Moderate EP Policies
EP Policies   Along with Some Measures of ISI regimes

$X^{FG}_{US\text{-}Korea}$

$X^{P}_{US\text{-}Korea}$

FDI
US-Korea

$X^{P}_{Korea\text{-}US}$

68 69 70 71 72 73 74 75 76 77 78 79 80
Time

X^{FG}_{US} -Korea ——— $X^{P}_{Korea\text{-}US}$ ***** ✶ ✶ ✶

$X^{P}_{US\text{-}Korea}$ + + + + $X^{FG}_{Korea\text{-}U.S.}$ · · · · ·

$FDI_{US\text{-}Korea}$ - - - - -
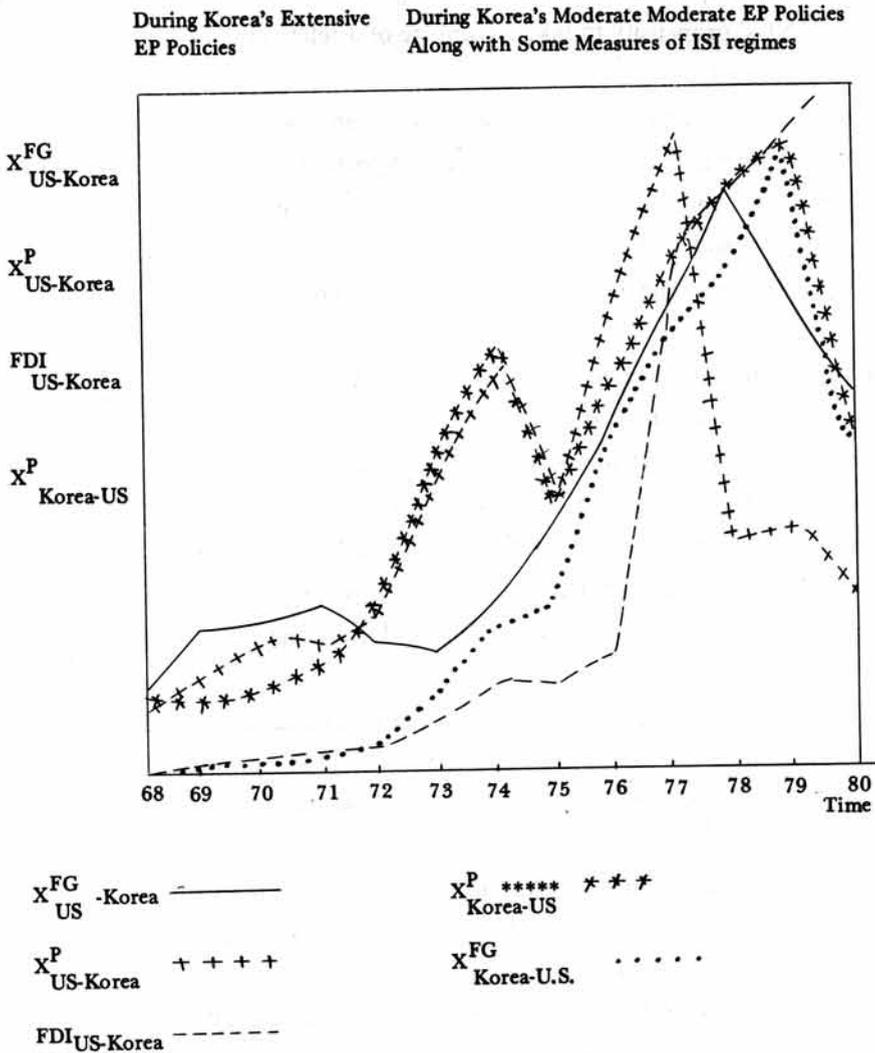
Note: Due to the large fluctuations in magnitudes of U.S. exports, FDI, and Korea's exports, each diagram is depicted separately. The results are then combined on this diagram.

to the United States, and Korea's exports of parts and components to the United States in the case of electronics industry throw some light on the issue of dynamic interdependence between U.S. MNCs' exports and FDI.

both consistent with the predicted trend of this variable by Model IV. This is because, according to the predictions by Model IV, the U.S. exports of final products to a foreign market can increase or decrease depending upon the cumulative effects of country specifics and firm specifics (EP and/or ISI policies of the host country in addition to the U.S. MNCs' propensity to take advantage of a relatively lower cost of of production in the host country).

Fourth, as the comparison shows the actual trend of U.S. imports of final products (industrial equipment) from Korea (Korea's export) during 1968-80 is increasing and consistent with the predicted pattern in Model IV. The only exception is the period 1979-80, during which U.S. imports of electronics final products (industrial equipment) from Korea declined. The indicated observations (above) may result in the following conclusions.

The simultaneous increase in U.S. MNCs' exports of final products and parts to and U.S. foreign productions of electronics products (FDI) in Korea suggests that during the period 1968-80, such investments generated additional exports for these multinationals. However, the reduction in U.S. exports of electronics (final products and parts) to Korea during 1975 and the late 1970s may be explained by the worldwide recessions, and by a possible substitutability between the U.S. exports and FDI. This possibility results from a tremendous increase in U.S. FDI in the Korean electronics industry duing 1977-80.

In addition, it is not surprising to observe an increase in U.S. exports of electronics final products *and at the same time* an increase in U.S. imports of the same category from Korea during the period of study. This is so because, as mentioned earlier in this paper, the nature of the electronics industry in Korea is different from that of the United States. The production process in Korean electronics is mostly labor intensive, while in the United States a technological-intensive process takes place. In fact, the Korean electronics industry lacks the relative advantage of producing those final products which require high technology content in their manufacture (World Bank, 1984).

Finally, the reduction in the values of U.S. exports for electronics final products and parts during 1975 and the late 1970s may be explained by the fact that during 1973-80 the Korean government has diversed its emphasis from an extensive use of EP policies to the moderate ISI policies in addition to a weaker emphasis on the prior EP policies.

Conclusions

In general, during the period 1968-80, Korea's extensive use of industrialization incentive policies, especially EP regimes, played a major role in the rapid expansion of the U.S. multinaionals' FDI in the electronics industry in Korea. In addition, the relatively lower cost of labor in Korea (compared to the United States) was another major motive for such expansion. The U.S. MNCs were able to transfer the labor-intensive part of the process and thereby produced less expensively in Korea, while at the same time benefiting as exporters from the attractive incentive policies of the Korean government.

Based on the applications of Model IV.A and IV.B to the relevant U.S.-Korean data (from Table 6), and in Figures 1 and 2, the following conclustions are drawn.

First, during the period considered in the study, in general the values of U.S. exports of electronic products and parts to Korea increased. Concurrently, U.S. FDI in the Korean electronics industry followed the same trend. Exceptions to these trends are 1975 and 1978-80. In 1975 U.S. exports of electronic products and parts and U. S. FDI within the same industry in Korea declined. The worldwide recession in that year provides an explanation for such reductions. Furthermore, as a result of another worldwide recession during the late 1970s and a moderate emphasis on ISI policies by the Korean policy makers the performance of U.S. exports to Korea in this industry deteriorated. Despite this fact, U.S. FDI during this period increased. However, if none of the indicated factors are strong enough to explain the weak performance of U.S. exports in the electronics industry, one may conclude that during the late 1970s U. S. FDI in the Korean electronics industry substituted for U.S. exports. This is so because, between 1976 and 1977 U.S. FDI in the electronics industry increased significantly.

Second, during 1972-73, U.S. exports of electronic parts to Korea increased, along with an increase in U.S. foreign production in Korea (Table 6), During the same period, U.S. exports of final products (industrial equipment) declined. However, foreign production of U.S. MNCs, on balance, did not substitute for U.S. exports of this industry to Korea. This resulted from a significant expansion in the values of U.S. exports of electronic parts and components to Korea, which was enough to offset a decline in U.S. exports of final products. In 1971 the reverse situation occurred; expansion in the value of U.S. exports of final products was sufficient to offset the reduction in the value of U.S. exports of parts to Korea (Table 6).

Although there is no strong indication to judge whether or not the U.S. MNCs'

FDI in the Korean eletronics industry was export stimulating, the above evidence suggests that, during the period under consideration except in 1975 and the late 1970s, such investments served as an export creator for U.S. multinationals in the Korean electronics industry.

References

Agarwal, J. P. "Determinants of Foreign Direct Investment : A Survey." *The Rev. of World Econ.*, 1980, *116*(4), pp. 739-65.

Behrman, Jack, N., and Mikesel, Raymond F. "The Impact of U.S. Foreign Direct Investment on U.S. Export Competitiveness in Third World Markets," *CSIS*, 1980, Significant Issues Series *2*(1), Washington, D.C.

Caves, R. E. *Multinational Enterprise and Economic Analysis.* Cambirdge : Cambridge Surveys of Economic Literature, 1982.

Dunning, J. H. "The Determinants of International Proudction," *Oxford Econ. Papers*, Nov. 1973, *25*(3), pp. 289-336.

_____, "Trade Location of Economic Activity and MNE. A Search for an Eclectic Approach." In Bertil Ohlin, Per-O. Hesselborn, Per M. Wijkman (Eds.), *The International Allocation of Economic Activity*. Proceedings of a Nobel Symposium held at Stockholm, June 8-11, 1976, London : George Allen & Unwin, 1977.

_____, "Explaining Changing Patterns of International Production : In Defense of the Eclectic Theory," *Oxford Bull. of Econ. and stat.*, November 1979, *41*(4), pp. 269-95.

_____, "Explaining the International Direct Investment Position of Countires Toward a Dynamic or Development Approach," *The Rev. of World Econ.*, 1981. *117*(1), pp. 20-64.

_____, "Changes in the Level and Structure of International Production : The Last One Hundred Years," in *The Growth of International Business* (pp. 84-139). Ed. : M. Casson, London : George Allen & Unwin, 1983.

Dunning, J. H. amd Norman, G. "Intra-industry Production as a Form of International Economic Involvement : An Exploratory Paper," University of Reading, Department of Economics, *Discussion Papers in International Investment and Business Studies*, no, 74, Sept. 1983.

Frank, C. R., Kim, K. S., and Westphal, L. E. *South Korea*, a publication of *NBER*. New York : NBER, 1975.

Hang, W. and Krueger, Anne O. *Trade and Development in Korea.* Honolulu : University of Hawaii, 1975.

Hasan, P. *Korea : Problems and Issues in a Rapidly Growing Economy.* Washington, D. C. : World Bank, 1976.

Hymer, S. H. "The International Operations of National Firms : A study of Direct Foreign Investment." Ph.D. Dissertation, M. I. T., 1960.

Kayhani, N. "The Dynamic Interdependence Between United State Foreign Direct Investment and the Exports of Manufacturing ; The Cases of Brazil, South Korea, and Mexico," A Ph.D. Dissertation, University of Oregon. 1986.

Korea Development Bank. *Industry in Korea.* Seoul, Korea : Korea Development Bank, 1968-80.

Lipsey, R. E., and Weiss, M. Y. "Exports and Foreign Investment in Manufacturing Industries. New York : National Bureau of Economic Research Working Paper No. 131, May 1976.

_____, "Foreign Production and Exports in Manufacturing Industries," *Rev. of Econ, and Stat.,* Nov. 1981, *63*(4), pp. 488-94.

_____, "Foreign Production and Exports of Individual Firms," *Rev. of Econ. and Stat.,* May 1984, *66*(2), pp. 304-308.

OECD, "OECD Development Cooperation," *OECD.* Paris : OECD, 1968-80.

United Nations. *Yearbook of International Trade Statistics.* United Nations (Trade by Commodity). New York : Deparment of International Economics and Social Affairs, Statistical Office, 1968-80.

United Nations. *Statistical Yearbook.* New York : Department of International Economics and Social Affairs, 1976.

Vernon, R, "The Product Cycle Hypothesis in a New International Environment," Oxford Bulletin of Economics and Statistics, Nov. 1979, *41*(4), pp. 255-67.

World Bank, *Korea Development in a Global Context.* A World Bank Country Study. Washington, D. C. : World Bank, 1984.

_____, *World Development Report*, Wahington, D. C. : World Bank, 1985.