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CHUNG-HUA INSTITUTION FOR ECONOMIC RESEARCH

**DOUBLE-EDGED TRADE EFFECT OF
FOREIGN DIRECT INVESTMENT
AND FIRM-SPECIFIC ASSETS:
EVIDENCE FROM THE CHINESE TRIO**

CHIN CHUNG

DISCUSSION PAPER SERIES No.9609

December 1996



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**Double-edged Trade Effect of Foreign
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Assets: Evidence from the Chinese Trio**

by

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CHIN CHUNG*

Double-edged Trade Effect of Foreign Direct Investment and Firm-Specific Assets: Evidence from the Chinese Trio

I. Introduction

It has been hotly debated in the literature whether foreign direct investment (FDI) is trade-reducing or trade-enhancing. Citing Japanese FDI towards Asian developing countries as an example, Kojima (1973, 1978) contended that while traditional oligopolistic FDI (e.g., U.S. investment towards Europe in chemicals and electronics in the 1950s) works to reduce trade between the home and host countries, the new form of "labor-oriented" FDI (e.g., Japanese investment towards Asian low wage countries in the 1960s) tends to enhance trade. The rationale behind this argument is essentially that FDI originating in the oligopolistic industries of the Western world was largely carried out by prestigious firms with specific technological know-how that was highly competitive in the export markets and much too sophisticated for local industries to emulate. As a result, FDI worked against the structure of comparative advantage between the home and host economies and engendered a trade reduction effect. By contrast, the cost-conscious, labor-seeking Japanese FDI was conducted with a view to achieving competitive costs in the standard-skilled industries, which conformed better with the structure of comparative advantage between the two economies and, therefore, resulted in a trade augmenting effect.

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Kojima used these differential trade effects as a welfare criterion for the investing country, contending that the oligopolistic (or market-oriented) type of FDI is *detrimental* to the home country because "it causes loss of export markets and later reverse imports, generates employment problems for the investing country and consequent protectionist barriers to exports of manufactures by less developed countries." This is contrasted with FDI for "creating manufacturing capacity in developing countries which plays a harmonious role for both sides because the industries chosen, such as textiles and other labor-intensive consumer goods industries, are those in which the investing country is losing its comparative advantage while the developing countries are gaining it" (Kojima 1973: 4; 1978: 115).

To stretch this argument one step further, Lee (1984, 1990) contended that labor-oriented FDI is *beneficial* to the home country because it makes it possible for the affected firms to maintain the value of the industry-specific capital, thereby facilitating the contraction of industries losing comparative advantage at a lesser cost than if foreign investment was not possible (1984: 69). He argued that in the absence of FDI domestic structural adjustment can be made only by transferring industry-specific capital in the declining industries to another industry. Such a transfer, however, entails a cost to society as the capital either becomes scrapped or less productive if used in another industry. It follows that the country gains from foreign investment by avoiding this loss. He further portrays, in the spirit of Akamatsu (1962), a picture of three countries moving forward in an orderly Flying Geese pattern, where firms in the transition (intermediate) country losing comparative advantage in labor-intensive industries will invest abroad as they experience falling or low profit rates at home, whereas those in capital- and knowledge-intensive industries which are gaining comparative advantage will invest at home as they experience rising or high profit rates. The latter industries will also receive FDI from the developed country which is in turn losing comparative advantage in some of its capital- and knowledge-intensive industries. During this process FDI nicely facilitates domestic structural adjustment by bringing about an inter-country, intra-industry transfer of industry-specific capital that is less costly to the country than an intra-country, inter-industry transfer or scrapping, which are, according to Lee, the only feasible alternatives in the absence of FDI.¹

¹ Lee seemed to have played down the possibility of selling off the industry-specific capital (perhaps in a turn-key fashion) here. Although this may yield less present value to

The purpose of this paper is to give an example of a contrary case, showing that the Kojima-cum-Lee argument may have erred in a fundamental sense. It will be argued that any capital movement in the form of direct investment entails a reorganization of production activities across national borders and, therefore, will have double-edged effects on the original pattern of trade. Different types of FDI do not seem to differ in this regard. Market-oriented FDI substitutes local production for cross-border trade while generating investment-induced trade in intermediate goods and owner-specific components and parts. Labor-oriented FDI, on the other hand, utilizes local production to satisfy third market demand, again generating trade in semi-finished products between the home and the host. Both types of FDI entail a substitution effect (target product) and an augmentation effect (logistic supply). In both cases, trade in the FDI target product is *shifted* from the FDI home to the FDI host, although in the market-oriented case it succumbs to the form of local production and exchange. The real difference between a market-oriented act and a labor-oriented act, therefore, does not seem to lie in their differential trade effects in a static sense, but rather in their dynamic prospects in maintaining the strength of logistic supply and in creating new competitive edges for home production and trade. These capabilities, which are highly correlated with the amount of *intangible asset* a FDI firm possesses, prove to be the key factors determining the pace of domestic restructuring as well as the ultimate pattern of trade between the home and host economies. They are also important features by which one may judge, if one must, whether an outward FDI is *beneficial* or *detrimental* to the home economy.

A conceptual cornerstone of the oligopolistic theory of FDI (e.g., Hymer 1960; Caves 1971; Knickerbocker 1973; Buckley and Casson 1976; Dunning 1981) is that the firm making a direct investment abroad must possess some kind of intangible assets to offset disadvantages inherent in operating in a foreign land. Intangible assets may take the form of firm-specific advantages in production, management, marketing, special resources, and/or R&D capability. Since such intangible assets are often possessed by firms producing differentiated products, FDI is said to be associated with industries characterized by product differentiation (Caves

the capital owner in the absence of a perfect futures market, it may however keep the owner's human capital within the home economy for intra- and/or inter-industry upgrading and/or diversification.

1971). Furthermore, as investing abroad entails a large burden on the FDI firm in terms of managerial, technical and financial resources, FDI is often carried out by large, integrated firms. This is the standard theoretical framework against which the Western countries' FDI is put to examination.

Theoretical considerations notwithstanding, there has been contrary evidence of FDI by small, specialized firms producing products that are not highly differentiated.² FDI from Japan in the 1960s, and from Taiwan, Korea, and Hong Kong in the 1980s are prominent examples. Unlike their Western predecessors, these countries in their respective times have invested more heavily in labor-intensive, standard-skilled industries in developing countries. What, then, are the "intangible assets" possessed by these smaller FDI firms? In particular, what enables them to venture abroad in an act of FDI and how does this behavior affect the long-term trade pattern between the home and host economies?

As Mason (1980) suggested in the Japanese case, marketing channels may be a key. He argued that Japanese firms may have specific assets in the form of marketing know-how and superior technology in the labor-intensive industries *vis-a-vis* the other developing countries.³ Chen and Wang (1994) also found that manufacturing technology may have been the firm-specific advantage that underlaid Taiwanese FDI in the electronics industry. In other words, an ability to produce reasonably good-quality products at low cost was what distinguished these smaller FDI firms from their potential competitors. Thus, it seems that labor-oriented FDI conducted by small- and medium-sized enterprises (SMEs) can also be explained by the intangible asset theory originally proposed to explain the behavior of oligopolistic firms. As Lee himself (1984) puts it, in other than long-run equilibrium, firms producing non-differentiated products also possess intangible assets. The only difference between a firm producing a differentiated product and a firm producing a non-differentiated product is that the former may be able to keep its intangible assets for a longer period of time than the latter (1984: 715).

Here lies the crux of the matter. Japanese industries in the 1960s and

² For a pioneering discussion of small-firm FDI originating from third-world countries, see Wells (1983).

³ It must be noted, however, that the advantage of market access was accorded to these firms under the umbrella of giant trading companies (or *sogo shosha*) which served as providers of marketing and technology infrastructure for their smaller, satellite firms.

Taiwanese and Hong Kong industries in the 1980s were, for the most part, receivers of Western technologies. They had not introduced any significant innovations which would invite massive imitation overseas as envisaged in the product cycle model (Vernon 1966). The type of technology they relied on was mature and standardized and often embodied in the machinery and equipment they used. Compared to the first generation of the product cycle, which pitted technology inventors against cost savers, they belonged to the second or third generation of the product cycle, which pitted cost savers against cost savers. The essence of their intangible assets, then, may be thought of as an "early entry advantage" based on manufacturing experience (i.e., movements up the learning curve in a general sense) which gave them an edge over latecomers. However, a comparative advantage based on past experience is, in the nature of the case, temporary, inevitably undermined sooner or later by imitators and rivals. As a result, these intangible assets may be too "thin" to render FDI successful if not substantiated by additional sources of advantage. Chung (1994) argues that Taiwanese investments in China by export-oriented SMEs are aided by a peculiar "locational advantage" deep-rooted in their linguistic and cultural proximity to China which effectively lowers the transaction costs of operating in a foreign land.⁴ Ozawa (1979) also conceded that Japan's escape from domestic macroeconomic calamities was engendered by a "collective will" (i.e., the government) and that without help from the government the capacity of small labor-intensive Japanese firms to go overseas would have been very limited (1979: 84).

Aside from being relatively meager in technological capability, the majority of Taiwanese and Hong Kong SMEs are also rather specialized in their respective fields, each producing only a narrow range of similar products (apparel, footwear, toys, and the like). As a result, they usually do not possess sufficient managerial, technological, and financial resources to spread them evenly between overseas and domestic operations. When they invest abroad in an attempt to salvage their sector-specific capital, they often have to hold back on domestic restructuring for a considerable period of time (until they are firmly rooted in the overseas operations). As a result, the home country not only finds its comparative *disadvantage* industries quickly evaporate as a result of outward FDI, but it also

⁴ Similar considerations apply to Hong Kong investors operating in the Pearl River Delta region, but perhaps not in other areas of mainland China.

witnesses its comparative *advantage* industries slow in growing because not enough entrepreneurial talent is left at home to cultivate domestic potentialities. The larger the share of this SME-dominated, cost-driven sector in the home economy, the more likely the latter is going to be haunted by the potential process of "industrial hollowing-out" as a result of inadequate entrepreneurial attention (as well as physical resources) devoted to domestic restructuring at a time of urgent need. It is in this sense that the smooth industrial transmission process suggested by Lee (1990) may be an incomplete one and that, contrary to Kojima's contention, labor-oriented FDI with insufficient intangible assets may actually be detrimental to the home country despite it saves the industry-specific capital for individual FDI firms.

The recent surge of FDI by Taiwan and Hong Kong to China is very relevant to the discussion above. We will show, by referring to the experience of the Chinese trio, that FDI, albeit labor-oriented, works as a double-edged sword on the trade performance of the home country. On the one hand, FDI serves as an engine for vertical trade from the home to the host economy which, in turn, helps fuel the FDI operations overseas. On the other hand, it tends to reduce home exports (and later to increase home imports) of the FDI-targeted products as the latter have been transplanted abroad. The derived demand for machinery and intermediate products can only partially offset the decline in exports of the FDI-targeted products because part of the value-added generated abroad must accrue to the host country. The imbalance will be greater if the FDI firms do not possess sufficient intangible assets or if these assets are short-lived. More importantly, the speed with which domestic restructuring will take place at the ebb of traditional industries also hinges upon the robustness of these intangible assets, which are essential in generating new sources of comparative advantage at home. Lacking such intangible assets, therefore, implies not only that FDI firms may themselves be limited in their overseas ventures, but also that the home economy may suffer from a decline of growth impetus with the exodus of traditional industries.

In the next section, the intensified trade flows and FDI movements within the trio are examined to give a proper background for subsequent discussions. Section three looks at the FDI-induced trade in materials and semi-finished products as generated by Taiwan and Hong Kong firms in support of their mainland operations. Section four illustrates the other edge of the FDI trade effect -- the phenomenon of "export shift" from FDI home to FDI host countries -- together with a discussion of the imbalance

problem arising from this process. Section five considers the implications for home restructuring in terms of GDP growth, export performance, and domestic capital formation in the manufacturing sector after the outflow of FDI. A simple statistical test is also conducted to substantiate the argument made in this article for the case of Taiwan. Section six provides some concluding remarks.

II. Economic Interactions among the Trio

Both Hong Kong and Taiwan have enhanced their trade links with China significantly since the mid-1980s.⁵ Trade with China grew at an average annual rate of 25.5% for Hong Kong and 20% for Taiwan from 1986 to 1994, compared with overall trade growth of 7.7% for Hong Kong and 10.6% for Taiwan over the same period. More specifically, China has become the foremost trading partner to Hong Kong since 1986, accounting for more than one-third of its total imports and over 40% of its re-export activities from that time on (Table 1). While Hong Kong's domestic exports in recent years have seemed to come to a standstill, its import and re-export sectors continue to boom as a result of its close ties with China. The situation with Taiwan is similar. The importance of Hong Kong and China together as an export market for Taiwan increased substantially from 7.3% in 1986 to 22.9% in 1994, and in 1995 they overtook the U.S. and became the most important export market for Taiwan. This rapid growth in trade among the trio can be attributed to a number of factors, foremost among them the relocation of Hong Kong's and Taiwan's manufacturing industries across the border to Chinese provinces (Tuan and Ng 1995; Yen et al. 1992). As is well-known, Hong Kong has been the primary source of foreign direct investment for China ever since China adopted its open door policy. As of the end of 1993, Hong Kong's cumulative contractual investment in China had reached US\$150 billion, accounting for over 68% of the total FDI China received between 1979 and 1993. Currently it is estimated that there are over 50,000 Hong Kong factories in Guangdong

⁵ Hong Kong's trade links with China have developed quickly since the late 1970s after China embarked on its "open door" policy. Due to its geographical proximity to the Pearl River Delta, its modern port facilities and efficient port management, Hong Kong has become the sole entrepot for southern China's external trade during the 1980s.

**Table 1 Taiwan's and Hong Kong's External Trade
by Major Partners**

	Taiwan						Hong Kong					
	(Share %)			(avg. growth rate %)			(Share %)			(avg. growth rate %)		
	1980	1986	1994	1980-86	1986-90	1990-94	1980	1986	1994	1980-86	1986-90	1990-94
Export to:	100.0	100.0	100.0	15.0	13.9	7.1	100.0	100.0	100.0	14.5	10.1	-0.4
U.S.	34.1	47.7	26.2	18.8	3.4	5.8	33.1	41.7	28.5	19.0	0.8	-1.9
Hong Kong (incl. China)	7.8	7.3	22.9	11.1	30.8	25.2						
China							2.4	11.7	27.7	49.6	27.4	6.5
Japan	11.0	11.4	11.0	13.1	16.3	2.8	3.4	4.0	4.7	17.8	18.1	-3.5
Germany	5.4	3.2	3.5	2.9	25.7	12.5	10.8	7.2	5.8	7.0	12.9	-8.3
Singapore	2.8	2.3	3.6	9.3	24.1	11.3	2.6	1.8	5.5	7.7	29.2	11.9
U.K.	2.4	2.4	2.3	12.7	19.6	2.4	10.0	6.4	4.6	6.5	8.0	-6.6
Rest of World	36.5	25.7	30.5	-	18.6	7.2	37.7	27.2	23.2	18.7	8.7	-10.9
Import from:	100.0	100.0	100.0	3.4	17.7	10.4	100.0	100.0	100.0	16.3	23.5	18.1
Japan	27.1	34.1	29.0	7.5	18.0	9.3	23.0	20.4	15.6	14.0	16.4	17.2
U.S.	23.7	22.5	21.1	2.5	18.3	8.5	11.8	8.4	7.1	9.8	22.2	14.6
Germany	3.7	4.7	5.6	7.9	21.5	13.7	2.6	1.2	2.3	19.2	15.8	17.9
Hong Kong (incl. China)	1.3	1.6	1.8	7.3	30.7	4.5						
China							19.7	29.6	37.6	24.5	30.4	18.8
Taiwan							7.1	8.9	8.6	20.2	24.8	16.6
Singapore	1.1	1.4	2.8	8.1	32.9	14.9	6.6	3.9	5.0	6.7	24.5	24.1
S. Korea	1.1	1.4	3.5	7.9	32.6	22.7	-	4.0	4.6	-	26.6	19.6
Rest of World	42.0	34.3	36.2	3.6	23.5	12.9	29.2	23.6	19.2	12.0	17.3	18.1
Re-export to:							100.0	100.0	100.0	26.4	35.6	23.0
U.S.							10.3	8.5	22.2	22.5	70.4	24.4
China							15.4	42.1	34.1	49.4	21.1	30.6
Japan							7.3	15.2	5.8	42.7	7.0	22.4
Germany							0.2	2.1	4.4	25.3	74.3	15.5
Singapore							8.3	0.9	2.1	-13.1	84.7	12.8
Taiwan							7.4	7.1	2.4	25.4	21.7	10.8
U.K.							-	1.6	2.9	-	58.5	22.6
Rest of World							51.1	22.5	26.1	10.2	44.9	25.5

Sources: Calculated from *Monthly Statistics on Taiwan's Export-Import Trade*; *Hong Kong Monthly Digest of Statistics*, various issues.

province alone, directly or indirectly employing 5 to 6 million people (almost the size of the population of Hong Kong itself).⁶ The relocation of industries has resulted in a rapid increase in the volume of goods moving between Hong Kong and China. According to Ng and Tuan (1996), as much as 72%~74% of Hong Kong's exports to China and Hong Kong's imports from China were outward-processing related in 1993.

In addition to Hong Kong's own processing activities in Guangdong, a second important factor contributing to the tremendous growth in Hong Kong's trade with China is, in fact, Taiwan's FDI toward the mainland. Since the mid-1980s, Taiwan has also come under the pressure of increasing domestic manufacturing costs. Like Hong Kong entrepreneurs, Taiwanese firms also responded by relocating a good part of their labor-intensive industries overseas, and the most popular site for such production relocation is, without doubt, the Chinese mainland. Taiwan's FDI toward China quickly took off after 1987 when the Taiwan government lifted the ban on visits to family members on the mainland after a forty-year freeze. By mid-1995, Taiwan's cumulative investment in China amounted to US\$25.34 billion with over 28,000 investment projects. Taiwan's share in China's total foreign investment was 8.3% in terms of contracted value and 11.8% in terms of the number of cases contracted, which made Taiwan the second largest investor on the mainland next to Hong Kong.

As a result of the Taiwan government's persistent refusal to allow direct shipping links with China, most of the trade flows generated from such foreign production have to go indirectly through an entrepot like Hong Kong. Taiwan-China trade thus showed up in Hong Kong's trade record as part of the re-export trade. This has done much to foster Hong Kong's entrepot trade during this period. In fact, almost 17.5% of Hong Kong's entrepot trade in 1994 was due to Taiwan's "indirect trade" with China through Hong Kong (including transshipment), which accounted for at least 5% of Hong Kong's total trade volume in that year.

Table 2 presents the results of a recent report on the industrial distribution of Taiwan's and Hong Kong's FDI in China. The figures are obtained from an official survey of all FDI operations in China as of the

⁶ See, for example, Sung (1995) and Ng and Tuan (1996) for a detailed discussion of this phenomenon.

Table 2 Industrial Distribution of FDI in China: 1992 Survey Data

Unit: %

DFI Source	Total	H.K.	Taiwan	U.S.	Japan	Singapore	Others
Industry							
Agriculture & Forestry	1.80	1.62	0.80	1.33	2.07	1.53	4.35
Manufacturing	62.12	59.13	76.72	73.71	33.93	61.61	72.34
Processed Foods	4.13	2.72	8.09	7.71	1.43	15.64	7.56
Beverages & Tobacco	1.33	1.18	0.86	5.77	0.07	1.32	1.57
Textiles	7.95	9.59	7.92	3.23	1.15	4.41	4.92
Wearing Apparel	5.14	5.98	5.12	2.24	4.12	2.29	1.82
Leather Products	1.91	2.15	1.78	1.46	0.74	0.46	1.82
Wood & Bamboo Products	1.85	1.25	3.31	1.11	2.84	3.45	3.68
Paper Products	1.75	1.93	1.39	1.74	0.32	0.54	2.41
Chemicals	2.13	1.88	1.72	8.72	0.74	2.13	1.79
Chemical Products	2.44	2.01	3.64	4.75	1.32	7.43	2.60
Petroleum & Coal	0.20	0.15	0.05	0.39	0.00	1.38	0.68
Rubber Products	0.51	0.41	1.43	0.69	0.05	0.05	0.54
Plastic Products	5.59	5.44	9.35	2.23	0.69	4.36	8.40
Nonmetallic Mineral Products	4.68	5.22	2.51	5.82	1.36	6.39	5.29
Basic Metals	1.24	1.18	0.85	0.66	1.85	0.45	2.21
Metal Products	3.13	2.83	5.25	6.94	1.07	1.09	2.62
Machinery	1.75	1.10	3.59	3.13	2.34	1.54	2.99
Electrical Appliances	9.40	9.47	9.37	9.42	3.87	6.75	9.23
Transportation Equipment	1.91	1.07	1.86	3.00	3.11	0.21	7.17
Precision Instruments	0.80	0.83	0.81	0.59	0.39	0.63	1.11
Miscellaneous Products	3.27	2.71	7.82	3.57	0.95	1.10	3.93
Services & Construction	37.09	39.25	22.48	25.50	64.01	36.86	23.13
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Adapted from Kao, Chang et al. (1994), *A Comparative Study of Foreign Investment in Mainland China* (in Chinese), project report commissioned by the Investment Commission, ROC, Appendix Table 5-3, p. 261.

end of 1992.⁷ Compared with FDI from the advanced countries, Taiwan's and Hong Kong's FDI concentrated more heavily in such labor-intensive sectors as textiles, wearing apparel, plastic products, metal products, electrical appliances, and miscellaneous items. Together these sectors accounted for 55.83% of Taiwan's realized manufacturing FDI and 62.27% of Hong Kong's realized manufacturing FDI at the end of 1992 (comparable figures for the U.S. and Japan were 37.48% and 34.92%, respectively). It is clear that cost-saving considerations counted heavily in Taiwan's and Hong Kong's FDI toward China, where the supply of abundant labor can make a real difference in these labor-intensive lines of production.

III. Investment as an Engine for Vertical Trade (Logistic Supply)

It is well-documented in the literature that Taiwan's indirect exports to China over the past decade have been characterized by large flows of intermediate products such as plastic materials, cotton cloth, synthetic fibre and yarn, and electronic components and parts.⁸ The share of these intermediate products remained as high as 74% of the entire indirect exports to China as of 1995. Several studies have tried to empirically divide Taiwan's indirect trade with China into an "investment-induced" part and an "autonomous" part. Using input-output linkage analysis, Chung (1991) and Chung et al. (1993) first estimated the investment-induced exports from Taiwan to the mainland to be roughly 40~45% of actual exports in 1991,⁹ and the remaining 55~60% was

⁷ For details of the method used to compile these data, see Kao, Charng et al. (1994).

⁸ See, for example, Chung (1991), Chiu and Chung (1993), and Kao, Charng et al. (1994).

⁹ Because earlier Taiwanese FDI was more concentrated in export-oriented sectors, which had to meet a 70% export ratio decreed by the Chinese authorities, it is reasonable to use the input-output table method in deriving the corresponding estimates. For later years, however, especially after 1992 when domestic market-oriented FDI started to boom, the same methodology should be used more carefully so as not to exaggerate the results.

deemed "autonomous" exports aimed at local demand in the Chinese market (Table 3). The implication is that without the derived demand from Taiwanese FDI on the mainland, the commodity exports to the mainland in 1991 would have been 40~45% less than observed. Kao, Lee, and Lin (1993) arrived at similar estimates based on survey data. On the import side, the same studies estimated that investment-induced indirect imports from China (i.e., return sales to the home country by FDI firms) were as high as 64~76% of the actual indirect imports from China. Taken together, the investment-related trade flows accounted for 33~51% of the actual indirect trade between the two economies, resulting in an investment-induced trade surplus for Taiwan equaling one-third of its total trade surplus with China in 1991.¹⁰

In the case of Hong Kong, various authors have also documented the importance of semi-finished products in the trade flows between Hong Kong and China. For example, Ng and Tuan (1996) find that, in 1993, the proportion of outward processing trade as a percentage of total trade with China was 72% for imports (finished or semi-finished products), 74% for domestic exports (raw materials, components, and parts), and 78% for re-exports (including both types). Combining the experiences of Taiwan and Hong Kong FDI operations, it seems clear that trade among the Chinese Trio has been characterized by investment-induced trade, i.e., exports of raw materials, components, and parts to China in exchange for imports (or re-exports) of processed or assembled goods from China.

The reason FDI firms resort to overseas sourcing of intermediate inputs has been examined in the literature from different angles. In the case of FDI in mainland China, a first important factor at work had been the lack of a proper indigenous supply base until very recently (Chung 1991; Wu 1994). The Chinese official policy of encouraging outward processing activities (*liangtouzaiwai*) further reinforced this tendency of outward sourcing (Chiu and Chung 1993). Under this policy, foreign investors were obliged to provide their own materials and semi-finished products so that the internal market of China was not disturbed by additional demands from foreign operations. Chung (1991) describes this phenomenon as an inadvertently self-imposed "enclave" economy.

¹⁰ The imbalance was in part due to the Taiwan government's imposing import restrictions on Chinese commodities while allowing free exports from Taiwan to China via a third country, as explicated in Chung (1991).

Table 3 Estimated Contribution of Investment-induced Trade to Actual Trade between Taiwan and China (1991)

	Actual Volume of Indirect Trade in 1991 (US\$ bil.)	Estimated Contribution of FDI-induced Trade to Total Trade			
		(A)		(B)	
		Estimates from Kao et al. (1993)	(%)	Estimates from Chung et al. (1993)	(%)
1. Taiwan's Indirect Exports	4.67	2.13	45.6%	1.91	40.8%
2. Taiwan's Indirect Imports	1.13	0.86	76.2%	0.72	63.9%
3. Total Bilateral Trade	5.79	2.99	51.6%	2.63	33.0%
4. Taiwan's Bilateral Surplus	3.54	1.27	35.9%	1.19	33.6%

Source: Chung et al., *Mainland China's Export Promotion Policy and its Impact on Taiwan's Trade Performance*, Chung-Hua Institution for Economic Research, 1993, Chapter 4, Table 4-9, p. 154.

A second, and more general, motive for FDI firms to hold on to their original supply sources is a need to control product quality, especially at the earlier stages of a FDI operation (Lecraw 1979). Being newly situated in the host country and lacking adequate knowledge of local supply conditions, the FDI firm often chooses to employ the same components and parts as in domestic production so as to reduce the possibility of product failure. This is particularly important for export-oriented firms since production credentials are at the core of their *intangible assets* and it is production credentials *per se* that help sustain their export market orders. Even for domestic market-oriented FDI firms, retaining long-standing supplier relationships seems a better way to uphold product quality, and thus corporate image, in the marketplace.

The above two types of overseas sourcing usually generate what we call intra-industry and inter-industry trade, by which we mean, for instance, the export of shoe soles and polished leather to overseas shoemakers (intra-industry trade) or of steel rods and plastic materials for offshore production of sporting goods (inter-industry trade). Both types of trade lead to commodity flows in which the exporting and importing firms are not necessarily linked in equity terms. A third type of overseas sourcing is known as intra-firm trade, in which the parent firm at home and the subsidiary abroad engage in trade in semi-finished products across national

borders. An important function of intra-firm trade is to facilitate *transfer pricing*, which allows the parent firm to extract economic rent from its subsidiaries (Mason 1980; Casson and Norman 1983). In order to do this, however, the parent firm must achieve a significant degree of vertical integration prior to FDI such that the owner-specific economic rent embodied in (for example) key components and parts of a product may be captured through this mechanism. Japan, for example, has been known to establish auto assembly lines in the U.S. while importing large quantities of auto parts and engines from Japan at high cost as a way of circumventing the Voluntary Export Restraints (VERs) imposed by the U.S. Lack of vertical integration in the parent firm leaves little room for division of labor between overseas and home operations and, as a result, dispossesses the necessary means by which economic rent may be transferred from the subsidiary to the parent firm (other than the trivial case of remittance of financial profits, which may itself be limited by a variety of circumstances at any rate). Not only is a considerable degree of internal linkage essential, the intermediate products, which are a manifestation of the parent firm's intangible assets, must also be competitive enough such that the parent-subsidiary internal transactions may be sustained without sacrificing total profit rates. In other words, intra-firm transactions are preferred to inter-firm transactions only when the parent firm is able to provide world-competitive components and parts for its subsidiaries.

As commented on previously, however, manufacturing firms from Hong Kong and Taiwan alike are among the least vertically integrated producers in the world. They are mostly SMEs working closely together in a regional network, each specializing in the production of a few items and parts thereof.¹¹ The scope for trade enhancement between the parent and the subsidiary is therefore severely limited. Also important are the characteristics of the industries involved: for most labor-intensive, low-technology products, the inherent levels of technology and production processes do not entail much possibility for intra-firm division of labor. Most of the processes may be labor-intensive, or it may be too costly to divide the knowledge-intensive parts from the labor-intensive parts of the entire production process (e.g., footwear and apparel design, cutting,

¹¹ This is especially true in the export sector as opposed to the domestic market-oriented sector in these economies. See, for example, Chou (1985) and Hamilton (1991) for excellent discussions of this phenomenon.

sewing, and finishing). Because a large number of Taiwan and Hong Kong FDI firms are originated in such industries, the scope for intra-firm division of labor is further limited.¹²

It is thus clear that the investment-induced trade among the trio has by and large consisted of inter- and intra-industry trade (rather than intra-firm trade) in which upstream producers at home furnish raw materials, components and parts for downstream FDI firms in China. Compared with intra-firm trade, which has a strong internal motivation due to a desire to appropriate rent, the momentum for inter- and intra-industry trade is likely to taper off over time as local supply capacity builds up either through indigenous effort or through second-tier FDI firms who follow in the footsteps of the first-tier downstream producers. In the case of Taiwan, for example, it has been widely documented that investments made by large-scale bicycle assemblers such as Merida (in Longhua, Guangdong) and Giant (in Kunshan near Shanghai) attracted numerous component and parts suppliers to establish production networks nearby to serve local demand generated by these firms (Yen, Lin, and Chung 1992). In other words, one expects to see a gradual decline of FDI-related exports from home and a concomitant increase in the importance of local shipments. This has indeed been the case if we look at empirical evidence. According to a 1992 survey of 431 Taiwanese firms from different manufacturing sectors, 71.4% of the raw materials, components, and parts necessary for their FDI operations in China were purchased from Taiwan (including parent and other firms) and only 20.8% were acquired from local sources (including indigenous firms and local FDI firms). A similar survey conducted among 285 firms in January 1995 indicates, however, that sourcing from Taiwan has declined to a mere 36.2% while local procurement has soared to 40.2% for these same items (Table 4). Figures for the procurement of machinery and equipment were 85.7% from Taiwan vs. 7.4% from local sources in 1992, as compared with 68.5% from Taiwan vs. 18.3% from local sources in January 1995.

¹² In this respect Hong Kong may have benefitted more from geographical proximity to China than Taiwan has in that goods can be swapped back and forth within a day's time without incurring large transportation costs.

Table 4 Changes in Sourcing Behavior of Taiwanese FDI in China: 1992-1995

unit:%

Sourcing Behavior	Study & Sample Size	Yen, Lin, & Chung (1992)* (n=431)	Industrial Federation (Nov. 1994)** (n=317)	Industrial Federation (Jan. 1995)*** (n=285)
Purchases of raw material, components, and parts (%):				
from Taiwanese (or parent) firm		71.4	47.2	36.2
from local Chinese firms		16.0	29.8	40.2
from local foreign firms		4.8	11.4	10.0
from a third country		7.2	11.6	13.6
Purchases of machinery and equipment (%):				
from Taiwanese (or parent) firm		85.7	73.0	68.5
from local Chinese firms		7.4	17.0	18.3
from local foreign firms				
from a third country		6.2	10.0	13.2

Sources: * Yen, Lin and Chung (1992), *A Study of Investment and Trade Relations between Taiwan and Mainland China*, Chung-Hua Institution for Economic Research.

** Industrial Federation of the ROC (1994).

*** Industrial Federation of the ROC (1995).

IV. Investment as a Substitute for Horizontal Trade (Export Shift)

Linking the host country to the international market may be one of the most important functions of FDI to the recipient countries. In the past, Taiwan and Hong Kong both benefitted substantially from export-oriented FDI originating in advanced countries, in particular Japan and the U.S. These investments consisted mainly of foreign-local joint ventures and original equipment manufacturing (OEM) contracts for various labor-intensive products, in which Taiwan and Hong Kong firms quickly mastered the production technology and became leading exporters in the world. Two decades later, Taiwan and Hong Kong firms have themselves turned into labor-seeking FDI firms and, in so doing, have found access to

the international market one of their most valuable assets *vis-a-vis* emerging competitors. It is important to note, however, that the essence of such a FDI move is precisely to *relocate* production from a high-cost to a low-cost base and that, as a result, an *export shift* that substitutes overseas exports for domestic exports necessarily ensues (Chung 1991). The extent of this export substitution is shown in Table 5 for the case of Hong Kong. It is estimated that, in 1993, out of the total manufacturing exports by Hong Kong, 95.4% of the travel goods and handbags were processed and exported from Guangdong, and only 4.6% were processed and exported directly from Hong Kong. Similar figures for toys were 94% (Guangdong) and 6% (Hong Kong), and for miscellaneous items 80.5% (Guangdong) and 19.5% (Hong Kong), respectively (Sung 1994). On average, more than 60% of Hong Kong's production-cum-exports of these labor-intensive products had been transplanted to the mainland as of 1993. These developments may help explain the observed drastic decline of Hong Kong's domestic exports in recent years.

The situation for Taiwan is similar. For example, it is believed that more than 60% of Taiwan's shoe-making industry and over 75% of Taiwan's umbrella industry have been transplanted to China since the mid-1980s.¹³ As a result, in 1994, shoes made in mainland China captured 45% of the U.S. market, a share enjoyed by products from Taiwan in 1986. Table 6 reports a set of estimates for Taiwan's "contribution" toward China's manufacturing exports by way of FDI. For the manufacturing sector as a whole, Taiwan's FDI of US\$2 billion in 1992 had generated an estimated sum of exports between US\$4,936~5,325 million, which accounted for 7.5~7.9% of China's actual manufacturing exports in that year.¹⁴ In some of the sectors where Taiwanese FDI was particularly concentrated, the share of Taiwan's "contribution" toward China's sectoral exports was as high as 37.6~44.5% for rubber and plastic products, 5.2~22.9% for transportation equipment (in particular, bicycles), and 13.7~18.8% for electrical and electronics products (e.g., telephone sets, color TVs, and tape recorders).

¹³ Estimates by the Manufacturers' Associations of the Footwear Industry and the Umbrella Industry, respectively. See *Economic Daily News* (in Chinese), Jan. 23, 1995.

¹⁴ These estimates were obtained using input/output analysis combined with survey data for relevant parameters such as export propensities for each individual sector. See Chung et al., (1993).

**Table 5 Exports from Hong Kong and Guangdong
by Hong Kong Firms (1993)**

unit: HK\$ mil.

SITC	Commodity	Exports of Hong Kong Firms Producing in		
		Hong Kong*	Guangdong**	Total
83	Travel Goods & Handbags	104 (4.6)	2,170 (95.4)	2,274 (100)
894	Toys	431 (6.0)	6,724 (94.0)	7,155 (100)
899	Miscellaneous Manufactures	327 (19.5)	1,347 (80.5)	1,674 (100)
76	Telecommunication & Sound Recording Equipment	1,716 (22.1)	6,041 (77.9)	7,757 (100)
69	Metal Manufactures n.e.s.	600 (37.8)	988 (62.2)	1,588 (100)
65	Textiles	2,092 (40.6)	3,057 (59.4)	5,149 (100)
84	Clothing	9,289 (51.3)	8,826 (48.7)	18,115 (100)
77	Electrical Machinery & Appliances	2,930 (51.4)	2,774 (48.6)	5,740 (100)
75	Office Machines & Automatic Data Processing Machines	2,229 (63.5)	1,279 (36.5)	3,508 (100)
885	Watches & Clocks	1,701 (66.8)	847 (33.2)	2,548 (100)
	Subtotal	21,419 (38.6)	34,053 (61.4)	55,472 (100)
	All Commodities	28,815 (39.6)	43,965 (60.4)	72,780 (100)

Note: percentage share in parentheses.

* Hong Kong's domestic exports.

** Re-exports of Guangdong origin involving outward processing (taken to be 93.3% of re-exports of China origin involving outward processing).

Source: Sung, Yun-Wing (1994), "The Economic Integration of the China Circle: Implications for the World Trading System," Table 5. Original data are from the Census and Statistics Department of Hong Kong.

Table 6 Estimated Contribution of Taiwan's FDI to China's Export Performance (1992)

Estimate	Estimated Sectoral FDI* (US\$ mil.)		Estimated Export Shift** (US\$ mil.)		As % of China's Exports (1992)	
	(A)	(B)	(A)	(B)	China's Exports (US\$ mil.)	Taiwan's Contribution (%)
Sector	(A)	(B)	(A)	(B)		(A) (B)
Textiles	85-208		223-546		7,749	2.88-7.05
Wearing Apparel	125-134		325-348		16,469	1.97-2.11
Leather Goods	19-47		93-230		2,329	3.99-9.88
Wood Products	69-87		192-242		1,820	10.55-13.30
Miscellaneous	263-205		995-776		5,516	18.04-14.07
Rubber & Plastics	335-283		814-688		1,830	44.48-37.60
Non-ferrous Minerals	64-66		88-91		1,299	6.77-7.00
Metal Products	85-138		98-159		1,600	6.13-9.94
Electrical & Electronics	338-246		1,537-1,119		8,176	18.80-13.69
Transportation Equip.	215-49		505-115		2,202	22.93-5.22
Others	402-550		455-622		32,834	1.39-1.89
Manufacturing Total	2,013		5,325-4,936		67,553	7.88-7.31

* Sectoral FDI is estimated from two alternative series of FDI distribution across manufacturing sectors. Distribution (A) is adopted from the Investment Commission, ROC, based on investment registration data of US\$735 million as of April 1991, with the assumption that the same industrial distribution is applicable as of end of 1992, when total investment reached US\$2 billion; distribution (B) is based on Chinese official survey results reported in Table 2 above. Estimates derived from each are reported side-by-side (connected by the symbol "~") in this table.

** Estimates of "export shift" are derived from multiplying sectoral FDI by overseas capital productivity, which is assumed to be 1.2 times that of the domestic output-capital ratio based on survey results reported in Chung et al. (1993).

Sources: Domestic output-capital ratio: *Census of Industry and Commerce of Taiwan, ROC, 1992.*

China's manufacturing exports: *China's Customs Statistics, 1993.* Original data is classified by SITC (revision 3). We have re-classified the data into 20 manufacturing sectors as shown in Table 2.

The transplant of export manufacturing bases has an immediate impact on the export market shares enjoyed by Taiwan and Hong Kong as well as on their respective trade position *vis-a-vis* the importing countries. Between 1989 and 1994, both Taiwan and Hong Kong experienced a serious deterioration of market share in the U.S. and Japan for such labor-intensive items as travel goods, apparel, footwear, umbrellas, furniture, and miscellaneous products (Table 7). A resultant transfer of trade surpluses from Taiwan and Hong Kong toward China has made China the second largest trade surplus country *vis-a-vis* the U.S. (next only to Japan) and has helped trigger the notorious Sino-American trade disputes in recent years (Table 8). Indeed, Taiwan's involvement in China's manufacturing exports to the U.S. has been such that a recent U.S. threat to impose trade sanctions on China spelled disaster for Taiwanese FDI firms. According to one estimate, it is projected that a tariff sanction of US\$1 billion upon imports from China (as proposed by the U.S. government in February 1995) could induce an immediate loss of US\$274 million for Taiwanese investors in the form of foregone orders, which was about 27% of China's actual exports to the U.S. under the proposed sanction (Table 9).¹⁵

There is no consensus, however, as to whether these export substitutions should be regarded as a positive or negative development for the home country. One argument advanced in the literature is that they are a result of free market forces (i.e., shifting comparative advantage between different countries) and therefore should not be a cause for policy concern. Furthermore, the argument goes, since the FDI firms are in a position to control more production bases and therefore bigger export market shares, their actions are beneficial to the home country because they generate greater GNP.¹⁶

Opponents of this view, however, point to the fact that governments

¹⁵ From Table 7 it is clear that China's export booms in these sectors more than offset the combined losses of Taiwan and Hong Kong, indicating that the Chinese export drive in these labor-intensive products may have been supported by multilateral interests (e.g., including township and village enterprises in the rural areas of China). However, we have reason to believe that economies of scale of Taiwanese and Hong Kong DFI played an important part in augmenting China's exports in these sectors. In fact, many Taiwanese firms have been documented to enlarge their scale of operations after the initial profit was made. See Chung et al. (1993).

¹⁶See, for example, Schive, Chi (1995) and Lin, Chu-chia Steve (1995).

Table 7 Changes in Export Market Shares for Taiwan, Hong Kong and China in Selected Product Groups in the U.S. and Japanese Markets: 1989-1994

Product Category	Market	The U.S. Market			The Japanese Market		
		Taiwan	Hong Kong	China	Taiwan	Hong Kong	China
HS 42 Handbags & travel goods		-9.12	-1.38	+30.95	-1.56	-4.42	+21.99
HS 46 Woven baskets		-4.49	-1.60	+14.81	-26.02	-0.77	+37.08
HS 61 Knitted apparel & accessories		-6.17	-2.77	+0.52	-10.96	-4.40	+24.07
HS 62 Non-knitted apparel & accessories		-5.08	-5.29	+4.91	-5.23	-1.93	+29.86
HS 64 Footwear & accessories		-20.03	-0.42	+36.27	-17.92	-0.18	+35.68
HS 65 Hats & accessories		-6.28	-0.56	+3.78	-8.16	-0.59	+2.77
HS 66 Umbrellas, sticks & stags		-27.54	-3.08	+27.98	-65.23	-2.46	+72.46
HS 67 Feather goods, man-made flowers, etc.		-4.77	-0.76	+29.76	-9.29	-2.41	+9.44
HS 94 Furniture & lighting		-11.44	-0.44	+13.85	-11.52	-0.20	+8.85
HS 95 Toys, games, & sporting goods		-8.73	-3.07	+24.35	-7.96	-1.34	+19.09
HS 96 Miscellaneous products		-4.67	-6.14	+10.50	-2.53	-3.72	+11.12
Manufacturing Total		-1.13	-0.60	+3.33	-0.33	-0.27	+4.71

Note: - means a decrease in import market share (in percentage points) during the period 1989-94, while + indicates an increase.

Sources: The export market shares for Taiwan, Hong Kong and China are calculated from customs statistics of the U.S. and Japan (on tape).

Table 8 Shifting Trade Surpluses with the U.S. among the Trio

Year	(A) Taiwan	(B) Hong Kong	(C) China	(A)+(B)+(C) The Trio
1987	16.04	4.06	3.40	26.48
1990	9.13	1.87	11.49	22.49
1992	7.80	-0.77	19.94	26.97
1994	6.30	-2.42	19.80	33.68

Sources: United States Customs Statistics.

Table 9 Potential Impact on Taiwanese FDI of a U.S. Sanction against China (1995)

Sector affected by U.S. Sanction	Sectoral Sanction (US\$ 10,000)	Taiwan FDI's Export Contribution (%)	Potential Impact (US\$ 10,000)
Processed Foods	3,097.5	1.39~1.89	43.1~58.5
Wearing Apparel	6,876.2	1.97~2.11	261.4~145.1
Wood Products	5,632.4	10.55~13.30	594.2~749.1
Paper Products	6,452.9	1.39~1.89	89.7~122.0
Plastic Products	45,615.3	44.48~37.60	20,289.7~17,151.4
Rubber Products	1,626.3	44.48~37.60	723.4~611.5
Metal Products	4,562.1	6.13~9.94	279.7~453.5
Electronics	10,583.7	18.80~13.69	994.9~1,448.9
Transport Equip.	1,925.6	22.93~5.22	220.8~100.5
Miscellaneous	21,682.0	18.04~14.07	3,901.7~3,050.7
Total Sanctions	108,000.0 (100.0%)	- -	27,398.6~23,891.2 (25.4%~22.1%)

Sources: Sanction data are from the U.S. Trade Representative's Office as reported in *United Daily News* (in Chinese), Feb. 21, 1995. Estimates for Taiwanese FDI's export contribution are taken from Table 6.

around the world are more concerned with GDP generation than with GNP generation because the latter may prove illusory for the home economy. Profits earned from overseas operations may be used for expansionary purposes in the host country or simply lie idle in some Swiss bank rather than being plowed back to benefit home employment and public taxation. More importantly, there are different *types* of FDI, all generating the same phenomenon of export substitution, some of which lead to mutually beneficial division of labor between home and host economies, while others simply transplant domestic production overseas. In other words, the welfare implications of export substitution are difficult to assess *a priori* as they hinge primarily on the contemporaneous restructuring effort in the home economy as well as the degree of success it is able to achieve. The important point is that industrial realignment is not a *guaranteed process* and that characteristics of the FDI firms are among the crucial factors determining whether a successful upgrading at home will indeed take place.¹⁷ In the case of Taiwan and Hong Kong, it seems that the odds are generally against a quick and successful restructuring at home. Lack of enduring firm-specific assets make FDI firms (especially SMEs) from these economies more a *migrator* than a *diversifier* in their overseas operations. The lure of a vast Chinese market coupled with a key dose of cultural advantage further strengthens these firms' tendency to relocate rather than to diversify. Even in the case of horizontal and/or vertical division of labor between the home and host economies, there is a higher risk that overseas operation may supplant domestic production as technological differences between the two economies lessen and cost calculations become more important over time. Last, but not least, the fact that these out-migrating SMEs represent a major economic force in their respective home economies further blemishes the prospect of a smooth restructuring as conjectured by Lee (1990).

¹⁷ For a discussion of the different types of FDI strategies in mainland China pursued by Taiwanese firms, see Chung (1996).

V. Empirical Evidence on Domestic Restructuring

To sum up our discussion so far, investment-induced trade largely consists of logistic supply of intermediate products, machinery, and equipment in support of overseas FDI operations, while the ensuing "export shift" signifies a horizontal substitution of export performance from the FDI home to the FDI host country. In the terminology of the Flying Geese pattern of industrial development, the FDI home economy must now endeavor to gain competitiveness in an entire new spectrum of products so as not to be left out of the flock. The argument made in this paper is that a lack of solid firm-specific assets on the part of Taiwan and Hong Kong FDI firms will tend to impede industrial restructuring at home since not enough entrepreneurial talent (as well as economic resources) is left to cultivate domestic potentialities. In this section, we turn to actual economic performance of Hong Kong and Taiwan in recent years to see if this argument can be substantiated by empirical evidence.

As can be seen from Table 10, Hong Kong's manufacturing share in total GDP has shrunk substantially (from 23.9% in 1980 to 9.3% in 1995) with the relocation of its manufacturing activities toward Guangdong. This has struck many observers as a textbook case of *industrial hollowing-out*.¹⁸ More importantly, the average GDP growth rate also came down from an enviable 7.7% during 1980~1987 to a mere 5.1% during 1987~1994, which was the lowest among the four Asian Dragons (i.e., Korea, Taiwan, Hong Kong, and Singapore). Fortunately, Hong Kong has developed a booming service sector at a time when its manufacturing activities are on the wane. It has reassumed the role of a financial, service, and transportation *entrepot* it once played decades ago as a result of its geographic and cultural proximity to a reforming China. Being a free port and a city economy, Hong Kong is expected to move steadily ahead along this inter-sectoral restructuring path to become a regional financial and transportation center, drifting further away from its traditional

¹⁸ For an in-depth discussion of Hong Kong's industrial hollowing-out, see Lin, Jiang (1995), pp. 223-235.

Table 10 Changes in the Sectoral Composition of Hong Kong's and Taiwan's GDP

unit:%

	Hong Kong			Taiwan		
	1980	1986	1994	1980	1986	1994
GDP share in:						
Agriculture and Fishing	0.9	0.5	0.2	7.8	7.8	3.6
Manufacturing	23.9	22.3	9.3	41.5	43.6	29.0
Mining, Electricity & Construction	8.2	7.9	7.5	9.9	8.7	8.2
Services	67.0	69.3	83.0	40.8	39.9	59.2
Average Real GDP Growth:						
1980~1987		7.7		8.3		
1987~1994		5.1		6.9		

Sources: *Hong Kong Monthly Digest of Statistics*, Census and Statistics Department, Hong Kong, various issues; *Economic Yearbook of the Republic of China* (1994), Directorate-General of Budget, Accounting and Statistics, Executive Yuan, ROC.

manufacturing activities.

On the other hand, Taiwan's restructuring process may prove to be more arduous. Compared with Hong Kong, Taiwan has a stronger manufacturing base which, however, needs to be upgraded in order to form new competitive edges in the world arena. As the bulk of Taiwanese SMEs venture into the Chinese market, however, the Taiwan economy itself is seen to be left with little impetus to move forward as strongly as is required. Taiwan's share of manufacturing in total GDP has also fallen dramatically from 43.6% in 1986 to 29.0% in 1994, dropping 14.6 percentage points in less than ten years. Average GDP growth rate registered 6.9% from 1987 to 1994, compared with 8.3% from 1980 to 1987, and was the second lowest achieved among the four Asian Dragons (only slightly better than Hong Kong but much lower than the 7.9% in South Korea and 8.8% in Singapore). Table 11 provides a quick comparison of Taiwan's industrial development between the two periods 1980~87 and 1987~93 in terms of export performance, real GDP growth, and domestic capital formation within the manufacturing sector. It can be seen that out of the twenty manufacturing sectors, only seven sectors (those with asterisks) have shown increased real GDP growth, six exhibited accelerated export expansion, and only three had hastened capital formation

Table 11 Industrial Restructuring in Taiwan: 1980-1987 vs. 1987-93

unit: avg. %

Indicator Industry	RGDP Growth		Export Growth		Real K Growth	
	1980-87	1987-93	1980-87	1987-93	1980-87	1987-93
1.Processed Foods	4.4	2.6*	6.7	-1.9	11.8	4.1
2.Beverages & Tobacco	3.5	5.3*	-8.0	-1.9	12.4	3.1
3.Textiles	4.3	-1.2	8.3	8.7*	9.3	3.5
4.Wearing Apparel	5.0	-5.6	8.6	-7.6	4.1	-2.7
5.Leaner Products	25.8	-6.9	24.9	-12.4	18.7	3.4
6.Wood & Bamboo Prod.	7.2	-3.3	6.9	-16.7	-0.2	-2.7
7.Paper Products	7.2	-1.8	9.0	13.4*	11.5	9.6
8.Chemicals	12.3	6.8	13.5	16.0*	8.8	8.5
9.Chemical Products	11.6	8.3	7.8	8.7*	9.1	9.1
10.Petroleum & Coal	1.9	6.8*	-	-	15.7	14.4
11.Rubber Products	10.5	1.2	14.3	-3.2	10.1	2.8
12.Plastic Products	12.6	1.1			9.1	9.1
13.Non-ferrous Mineral Products	4.5	8.4*	12.8	-4.3	13.4	3.5
14.Basic Metals	9.2	8.8	10.0	11.8*	15.1	5.3
15.Metal Products	7.4	9.4*	18.3	6.3	14.2	10.1
16.Machinery	5.7	10.3*	13.6	13.8*	5.8	6.4*
17.Electrical & Electronics	16.1	10.9	16.3	9.6	5.8	8.8*
18.Transportation Equip.	5.6	8.4*	18.1	7.3	12.2	4.9
19.Precision Instruments	8.8	1.6	9.6	4.6	7.9	8.8*
20.Miscellaneous Products	11.7	-4.1	12.0	-9.1	2.3	-1.2
Manufacturing Total	8.5	4.7	12.5	1.5	9.7	6.5

Sources: *Statistics of Industrial Production Monthly, Taiwan Area, ROC (1994)*; *Monthly Statistics of Exports and Imports, Taiwan Area, ROC, various issues*; *Trends in Multifactor Productivity, ROC (1995)*.

during the second period. Among the faster-growing sectors, especially in terms of GDP performance, two are dominated by public enterprises (the petroleum and coal industry and the tobacco industry), suggesting that the private sectors in general have been slow in making realignment efforts in a period of accelerated outward FDI. Taken together, manufacturing GDP growth for the second period averaged 4.7% compared with 8.5% in the first period; total exports grew at 1.5% as opposed to 12.5% previously, and average growth in real capital formation was 6.5% compared with the previous 9.7%. All in all, one does not see any serious sign of *spontaneous* structural change but more of a passive adjustment as a result of the exodus of traditional industries which tilted the balance toward what is left on the island.

It is interesting to note that some of these sectors have shown a faster growth in exports but not in real GDP or capital formation (e.g., textiles, paper products, chemicals and chemical products, and basic metals), and others have shown faster growth in capital formation but not in real GDP or exports (e.g., precision instruments). The former industries have exhibited this peculiar pattern primarily because they have been major suppliers of raw material and semi-finished products to downstream producers of apparel, electronics devices, and miscellaneous products. Now that these downstream firms have migrated to the mainland, the original supply relationship must now assume the new form of cross-border trade with little or no corresponding gains in domestic production. Nor is it necessary, or so it seems, for these firms to step up capital formation because total sales have remained more or less constant, if not gradually diminishing. In other words, there is no evidence to support the claim that these industries have taken the opportunity to enhance their market competitiveness and thus increase relative market share over this period of presumably intense restructuring.¹⁹ For the latter group of products which show a higher level of investment but a laggard output performance, it may be that, for these industries, it takes considerably more time to form new competitive edges as older products and equipment become obsolete. In other words, they will have to keep up the investment (as well as R&D) level for a sustained period of time before the current downward trend in

¹⁹ Indeed, we have seen various upstream producers establishing additional capacities on the mainland to serve local Taiwanese FDI firms as well as potential local demand. Again, domestic upgrading efforts are, to some extent, diverted through this second-tier outward FDI.

output and exports changes course and turns up again.²⁰

An important implication arising from our discussion is that it is the *relative strength* of domestic capital formation compared with outward FDI, which may be thought of as an embodiment of firm-specific asset on the part of FDI firms, that determines the speed and content of domestic restructuring. If sectoral investment in the comparatively advantaged sectors do not show obvious signs of speeding up, one may then suspect that domestic restructuring may not have proceeded smoothly. In what follows, a simple correlation analysis will be conducted for Taiwan among the four key variables: FDIINTENS (Taiwanese cumulative FDI towards China by sector as a share of domestic capital formation in that sector during 1987~1993); RGDPG (average growth rate of sectoral real GDP during 1987~1993); XG8793 (average growth rate of sectoral exports during 1987~1993); and RKG (average growth rate of sectoral real capital formation). It is expected that a high value of FDIINTENS, meaning insufficient domestic investment in the face of outward FDI, will tend to impede domestic performance not only in exports, but also in sectoral GDP and further incentives for capital accumulation. On the other hand, lower levels of FDIINTENS signifies that more adequate attention has been given to domestic restructuring and that, as a result, domestic performance in terms of exports, GDP, and sectoral capital formation will be grossly on track. In other words, we expect to find significant *negative correlations* between FDIINTENS and the three performance variables XG8793, RGDPG, and RKG. The Pearson correlation results are presented in Table 12. As expected, one observes a clear pattern of negative correlations between the above four key variables during 1987~1993 for the case of Taiwan. Furthermore, these correlations are all statistically significant at the 1% level, lending support to the proposition that the relative strength of domestic investment compared with outward FDI (here taken to be a surrogate for the average level of firm-specific asset of the FDI firms) is an important determinant of sectoral performance in terms of export

²⁰ There is yet a third class of industries which have shown faster growth in GDP but not in exports or capital formation (e.g., beverages and tobacco, petroleum and coal, non-ferrous mineral products, metal products, and transportation equipment). The explanation seems to lie in the fact that these industries traditionally cater more to domestic consumption, and are somewhat segregated from competitive export markets due either to tariff protection (i.e., automobiles) or transportation costs (i.e., basic metals and non-ferrous mineral products).

growth, GDP growth, and growth in domestic capital formation.

Table 12 Pearson Correlation Coefficients between Taiwan's (China-bound) FDI-intensity, Export Performance, Real GDP Growth, and Domestic Capital Formation
(n=18)

	FDIINTENS	XG8793	RGDPG	RKG
FDIINTENS	1.0000	-0.6475*** (0.0037)	-0.7079*** (0.0010)	-0.6727*** (0.0022)
XG8793		1.0000	0.6736*** (0.0022)	0.7260*** (0.0006)
RGDPG			1.0000	0.6137*** (0.0068)
RKG				1.0000

Note: *** refers to 1% significance level; figures in parentheses are α -values.

Sources: **FDIINTENS**: Cumulative realized FDI to China at the end of 1993 are adopted from Gao et. al. (1994), Appendix Table 5.2, p. 260; domestic investment data are from *Trends in Multifactor Productivity, ROC* (1995), Directorate-General of Budget, Accounting and Statistics, Executive Yuan, ROC.
XG8793: *Monthly Statistics on Taiwan's Export-Import Trade, Taiwan Area, ROC*, ibid.
RGDPG: *Statistics of Industrial Production Monthly, Taiwan Area, ROC* (1994), ibid.
RKG: *Trends in Multifactor Productivity, ROC* (1995), ibid.

VI. Concluding Remarks

Against the background of intense investment and trade flows among the Chinese trio in recent years, this paper aims at exploring the possible divergence between private interest and social benefit of an act of FDI -- particularly that of a labor-seeking sort. As Arndt (1974) noted in an excellent discussion of technology transfer as a result of outward FDI, scope for trade continues provided technological advance in the home country reopens the gap between the donor and recipient countries as fast as it is closed. In the same vein but put differently, we argue that outward FDI by firms with meager technological, financial, and managerial resources runs a risk of depriving the home economy of critical means to embark on a successful and timely industrial realignment, particularly when these firms make up a large portion of the home economy. The rationale

for this argument is that the intangible assets possessed by these firms may be too "thin" to render a sustainable pattern of division of labor across national borders. As a result, FDI firms often become migrators rather than diversifiers in their overseas venture given macroeconomic pressures. Indeed, one may say that these small-scaled firms are able to invest abroad only because they are assisted by some non-standard sources of advantage, e.g., government facilitation in the case of Japan in the 1960s, and linguistic and cultural proximity in the case of Hong Kong and Taiwan in recent years. Since intra-firm production integration across national borders is systematically absent in this type of FDI, investment-induced exports from home tend to taper off while export substitution, which puts the home country at a disadvantage, soon become the norm. The double-edged trade effect as induced by FDI now tilts against the home country and is likely to be accompanied by deteriorating GDP growth and slackened domestic capital formation, as we have witnessed for Hong Kong and Taiwan during the period 1987~1994. Although individual firms manage to maintain the value of their sector-specific capital by relocating production overseas, the society as a whole loses in that it is left with inadequate resources (in particular, entrepreneurial attention) to engage in intra-industry upgrading and/or inter-industry restructuring. Contrary to Kojima's view, then, FDI by competitive firms with meager intangible assets may prove to be *detrimental* to the home economy in a dynamic perspective. This, in turn, implies that FDI should probably be made by industries that conform better to the comparative advantage of the *home* country (rather than of the host country) in order that a smoother realignment process may take place at home following an outward FDI.

An important distinction needs to be made here, however, between a coordinated and an uncoordinated act of FDI with meager firm-specific assets. In the case of FDI by Japanese SMEs in the 1960s, government or the "collective will" assumed an important role in guiding investment activities not only in these firms' outward FDI but also in their domestic restructuring. The fact that these smaller firms often constituted the outer ring of an industrial *keiretsu* further implied that they might have a good chance to upgrade at home under the financial, technological, and managerial umbrella of the *keiretsu* to which they belonged. In other words, in the case of Japan a crucial dose of intangible asset may have been injected from outside which helped the small-scaled FDI firms maintain a healthy pattern of division of labor across national borders over time. The story of Taiwanese and Hong Kong FDI firms may be quite

different, however, as the role of government is either not clear or completely absent, and as SMEs from these economies are usually independent exporters rather than members of a closely integrated *keiretsu* system. With the exodus of these FDI firms their connection with the home economy may dwindle over time. This seems to imply a need for government intervention at both the firm and the industry level, providing necessary inter-firm coordination, adequate industrial infrastructure as well as technological, financial, and managerial assistance to help propel domestic realignment in such a way that the home economy may continue to thrive along with the success of individual firms' FDI.

References

- Akamatsu, Kaname (1962), "A Historical Pattern of Economic Growth in Developing Countries," *Developing Economics*, No.1, pp. 3-25.
- Arndt, H. W. (1974), "Professor Kojima on the Macroeconomics of Foreign Direct Investment," *Hitotsubashi Journal of Economics*, Vol. 15, No. 1, pp. 26-35.
- Buckley, Peter and Mark Casson (1976), *The Future of Multinational Enterprise* (London: Macmillan).
- Casson, Mark C. and G. Norman (1983), "Pricing and Sourcing Strategies in a Multinational Oligopoly," in M. C. Casson (ed.), *The Growth of International Business* (London: George Allen & Urwin).
- Caves, Richard (1971), "International Corporations: The Industrial Economics of Foreign Investment," *Economica*, Vol. 38, pp. 1-27.
- Census of Industry and Commerce of Taiwan, ROC* (1992), Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, ROC.
- Chen, Tain-jy and Wen-thuen Wang (1994), "Globalization of Taiwan's Electronics Industry," in Chien-nan Wang (ed.), *Globalization, Regionalization, and Taiwan's Economy* (Taipei: Chung-Hua Institution for Economic Research), pp. 199-214.
- China's Customs Statistics*, General Administration of Customs of the People's Republic of China.
- Chiu, Chen Lee-in and Chin Chung (1993), "An Assessment of Taiwan's Indirect Investment toward Mainland China," *Asian Economic Journal*, Vol. 7, No. 1, pp. 41-60.
- Chou, Tein-chen (1985), *Industrial Organization in the Process of Economic Development: The Case of Taiwan* (Chicago: Louvain-la-Neuve).
- Chung, Chin (1991), "Taiwan's DFI in Mainland China: Impact on the Domestic and Host Economies," paper presented at the Third Annual Conference of the Chinese Economic Association (U.K.), Dec. 1991, London; later published in Thomas Lyons and Victor Nee (eds.), *The*

Economic Transformation of South China: Reform and Development in the Post-Mao Era (Ithaca: Cornell East Asian Series), 1995, pp. 215-242.

Chung, Chin (1994), "The Emerging Pattern of Division of Labor across the Taiwan Strait: Macro Overview and the Sectoral Analysis of the Electronics Industry," paper presented at the International Conference on the China Circle, sponsored by the Institute for Global Conflict and Cooperation, University of California at San Diego, Hong Kong, Dec. 1994; forthcoming in Barry Naughton (ed.), *The China Circle* (Washington D.C.: Brookings Institution).

Chung, Chin (1996), "Firm Characteristics and FDI Strategy: A Three-way Typology of Taiwanese Investment in Mainland China," in Lee, Joseph S. (ed.), *The Emergence of the South China Growth Triangle* (Taipei: Chung-Hua Institution for Economic Research), pp. 287-326.

Chung, Chin et al. (1993), *Mainland China's Export Promotion Policy and Its Impacts on Taiwan's External Trade Development* (in Chinese), research project report commissioned by the Industry Bureau, Ministry of Economic Affairs, ROC (Taipei: Chung-Hua Institution for Economic Research).

Dunning, J. H. (1981), *International Production and Multinational Enterprise* (London: George Allen and Unwin).

Economic Yearbook of the Republic of China (1994), Directorate General of Budget, Accounting, and Statistics, Executive Yuan, ROC.

Hamilton, Gary G. (ed.) (1991), *Business Networks and Economic Development in East and Southeast Asia* (Hong Kong: Centre of Asian Studies, University of Hong Kong).

Hong Kong Monthly Digest of Statistics, Census and Statistics Department, Hong Kong.

Hymer, Stephen (1960), *The International Operations of National Firms: A Study of Direct Foreign Investment*, Ph.D. thesis, Department of Economics, MIT (Cambridge Mass: MIT Press, 1976).

Kao, Charng et al. (1994), *A Comparative Study of Foreign Investment in Mainland China* (in Chinese), research project report commissioned by the Investment Commission, ROC (Taipei: Chung-Hua Institution for Economic Research).

Kao, S., Joseph S. Lee, and Chu-chia Steve Lin (1993), *An Empirical*

- Study of Taiwanese Firms' Mainland Investment on Industrial Upgrading in Taiwan and on the Vertical Division of Labor across the Taiwan Strait* (in Chinese), research project report commissioned by the Ministry of Economic Affairs, Executive Yuan, ROC.
- Knickerbocker, F. T. (1973), *Oligopolistic Reaction and the Multinational Enterprise*, Ph.D. thesis, Graduate School of Business Administration, Harvard University, Boston, MA.
- Kojima, Kiyoshi (1973), "A Macroeconomic Approach to Foreign Direct Investment," *Hitotsubashi Journal of Economics*, Vol. 14, pp. 1-21.
- Kojima, Kiyoshi (1978), *Direct Foreign Investment: A Japanese Model of Multinational Business Operations* (New York: Praeger).
- Lecraw, Donald (1979), "Choice of Technology in Low Wage Countries: A Non-Neoclassical Approach," *Quarterly Journal of Economics*, Vol. 53, pp. 631-654.
- Lee, Chung H. (1984), "On Japanese Macroeconomic Theories of Direct Foreign Investment," *Economic Development and Cultural Change*, Vol. 32, pp. 713-723.
- Lee, Chung H. (1990), "Direct Foreign Investment, Structural Adjustment, and International Division of Labor: A Dynamic Macroeconomic Theory of Direct Foreign Investment," *Hitotsubashi Journal of Economics*, Vol. 31, pp. 61-72.
- Lin, Steve Chu-chia (1995), "Parent-Subsidiary Division of Labor and Industrial Upgrading of Taiwanese DFI Firms: Comparison between Electronics and Footwear Industries," in Rao, M. J. (ed.), *Economic Cooperation in the Greater South China: Industrial Interactions among Taiwan, Hong Kong, Macao, and South China* (in Chinese) (Hong Kong: World Wide Publications), pp. 176-200.
- Lin, Jiang (1995), "Hong Kong's Industrial Structure toward the Twenty-first Century," (in Chinese), in M. J. Rao (ed.), *Economic Cooperation in Greater South China: Industrial Interactions among Taiwan, Hong Kong, Macao, and South China* (in Chinese) (Hong Kong: World Wide Publications), pp. 220-256.
- Mason, R. Hal (1980), "A Comment on Professor Kojima's Japanese Type Versus American Type of Technological Transfer," *Hitotsubashi Journal of Economics*, February 1980, pp. 42-52.
- Monthly Statistics of Exports and Imports, Taiwan Area, ROC*, Department of Statistics, Ministry of Finance, ROC.

- Monthly Statistics of the Republic of China*, Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, ROC.
- Ng, Linda Fung-yee and Chyau Tuan (1996), "The Industrial Foundation of the Growth Triangle: Evidence from the Integration of Hong Kong and South China," in Lee, Joseph S. (ed.), *The Emergence of the South China Growth Triangle* (Taipei: Chung-Hua Institution for Economic Research), pp. 115-152.
- Ozawa, Terutomo (1979), "Japan's New Resource Diplomacy: Government-Backed Group Investment," *Journal of World Trade Law*, Jan.-Feb.
- Schive, Chi (1995), "Direct Foreign Investment and Industrial Adjustment in Taiwan," in Wang, Chien-nan (ed.), *Globalization, Regionalization, and Taiwan's Economy* (Taipei: Chung-Hua Institution for Economic Research), pp. 171-197.
- Statistics of Industrial Production Monthly, Taiwan Area, ROC*, Department of Statistics, Ministry of Economic Affairs, ROC.
- Sung, Yun-wing (1994), "The Economic Integration of the China Circle: Implications for the World Trading System," paper presented at the Conference on the China Circle, sponsored by the Institute for Global Conflict and Cooperation, University of California at San Diego, Hong Kong, Dec. 1994.
- The Trends in Multifactor Productivity, ROC* (1995), Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, ROC.
- Tuan, Chyau and Linda Fung-yee Ng (1995), "Hong Kong's Outward Investment and Regional Economic Integration with Guangdong: Process and Implications," *Journal of Asian Economics*, Vol. 6, No. 3, pp. 385-405.
- Vernon, Raymond (1966), "International Investment and International Trade in the Product Cycle," *Quarterly Journal of Economics*, Vol. 80, pp. 190-207.
- Wells, Louis (1983), *Third World Multinationals* (Cambridge: MIT Press).
- Wu, Yu-shan (1994), "Shifting Dependency: Taiwan's New Growth Pattern," paper prepared for the American Enterprise Institute's Project; unpublished Manuscript.
- Yen, Tsung-ta, Y. C. Lin and Chin Chung (1992), *A Study of Taiwan's Investment and Trade Relations with Mainland China* (in Chinese),

research project report commissioned by the Council for Economic Planning and Development (Taipei: Chung-Hua Institution for Economic Research).

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