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Location Choice of Multinational Companies in China: Korean and Japanese Companies

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KOREA INSTITUTE FOR
INTERNATIONAL ECONOMIC POLICY

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KIEP

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President

**KOREA INSTITUTE FOR
INTERNATIONAL ECONOMIC POLICY**

300-4 Yomgok-Dong, Seocho-Gu, Seoul 137-747, Korea
Tel: 02) 3460-1114 / FAX: 02) 3460-1144,1199
URL: http//www.kiep.go.kr

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KIEP KOREA INSTITUTE FOR INTERNATIONAL ECONOMIC POLICY

KOREA INSTITUTE FOR
INTERNATIONAL ECONOMIC POLICY (KIEP)
300-4 Yomgok-Dong, Seocho-Gu, Seoul 137-747, Korea
Tel: (822) 3460-1178 Fax: (822) 3460-1144
URL: http://www.kiep.go.kr

Choong Yong Ahn, *President*

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Executive Summary

By using aggregate and firm level data of Korean and Japanese foreign affiliates in China, we investigate the recent FDI trends and the determinants of location choice. The comparision of the FDI trends of Japanese and Korean companies show that Korean companies are concentrated into China, especially in three regions of northeast of China. The conditional logit estimation results differ between Korean and Japanese companies. Even though agglomeration variable is shown to be positive and significant for two countries, regional income is shown to be positive for Japan but negative for Korea. For Korean companies, the college graduate, the railway variables and trade share are shown to be positive and significant but other variables such as the number of economic zones and the share of production by government-owned companies to total regional production are shown to be negative. In addition, the distance from Korea and the ethnicity factor might play more significant roles in FDI decisions as well. Thus, we can interpret that the main determinants such as agglomeration, vertical, horizontal FDI and infrastructure variables play significant roles in explaining recent FDI location. However, explanatory power of those variables above for location decision of Japanese companies is not significant.

JEL No: F11, F12

Key words: Location choice, Multinationals, Agglomeration, Conditional logit

Sung Jin Kang is Assistant Professor at Korea University. He received his Ph.D. degree in Economics at Stanford University. His areas of interest include Foreign Direct Investment, Technology Transfer, and Social Safety Nets. His most recent publications include "Economic Integration of Northeast Asian and Industrial Restructuring" (2004), "The Evolution of Regional Income Distribution of Japan" (2004), "Are Private Transfers Altruistically Motivated? The Case of Korea before and during the Financial Crisis" (2003) and "Analysis of Private Transfers with Panel Fixed-Effect Censored Model Estimator" (2003).

Hongshik Lee is Research Fellow of Center for Northeast Asian Economic Cooperation at Korea Institute for International Economic Policy. He received his Ph.D. degree in Economics at University of Texas at Austin. His areas of interest include International Trade, Foreign Direct Investment, Technology Transfer, and Economic Cooperation. His most recent publications include "Expansion Strategies of Korea Multinationals" (2004), "Decision to Invest Abroad: The Case of Korean Multinationals" (2003), and "The Real Side Determinants of Countries' Terms of Trade: A Panel Data Analysis" (2002).

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Location Choice of Multinational Companies in China: Korean and Japanese Companies*

Sung Jin Kang and Hongshik Lee

I. Introduction

The sustained economic growth of China since it adopted an open-door policy in 1978 is at least partly due to large amounts of foreign direct investment (FDI) inflows. Traditionally, Taiwan, the United States and Hong Kong have been the largest FDI investors while in recent years, Japan and the Republic of Korea have also invested a substantial amount of FDI.

FDI by multinational enterprises is one of the recent features of the world economy. Most developing countries consider FDI inflows as one of the most important channels for economic development. One of the important questions raised by FDI literature is what determines the selection of locations by multinational enterprises. Potential determinants of FDI location have been extensively studied (Coughlin et al. 1991; Friedman et al. 1992, 1996; Wheeler and Mody 1992; Head et al. 1995; Chen 1996; Barrel 1999; Cheng and Kwan

* We would like to thank the participants at the Ninth International Convention of the East Asian Economic Association, Hong Kong, 13-14, November, 2004.

2000). Main determinants of FDI location suggested by the studies above can be summarized by four categories: agglomeration effects, infrastructure effects, factor cost effects and market access effect.

Agglomeration effects might be due to positive links among projects. One incentive is the spillover effect created by research and development. The second is confidence and the possibility that firms cluster. For example, firms are unsure whether a particular country (region) is a good location for FDI and thus take the success of one firm as a signal of underlying national (regional) characteristics. A third incentive arises from the supply of, and demand for, intermediate goods (see Fujita et al. 1999 for a general overview).

Second, most developing countries have tried to attract FDI through special economic policies such as an establishment of special economic zones and construction of new roads. This infrastructure leads FDI investors to decrease setup costs of new local establishments in host countries (Chen 1996; Cheng and Kwan 2000).

Third, a significant part of multinational activity tends to take the form of firms shifting their production process to low-cost locations. The economic analysis of this shift is based on the idea that different parts of the production process have different input requirement. For example, it may be profitable to move production of labor-intensive goods to labor-abundant countries while the headquarter services are left in the home country (Helpman 1984, 1985; Helpman and Krugman 1985).

Fourth, switching from direct exports to local production will bring savings. Obviously, local production can save by avoiding transport cost and trade barriers such as tariff and other non-trade barriers. Furthermore, for example, joint production venture with local firms can decrease the cost dealing with foreign regulation, tax, and administration. Theoretical modeling based on distinct firms with an increasing returns to scale predicts that FDI is more likely to replace exports when the market is larger because the plant-specific fixed cost may spread over more units of output as the market size increases. And larger markets will tend to have more local firms, and consequently more intense competition than smaller markets. This will lead to lower prices and becomes particularly damaging to the profitability of exporting, making the firms' favor local production (Horstmann and Markusen 1987; Markusen and Venables 1998).

Employing the comprehensive firm-level data, which covers the FDI cases and amount of Korean and Japanese companies into China, this paper attempts to investigate the relative importance of the above effects.

First of all, employing the aggregate FDI trends of Japanese and Korean companies, we compare the total number and amount of investment of two countries over a few years and the regional distribution of investments of the two countries in China. Second, we test the location choice of Korean companies through the estimation of conditional logit model. Here we use comprehensive FDI data, which includes regions, investment ratio and amounts of investment, and so on. Since most of regional variables are available for 1989-2002, estimation used regional data and Korean FDI data for 1989-2002. FDI by Korean companies going into China is recorded in the data so that the analysis can assume that estimation considers all Korean FDI into China.

In one of the main findings for comparative statistics of FDI with Japan, we find that the FDI by Korean companies has been too concentrated in China. In particular, more than 60 percent of the investments are in four regions: Shandong, Liaoning, Tianjin and Jilin. Through estimated results, we confirm agglomeration, vertical and horizontal effects. However, unlike the general arguments on the effect of economic zones where FDI is well affected, Korean companies do not depend on the number of economic zones but the distance and ethnic factors.

The paper is organized as follows. Section 2 discusses the general characteristics of FDI of Japan and Korea in China. Section 3 describes model specification and data and descriptive statistics are summarized in Section 4. Estimation results are discussed in Section 5, and Section 6 concludes.

II. General Characteristics of FDI in China

FDI into China has increased significantly since China adopted an open-door policy in 1978. Table 1 shows recent trends of contracted and realized FDI into China. It was in the mid-1980s excluding 1986 when the FDI inflows into China surged. In particular, the contracted FDI increased 53.1 and 123.8 percent in 1984 and 1985, respectively, and the realized FDI increased 97.8 and 32.0 percent.

China achieved unprecedented growth between 1991 and 1993. During the three years, for example, contracted and realized FDI increased by 385.3 and 152.1 percent, respectively, from 1991 to 1992. And then, it was in 2000 when the new surge of FDI occurred.

Table 2 presents the contracted and realized FDI values in 15 leading investing countries. In an attempt to attract FDI, one of China's strategies is to open up 'Special Economic Zones' (SEZs). At of the end of 2002, five SEZs were established: 3 in Guangdone, 1 in Fujian and 1 in Hainan provinces. One of the features of the FDI inflows into China is the large contribution of the investment from Hong Kong, Taiwan and Macau, especially during the late 1980s and the early 1990s. In particular, investments from Hong Kong have increased dramatically since the early 1980s. Between 1983 and 2002, the contracted and realized FDI amount was about 375 and 204 UIS$ billion, respectively with 45.4 and 45.8 percent share out of the total FDI amounts.

Between 1983 and 2002, Japan and Korea ranked 4th and 6th in total contracted FDI also ranking 3rd and 7th respectively in total realized FDI. Interestingly, the share of Korea in the 1999-02 period increased relative to that in 1983-02. The share of the contracted and realized FDI during 1999-02 was 4.9 and 4.2 percent, respectively.

<Table 1> Recent Trends of Contracted and Realized FDI into China

Year	Contracted		Realized	
	Amount	Growth rate (%)	Amount	Growth rate (%)
1979-82	6,010		1.166	
1983	1,732		636	
1984	2,651	53.1	1,258	97.8
1985	5,932	123.8	1,661	32.0
1986	2,834	52.2	1,874	12.8
1987	3,707	30.9	2,314	23.5
1988	5,297	42.8	3,194	38.0
1989	5,600	5.7	3,392	6.2
1990	6,596	17.8	3,487	2.8
1991	11,977	81.6	4,366	25.2
1992	58,124	385.3	11,007	152.1
1993	111,436	91.7	27,515	150.0
1994	82,680	25.8	33,767	22.7
1995	91,282	10.4	37,521	11.1
1996	73,277	19.7	41,725	11.2
1997	51,004	30.4	45,257	8.5
1998	52,102	2.2	45,463	0.5
1999	41,223	20.9	40,319	11.3
2000	62,380	51.3	40,715	1.0
2001	69,195	10.9	46,878	15.1
2002	82,768	19.6	52,743	12.5
1979-02	827,809		446.258	

Note: Amount is at US$ million.
Source: *China Foreign Economic Statistical Yearbook*, various issues.

<Table 2> Contracted and Realized FDI into China by Countries

	Contracted FDI				Realized FDI			
	1983-93	1994-98	1999-02	1983-02	1983-93	1994-99	1999-02	1983-02
Total	220,839	350,343	255,565	826,747	61,813	203,772	180,654	446,239
Hong Kong, China	147,010	151,804	76,178	374,992	38,458	99,543	66,441	204,442
United States	14,604	31,817	29,688	76,109	5,159	16,155	18,457	39,771
Taiwan	15,513	22,211	21,071	58,795	4,189	16,232	11,846	32,267
Japan	8,849	23,314	16,990	49,152	5,150	16,590	14,427	36,167
Singapore	4,878	22,229	9,059	36,166	882	11,285	9,295	21,463
Virgin Islands	348	16,570	32,431	49,348	0	6,590	17,652	24,241
Korea	1,977	12,863	12,639	27,479	493	7,069	7,637	15,199
United Kingdom	3,060	11,995	4,577	19,633	590	5,936	4,156	10,682
Germany	1,552	6,878	5,926	14,355	545	2,893	4,556	7,994
France	772	3,696	2,549	7,018	392	2,092	2,846	5,330
Macau, China	2,815	3,951	1,909	8,675	789	2,346	1,445	4,580
Netherlands	413	2,987	5,580	8,981	176	1,483	2,679	4,338
Canada	1,834	4,549	4,011	10,394	263	1,472	1,623	3,358
Malaysia	1,030	3,251	1,919	6,200	122	1,642	1,071	2,835
Australia	1,254	3,941	2,871	8,065	337	1,201	1,288	2,827
	Share in Total (%)							
Hong Kong, China	66.6	43.3	29.8	45.4	62.2	48.9	36.8	45.8
United States	6.6	9.1	11.6	9.2	8.3	7.9	10.2	8.9
Taiwan	7.0	6.3	8.2	7.1	6.8	8.0	6.6	7.2
Japan	4.0	6.7	6.6	5.9	8.3	8.1	8.0	8.1
Singapore	2.2	6.3	3.5	4.4	1.4	5.5	5.1	4.8
Virgin Islands	0.2	4.7	12.7	6.0	0.0	3.2	9.8	5.4
Korea	0.9	3.7	4.9	3.3	0.8	3.5	4.2	3.4
United Kingdom	1.4	3.4	1.8	2.4	1.0	2.9	2.3	2.4
Germany	0.7	2.0	2.3	1.7	0.9	1.4	2.5	1.8
France	0.3	1.1	1.0	0.8	0.6	1.0	1.6	1.2
Macau, China	1.3	1.1	0.7	1.0	1.3	1.2	0.8	1.0
Netherlands	0.2	0.9	2.2	1.1	0.3	0.7	1.5	1.0
Canada	0.8	1.3	1.6	1.3	0.4	0.7	0.9	0.8
Malaysia	0.5	0.9	0.8	0.7	0.2	0.8	0.6	0.6
Australia	0.6	1.1	1.1	1.0	0.5	0.6	0.7	0.6
Above 15	93.2	91.9	89.0	91.4	93.1	94.5	91.6	93.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Amount is at US$ million.
Source: *China Foreign Economic Statistical Yearbook,* various issues.

Japan and Korea show different regional FDI patterns. Tables 3 and 4 describe the regional distribution of the number of cases and the amount of Japanese and Korean FDI, respectively. Using three 5-year periods until 2003, it is shown that the two countries show different FDI patterns. From the number of cases in Table 3, the number of Japan's FDI shows a decreasing trend in 1990s, which might reflect economic depression during this period. Between 1989 and 1993, total investment was 243,177 cases while that decreased to 9,822 cases. This is in contrast to the Korean trends. During 1989-93, the number of FDI cases was 2,240 but that increased to 10,448, which is slightly more than that of Japan during the same period.

In terms of regional distribution, Japan has switched investments from North America to Europe. During the 1999-03 period, the total number of shares of the FDI cases was 13.1% when it was 37.9% during 1989-93 period. However, the share of FDI cases to Europe increased from 15.6% during 1989-92 to 47.2% during 1999-03.[1] For China, the share did not change significantly even though it increased to 17.9% during 1994-98.

Table 3 clearly shows the share of Korean's FDI cases have significantly been concentrated on the Asian region, showing almost more than 67% in the 1990s. The share to China, Especially, increased

1) This trend might be consistent with the prediction of Markusen and Venables (1998). Using a full multi-country model with multinational and national companies operating in each country, they show that multinational enterprises will be prevalent the more similar the countries are in size, technologies or factor endowments. Thus even with the same or decreasing trade and nontrade barriers, Japanese companies have many incentives to enter the European market as Europe has become integrated.

significantly showing 29.1% in 1989-93 to 50.3% in 1999-03. The other regions except for North America (24.5% in 1999-03) show share that are insignificant.

Table 4 shows regional patterns of FDI amounts. For Japan, the share of the FDI amount to North America shows a decreasing trend but is larger than the share of the number of cases. But the share of the FDI amount to Asia was lower than that of the FDI cases. The share to Europe was not significantly different from that of the FDI amount. Thus, it can be inferred that Japanese investments per case

<Table 3> Regional Distribution of the Number of FDI Cases

	Japan			Korea		
	1989-93	1994-98	1999-03	1989-93	1994-98	1999-03
North America	9,199 (37.9)	2,671 (22.3)	1,289 (13.1)	362 (16.2)	1604 (25.8)	2560 (24.5)
Latin America	1,784 (7.4)	1,420 (11.9)	976 (9.9)	147 (6.6)	157 (2.5)	159 (1.5)
Asia	7,230 (29.8)	5,874 (49.1)	2,658 (27.1)	1,493 (66.7)	4,641 (74.7)	7,074 (67.7)
China	1,727 (7.1)	2,143 (17.9)	969 (9.9)	651 (29.1)	3,217 (51.8)	5,258 (50.2)
Mid& Near East	48 (0.2)	35 (0.3)	15 (0.2)	7 (0.3)	12 (0.2)	22 (0.2)
Europe	3,786 (15.6)	1,361 (11.4)	4,635 (47.2)	137 (6.1)	306 (4.9)	312 (3.0)
Africa	397 (1.6)	171 (1.4)	69 (0.7)	22 (1.0)	48 (0.8)	37 (0.4)
Oceania	1,989 (8.2)	442 (3.7)	180 (1.8)	72 (3.2)	218 (3.5)	284 (2.7)
Total	24,245 (100.0)	11,974 (100.0)	9,822 (100.0)	2,240 (100.0)	6,216 (100.0)	10,448 (100.0)

Note: The percentage share is in parenthesis.
Source: Online database of the Ministry of Finance of Japan and the Export Import Bank of Korea.

<Table 4> Regional Distribution of the FDI Amount of FDI (Million USD)

	Japan			Korea		
	1989-93	1994-98	1999-03	1989-93	1994-98	1999-03
North America	112,953 (46.5)	95,134 (40.6)	64,038 (28.8)	1,964 (38.3)	4,580 (25.1)	5,834 (28.5)
Latin America	18,742 (7.7)	26,675 (11.4)	31,566 (14.2)	244 (4.8)	967 (5.3)	2,252 (11.0)
Asia	35,366 (14.5)	51,890 (22.1)	45,660 (20.5)	1,868 (36.4)	8,489 (46.6)	7,815 (38.2)
China	4,271 (1.8)	12,396 (5.3)	7,975 (3.6)	470 (9.2)	3,784 (20.8)	3,995 (19.5)
Mid& Near East	1,130 (0.5)	1,286 (0.6)	213 (0.1)	291 (5.7)	184 (1.0)	87 (0.4)
Europe	55,192 (22.7)	48,006 (20.5)	89,311 (40.1)	491 (9.6)	3,237 (17.8)	3,880 (19.0)
Africa	2,840 (1.2)	1,960 (0.8)	1,121 (0.5)	113 (2.2)	382 (2.1)	227 (1.1)
Oceania	16,954 (7.0)	9,434 (4.0)	4,498 (2.0)	158 (3.1)	395 (2.2)	346 (1.7)
Total	243,177 (100.0)	234,385 (100.0)	222,610 (100.0)	5,130 (100.0)	18,234 (100.0)	20,441 (100.0)

Note: The percentage share is in parenthesis.
Source: Online database of the Ministry of Finance of Japan and the Export Import Bank of Korea.

into Asia including China was smaller than the one to North America.

Korea shows a bit different pattern. The share of the FDI amount to North America (28.5% in 1999-03) is similar to that of the FDI cases (24.5% in 1999-03). However, the shares of the FDI amount to Asia and Europe were 38.2% and 19.0%, respectively, while those of the FDI cases to the same regions were 67.7% and 3.0% in 1999-03, indicating that the average amount per case in FDI to Europe was larger than that to Asia (including China).

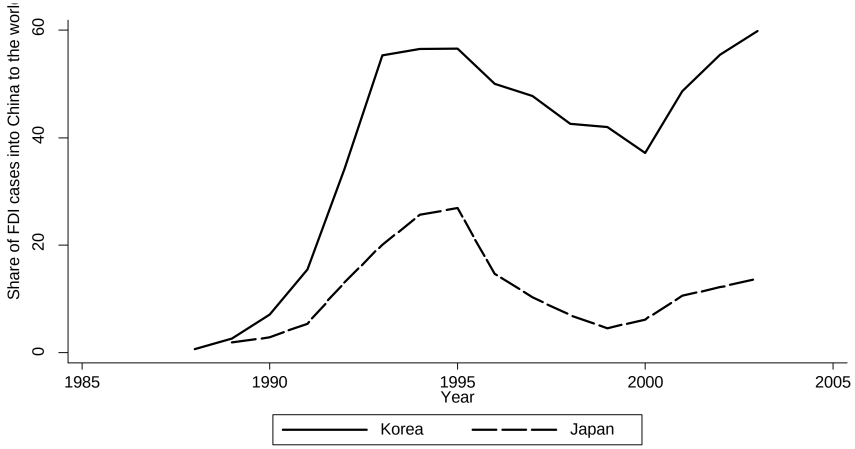
Figures 1 and 2 compare the trends of FDI of Japan and Korea. Figure 1 describes the trend of the share of the establishments invested into China and those into the world by Japan and Korea and Figure 2 plots the trend of the share of investment amount into China and into the world by Japan and Korea.

From two figures, it is clearly shown that both the cases and amounts of FDI of Korea have significantly concentrated into China than those of Japan. From the share of FDI cases, the share of Korean FDI cases was 0.6% in 1988 which increased until 1995 (56.6%), and decreased until 2000 (37.2%) and again increased until recently (59.9% in 2003). The pattern of Japanese FDI cases was similar to that of Korean FDI cases even though the share was significantly lower. The share in 1989 was 1.9% reaching a peak in 1995 (26.9%). It reached 13.8% in 2003 after the share started to increase again from 2000 (6.2%).

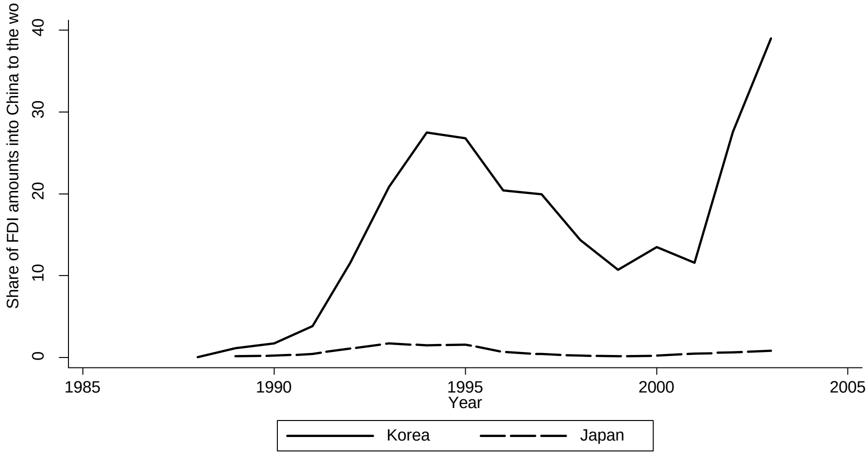
In terms of investment amounts, Japan shows significantly low shares over the same period. The maximum share during this period was 8.8% in 1995. On the other hand, Korea shows an increasing trend of the share. For example, the share was 4.6% in 1988, which reached the maximum in 2003 (39.0%). The share increased and then reversed to a decreasing trend in 1995 (26.8%) and then increased again from 2001 (11.6%).

Table 5 presents the recent trend of Japanese and Korean FDI by industries: manufacturing and non-manufacturing. In terms of the number of cases invested into China, the shares of the cases in manufacturing sector were 82.5 (3,952 cases) and 86.1 (7,849 cases) percent for Japan and Korea, respectively, between 1989 and 2003. Furthermore, the shares of the total FDI amount in manufacturing

<Figure 1> Trends of the Share of Establishments invested into China to those into the World: Japan and Korea



<Figure 2> Trends of the Share of Investments into China to those into the World: Japan and Korea



sector were 76.9 (18 US$ billion) and 86.1 (US$ 7 billion) percent for Japan and Korea, respectively. Thus, we can infer that the investment of two countries into China has much focused on manufacturing sector. It contrasts with the share of FDI in the world. For Japan, it is shown that the shares of FDI cases and amounts in manufacturing sector were 35.2 (16,064 cases) and 36.4 (US$ 252 billion), respectively, during the same period. And the shares of the FDI cases and amounts of Korea were 65.3 (12,820 cases) and 53.9 (US$ 24 billion), respectively.

<Table 5> Trends of Korea and Japanese FDI to China by Industries

Japan								
year	Manufacturing				Non-manufacturing			
	World		China		World		China	
	Cases	Amount	Cases	Amount	Cases	Amount	Cases	Amount
1989-93	7,403	67,460	1,336	2,794	16,632	173,003	374	1,321
1994-98	5,726	83,783	1,803	9,301	6,140	147,358	317	2,804
1999-03	2,935	101,214	813	6,336	6,859	120,120	149	1,421
Total	16,064	252,457	3,952	18,431	29,631	440,481	840	5,546

Korea								
1989-93	2,180	2,589	607	430	752	2,542	44	37.7
1994-98	4,339	10,530	2,760	3,091	1,877	7,703	457	693
1999-03	6,301	10,493	4,482	3,461	4,187	9,948	766	399
Total	12,820	23,612	7,849	6,982	6,816	20,193	1,267	1,129

Notes: 1) The cases and amount of branches are excluded. Amount is in million USD.
2) The amount of Japanese FDI is converted into USD by using average exchange rate.

III. Empirical Model Specification

We model the location decision of Japanese and Korean non-financial plants as a conditional logit problem where the dependent variable is the province chosen by each investor. Following the method employed in earlier studies such as Carton (1983) and Head et al. (1995), we exploit McFadden's (1974) result that logit choice probabilities may be derived from individual maximization decisions if unobserved heterogeneity takes the appropriate form. We assume that each investor chooses the province that would yield the highest profit. Then to measure profitability of each investment, profits of an investor j in a province s depends on the sets of variables, which are assumed to affect the revenues and costs of investors.

On the revenue side, the province per capita income is a measure of market demand in a province and is expected to be related to FDI, which is known as a horizontal FDI. A second variable, which might affect revenue, is agglomeration effect, which stems from nearby economic activity of similar firms or accumulates stock of FDI. For example, a province with higher densities of manufacturing activity could attract more FDI because the foreign investors might be serving existing manufacturers. A common finding in recent studies is that regions with a relatively higher existing stock of foreign investment are more likely to attract more investments, after controlling for various regional characteristics (e.g., Wheeler and Mody 1992; Head et al. 1995; O'Huallachain and Reid 1997; Barrel and Pain 1999).

On the cost side, the factors affecting costs include wages and interests which are chosen to minimize costs given that the prices prevail in each province, for example, labors and capitals. For labor market, wage rate, the availability of labor and the labor-management relation are potentially important characteristics. For capital market, interest rates and the flexibility of the capital market are good indicators of province characteristics. Higher wages are expected to deter FDI (Bartik 1985). This is called a vertical FDI.

Another frequently considered factor in attracting FDI is the cost and quality of infrastructure. A well-developed transportation system reduces production costs by reducing the costs of importing components and machinery and exporting outputs. In addition, we also controlled policy incentives to foreign investors in designated economic zones. For developing countries, the policy incentives are quite important because they try to attract FDI through offering some favorable incentives toward foreign investors.

Considering the determinants of profits of the foreign investors, the profitability of province *s* for investor *j* at time *t* may be represented as:

$$\alpha_1 \ln A_{jst} + \alpha_2 \ln I_{st} + \alpha_3 \ln F_{st} + \alpha_4 \ln Y_{st} + \varepsilon_{jst}. \qquad (1)$$

I_s, F_s, Y_s reflect attractiveness of province s to the average investor, i.e., infrastructure effects, factor effects by factor prices and demand effects, respectively. A_{jst} captures agglomeration effects for investor i in province *s* at time *t*. For a short time, time notation is omitted throughout the paper. Here the measure of A_{jst} varies across investors, *j*, since investors differ by industry and time of entry. ε_{js} is idiosyncratic shock.

McFadden (1974) demonstrated that if, and only if, ε_{js} are independent log-Weibull distributed random variables, the probability that province *s* will yield investor *j* the highest profits among all the provinces in choice set Γ (P_{jst}) is given by the logit expression

$$P_{jst} = \frac{\exp(\alpha_1 \ln A_{jst} + \alpha_2 \ln I_{st} + \alpha_3 \ln F_{st} + \alpha_4 \ln Y_{st})}{\sum_{l \in \Gamma} esp(\alpha_1 \ln A_{jlt} + \alpha_2 \ln I_{lt} + \alpha_3 \ln F_{lt} + \alpha_4 \ln Y_{st})} \cdot \quad (2)$$

Maximum likelihood techniques use these probabilities to estimate the coefficients of the four effects: agglomeration, inputs, infrastructure and province per capita income.

IV. Data and Descriptive Statistics

The sample of Korean foreign subsidiaries is from the database of the Export-Import Bank of Korea, which includes the list of Korean subsidiaries in the world since 1968. After the first investment in China was recorded in 1988, the data shows a significant increase in the number of cases and amount of FDI. The sample of Japanese foreign subsidiaries is drawn from the 2001 Kaigai Shinshutsu Kigyou (Overseas Japanese Companies Data). Toyo Keizai compiles this data as a part of an annual survey of the overseas operations of major listed and non-listed Japanese companies.

The variables, which reflect province characteristics to attract FDI, are divided into four groups. First the variables, reflecting agglomeration effects are assumed to the total number of establishments of each country by province and by both province and industry. Second, the province per capita income is included as a measure of potential demand for foreign investors' products.[2] The data is from the China Statistical Yearbook.

Third, the cost of labor is controlled by including the average level of wage of staffs and workers in the region, which is taken from the

2) Regional income data are available only after 1998 so figures for 1989-1997 are interpolated from the GDP per capita data, which are available over the whole period (Cheng and Kwan 2000). Through estimation of a fixed-effect panel estimation of the specification, $\ln(income_{it})=\alpha_i+\beta \ln(gdp_{it})+\beta_{it}$ over the period, 1998-2002, during which both data are available, income per capita data for 1989-1997 are interpolated from the estimated equation.

China Statistical Yearbook. Another input, capital, is ignored in the paper since the data is not available and it is assumed that regional difference of interest rate is not significant due to the controlled interest rate policy of the central government. Further, to control for the quality of workers, two education variables, the share of high school and college graduate to total population of each province is included. The data is taken from the China Statistical Yearbook.

Finally, the variables, reflecting infrastructure are two policy variables: the average level of corporation tax and the number of Special Economic Zones, which are Economic and Technological Development Zones, Technology Industry Development Zones, Bonded Zones, Border Economic Cooperation Zones, and Export Processing Zones. The data is collected from the database of the Korea International Trade Association. Other infrastructure variables include the total lengths of railway per unit of land area, and the total lengths of highway per unit of land area. The data are from the China Statistical Yearbook.

In addition, the degree of openness of a region and the concentration of Koreans as a minority is included. Conventional neoclassical models of MNEs view imports and FDI as substitutes, particularly in the manufacturing sector. In addition, if FDI is directed to industries in which a country has comparative advantages, then imports and FDI are likely to be positively relate d.[3] In order to test the relation between imports and FDI inflows in

3) Graham and Krugman (1993) argue that, for some industries, foreign investment is likely to be complementary with trade. Baldwin (1990) suggests that downstream services are typically associated with the level of export sales from the parent country to the host country. Locals can set

a region, the ratio of imports to GDP is used as an approximation of openness of each region. The data is taken from the China Statistical Yearbook.

Following online explanation by the Ministry of Foreign Affairs of the People's Republic of China, three regions (Jilin, Liaoning, and Heilongjiang) are selected as major areas of distribution of Korean ethnicity.[4)]

The data covers 1988-2002 for the 26 regions. China has 23 provinces (sheng) including Taiwan, 5 autonomous regions (zizhiqu), and 4 municipals (shi). This paper includes 26 regions: 22 provinces (excluding Taiwan), 1 autonomous region and 4 municipals. The 5 independent regions (Inner Mongolia, Guangxi, Tibet, Ningxia , Xingxia) are considered at a province because the original FDI data are reported together. And since Chongqing city became independent only after 1997, the data of this city are combined with that of Sichuan sheng. Thus the variables, which reflect regional characteristics are calculated as a simple average except for average wage which is a weighted average. All value variables are converted into the 1996 constant US dollar.

The summary statistics of the variables used in the estimation are reported in Table 6.

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some of these facilities up, although parent country involvement may be beneficial.

4) The Ministry of Foreign Affairs of the People's Republic of China listed 55 national minorities of which Korean is 13th with 1.9 million. Other ethnic groups in three regions where Koreans are mainly live Mongol, Hui and Manchu.

<Table 6> Summary Statistics

	Mean	Std. dev.	Minimum	Maximum
Agglomeration				
Establishments: Korea	179.56	486.39	0	3,335
Establishments: Japan	53.29	94.96	0	630
Demand: per capita income Inputs	674.0	195.5	464.6	1,491.6
average wage (USD)	975.8	332.0	486.3	2,692.1
share of college graduate to population	0.0008	0.0008	0.0002	0.0048
share of high school graduate to population	0.0023	0.0007	0.0010	0.0050
Infrastructure				
number of economic zones	3.377	3.610	0	20
railway (km per km^2)	2,202.8	1,833.7	213.9	12,498.9
Others				
share of production by government owned companies to GDP	0.5888	0.2403	0.1444	1.5066
share of trade to GDP	0.2989	0.4010	0.0316	2.3306
flight time (min.)	201.34	64.98	105	440

V. Estimation Results

Using the Heckman's conditional logit estimation, Tables 7, 8 and 9 report the estimation results. Table 7 reports the estimation results by using pooled data of Japan and Korea while Tables 8 and 9 present the separate estimation results for Japan and Korea.

<Table 7> Estimation Results: Japan and Korea

	Model 1	Model 2	Model 3	Model 4
log (companies)	0.977 (81.38)**	0.998 (81.92)**	0.911 (56.23)**	0.903 (57.08)**
log (income)	0.294 (2.23)*	-0.121 (0.9)	-0.008 (0.06)	0.228 (2.23)*
log (wage)	-0.339 (2.63)**	0.687 (4.96)**	0.367 (2.32)*	
log (college)	140.582 (3.47)**	-255.551 (5.60)**	-309.707 (6.55)**	-260.353 (6.16)**
log (railway)	35.931 (18.63)**	40.006 (20.29)**	31.922 (14.79)**	31.236 (14.64)**
log (zone)	0.297 (7.83)**	-0.377 (9.93)**	-0.49 (12.21)**	-0.459 (12.10)**
log (government)		3.108 (20.29)**	3.303 (19.18)**	3.223 (19.05)**
log (trade)			0.754 (9.14)**	0.817 (10.46)**
log (flight)			-0.857 (8.48)**	-0.83 (8.24)**
Pseudo-R^2	0.51	0.52	0.52	0.52
Log-likelihood	-17,734.0	-17,527.8	-16,714.3	-16,717.0
No. of choice	26	26	26	26
No. of chooser	12,471	12,471	12,471	12,471

Note: Absolute value of z statistics in parentheses, * significant at 5%; ** significant at 1%.

<Table 8> Estimation Results: Japan

	Model 1	Model 2	Model 3	Model 4
log (companies)	1.069 (27.20)**	1.077 (27.11)**	1.076 (21.43)**	1.076 (21.49)**
log (income)	0.953 (4.05)**	0.811 (3.15)**	0.236 (0.73)	0.722 (3.26)**
log (wage)	-0.226 (1.22)	-0.042 (0.19)	0.671 (2.06)*	
log (college)	-86.106 (0.88)	-115.58 (1.15)	-139.204 (1.28)	-44.061 (0.45)
log (railway)	-6.004 (1.33)	-7.791 (1.67)	-1.069 (0.19)	-3.511 (0.63)
log (zone)	-0.082 (1.11)	-0.118 (1.51)	-0.06 (0.65)	-0.029 (0.32)
log (government)		0.461 (1.38)	0.309 (0.79)	0.013 (0.04)
log (trade)			-0.504 (3.08)**	-0.366 (2.48)*
log (flight)			0.122 (0.73)	0.19 (1.16)
Pseudo-R^2	0.29	0.29	0.29	0.29
Log-likelihood	-5,310.7	-5,309.7	-4,872.7	-4,874.8
No. of choice	26	26	26	26
No. of chooser	2,310	2,310	2,310	2,310

Note: Absolute value of z statistics in parentheses, * significant at 5%; ** significant at 1%.

First of all, Table 7 shows that agglomeration effect is statistically significant.[5] Thus as the number of companies increased in a specific region, Korean and Japanese companies tend to choose that area as

5) Since the estimate number of companies by region and industry does not converge well, the total number of companies by region is used.

an investment target.[6)] Second, regional income per capita show positive and significant coefficient, confirming a horizontal FDI incentive.

Third, as a part of vertical FDI, it is shown to be unclear. For example, average wage does not show a consistent pattern. The coefficient of Model 1 shows negative and significant while those of Models 2 and 3 show positive and significant. Thus, the interpretation for the two groups is opposite: lower and higher probability to invest in Models 1 and Models 2 and 3, respectively. In addition, the shares of college graduates appear to be positive and significant for Model 1 but negative and significant for Models 2 and 3.

Fourth, the infrastructure variables, the share of railway to regional size and the number of economic zones, are shown to be significant. As we expected, Japanese and Korean companies tend to show a higher probability to invest as the share of railway to total area size increased. However, the number of economic zones does show negative and significant signs. This issue is explained in more detail by Table 10, which covers the number and amounts of investment by regions.

The estimation results for other supporting variables are reported as well. The coefficient for the share of the production of government-owned companies is shown to be positive and significant. The coefficient for trade share to GDP is shown to be positive and significant, indicating complementary relation between FDI decision and trade. In addition, the coefficient for the flight time is shown to be negative.

6) Due to a possible endogeneity of the agglomeration variable, the lagged value has been used for all estimates.

Tables 8 and 9 present the estimation results for Japan and Korea, respectively. The estimation results between two countries are quite different. The result for agglomeration effects is consistent between two countries. In contrast, the coefficient for regional income shows

<Table 9> Estimation Results: Korea

	Model 1	Model 2	Model 3	Model 4	Model 5
log (companies)	1.508 (76.45)**	1.537 (73.41)**	1.68 (66.10)**	1.357 (33.94)**	1.194 (30.30)**
log (income)	-1.397 (6.90)**	-1.506 (7.37)**	-2.004 (9.13)**	-2.87 (12.22)**	-1.156 (6.08)**
log (wage)	0.747 (3.65)**	0.63 (3.04)**	3.425 (13.80)**	3.228 (12.80)**	
log (college)	810.656 (15.35)**	1,007.07 (14.56)**	1,280.17 (16.26)**	999.09 (12.60)**	1,242.23 (15.47)**
log (railway)	70.198 (29.94)**	67.531 (28.19)**	81.361 (34.35)**	80.916 (33.95)**	70.569 (31.81)**
log (zone)	-1.845 (32.85)**	-1.925 (32.50)**	-2.179 (35.33)**	-2.177 (35.56)**	-1.949 (33.55)**
log (government)		-1.225 (4.58)**	-7.504 (21.09)**	-7.122 (20.51)**	-6.976 (19.80)**
log (trade)			0.391 (2.71)**	1.72 (8.42)**	2.878 (14.47)**
d_korean			3.048 (41.72)**	3.031 (41.71)**	2.728 (39.69)**
log(flight)				-2.325 (9.81)**	-2.865 (11.11)**
Pseudo-R^2	0.69	0.69	0.74	0.74	0.73
Log-likelihood	-8,976.3	-8,965.7	-7,489.3	-7,432.9	-7,514.3
No. of choice	26	26	26	26	26
No. of chooser	10,161	10,161	10,161	10,161	10,161

Note: Absolute value of z statistics in parentheses, * significant at 5%; ** significant at 1%.

different signs negative for Korea but positive for Japan. It can be interpreted that the decision of Japanese companies is consistent with horizontal investment, seeking market demand. However, Korean companies might follow vertical FDI, which looks for cost-saving production. Due to high correlation coefficients between regional income and average wage (0.86), Model 4 of Table 8 and Model 5 of Table 9 present the estimation results by excluding average wage variable, confirming positive coefficient for Japanese but negative for Korean companies.

The coefficients for college and other variables such as railway, the number of economic zones and the share of government output are not shown to be significant for Japanese companies. However, the share of imports to total regional production is negatively related with the location choice.

For Korean companies, the estimation results are different from those of Japanese companies. The share of college graduate appears to be positive and significant, indicating that the college graduate plays a significant role in attracting Korean companies. The infrastructure variables, the share of railway to regional size and the number of economic zones, are shown to be significant. As expected, Korean companies tend to show a higher probability to invest as the share of railway to total area size increased. However, the number of economic zones does not show the expected sign.

The estimated results for other supporting variables are reported as well. The coefficient for the share of the production of government -owned companies is shown to be negative and significant. Here we interpret this share as an approximation of the functioning of market economy. If the share is large in a region, it implies that government-owned

<Table 10> Regional Distribution of Korean FDI

Region	Cases(%)	Amount(%)	Income	Wage	Government	Zones
Beijing	608 (6.0)	641.5 (9.2)	1,013.0	1429.6	0.765	1.13
Shanghai	441 (4.3)	569.0 (8.2)	1,217.8	1661.4	0.957	6.33
Tianjin	922 (9.1)	878.8 (12.6)	870.9	1201.7	0.864	2.80
Hebei	248 (2.4)	927.0 (13.3)	610.9	820.3	0.486	2.53
Shanxi	17 (0.2)	457.6 (6.6)	564.1	808.9	0.658	0.87
Liaoning	1,794 (17.7)	652.9 (9.4)	683.1	915.1	0.755	6.00
Jilin	919 (9.0)	206.6 (3.0)	588.6	798.6	0.817	2.40
Heilongjiang	396 (3.9)	174.0 (2.5)	614.1	788.4	0.764	1.60
Jiangsu	631 (6.2)	866.7 (12.5)	727.2	1026.0	0.487	6.73
Zhejiang	265 (2.6)	298.5 (4.3)	837.0	1205.8	0.340	3.93
Anhui	23 (0.2)	146.2 (2.1)	571.3	788.0	0.488	2.13
Fujian	78 (0.8)	521.3 (7.5)	719.1	1002.2	0.311	7.53
Jiangxi	26 (0.3)	4.1 (0.1)	557.4	741.5	0.522	1.47
Shandong	3,335 (32.8)	1,938.6 (27.8)	664.0	906.1	0.503	8.47
Henan	33 (0.3)	6.1 (0.1)	556.9	752.8	0.498	1.73
Hubei	29 (0.3)	22.4 (0.3)	617.4	848.0	0.627	2.40
Hunan	11 (0.1)	102.6 (1.5)	604.8	872.5	0.455	1.73
Guangdong	266 (2.6)	268.8 (3.9)	862.2	1375.3	0.390	13.73
Sichuan	35 (0.3)	17.9 (0.3)	597.8	867.8	0.503	2.93
Guizhou	3 (0.0)	4.7 (0.1)	528.8	809.9	0.577	0.93
Yunnan	6 (0.1)	3.2 (0.1)	606.5	968.5	0.574	1.47
Shaanxi	13 (0.1)	6.5 (0.1)	563.6	854.6	0.659	2.13
Gansu	5 (0.1)	0.6 (0.0)	543.4	976.5	0.800	0.93
Hainan	16 (0.2)	21.2 (0.3)	634.2	849.0	0.276	1.73
Autonomous	45 (0.4)	114.2 (1.6)	598.3	1011.8	0.522	3.93
Qinghai	1 (0.0)	0.1 (0.0)	572.2	1091.4	0.652	0.20
Total	10,167 (100)	6,963.1	674.0	975.8	0.587	3.38

Notes: 1) The amount is in USD 1,000 and until the end of 2003.
2) The average investment amount into Hunan is very high. This is from an investment (about 100 million USD) by LG electronics which is reported in 1994. Excluding this investment, the average investment amount is 175.5 thousand USD.
3) Government implies the share of production of the government owned companies to GDP.
4) Sichuan includes Chongqing city.
5) Autonomous includes Inner Mongolia, Guangxi, Tibet, Ningxia, and Xinjiang.

companies relatively dominate the region, which do not guarantee market-based competition. Thus Korean companies are reluctant to choose this region compared to the region with lower shares.

The coefficient for trade share to GDP is shown to be positive and significant, indicating complementary relations between FDI decision and trade. Finally, Koreans companies tend to invest relatively on the areas concentrated with Koreans and the distance is negatively related with the location decision.

The estimation results can be investigated thoroughly by using Table 10. First of all, about 69% of investments are in four regions: Shandong (32.8%), Liaoning (17.7%), Tianjin (9.1%) and Jilin (9.0%). In terms of amount, the share in four regions is about 53%: Shandong (27.8%), Liaoning (9.4%), Tianjin (12.6%) and Jilin (3.0%). As a factor of horizontal FDI, the average income per capita at the 1996 constant price of Shandong was 664 USD in Shandong, which is even lower than the average income of China. This implies that the investment in Shandong does not reflect the market incentive of Korean companies. The special economic zones might affect investments in this area. The average accumulated number of economic zone is 8.47, which is higher than the average number (3.38) in China while the number is lower than that of Guangdong.[7] However, the generalized estimation

7) Using the data of Japanese foreign subsidiaries in China, the 2001 Kaigai Shinshutsu Kigyou (Overseas Japanese Companies Data), compiled by Toyo Keizai, shows that Japanese subsidiaries are distributed mostly in three regions: Shanghai (26.9%), Jiangsu (14.3%), and Guangdong (12.7%). The number of companies recorded was limited with 2,312. This might reflect distance or the special economic zones in Guangdong and the market demand in Shanghai.

that the number of economic zones shows not a positive but a negative factor in FDI decision of Korean companies. Thus, we can infer that the main determinants in addition to horizontal and vertical elements are the distance from Korea and the ethnicity (Korean) as we see from the regional distribution of Korean affiliates in China.

VI. Conclusion

By using aggregate and firm level data of Korean foreign affiliates in China, we investigated recent FDI trends with the comparison of Japanese FDI, which is one of the main foreign investors in the world. Comparing it to the FDI trends of Japanese companies, shows that Korean companies are much too concentrated into China and furthermore into specific regions in China as well. Japan has diversified the FDI cases and amounts in the world and is especially moving their FDI to European countries, which might reflect the increasing size of European market due to an expansion of members.

The conditional logit estimation results confirm the main determinants of location choice of FDI. The number of Korean and Japanese companies as an indicator of agglomeration effects plays a significant role in the location decision. Second, the regional income level is also a good decision variable, which reflecting a market access effect. The coefficient for regional income is shown to be positive for Japanese companies but negative for Korean companies.

Third, the variables, which reflect production costs, for example, average wage, was a significant role but the signs depend on model specification. However, estimate results on the effect of infrastructure factors are mixed. The coefficients for highways and roads are positive and significant which supports the hypothesis that better infrastructures will attract foreign affiliates. However, the number of economic zones, reflecting the policy variables to attract FDI in developing countries is shown to be negative and significant. Interestingly, those variables are not shown to be significant for

Japanese companies. Rather than the policy factor, the distance measured by flight time is shown to be negative and significant for both Korean and Japanese companies. The ethnicity factor also plays a significant role in FDI decision of Korean companies as well.

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<Appendix Table 1> Trends of Japanese FDI to China by Industries

year	Manufacturing				Non-manufacturing			
	World		China		World		China	
	Cases	Amount	Cases	Amount	Cases	Amount	Cases	Amount
1989	1,829	15,178	85	192	4,683	47,100	40	216
1990	1,528	16,903	113	176	4,286	44,376	51	201
1991	1,338	13,514	178	335	3,201	31,395	63	248
1992	1,318	10,451	381	672	2,397	24,697	103	374
1993	1,390	11,414	579	1,419	2,065	25,435	117	282
1994	1,233	14,464	558	1,947	1,206	28,051	69	634
1995	1,589	17,734	675	3,275	1,241	29,558	88	828
1996	1,229	19,673	303	1,752	1,253	25,971	58	646
1997	1,079	18,262	187	1,429	1,405	32,166	69	422
1998	596	13,650	80	898	1,035	31,612	33	274
1999	619	46,268	62	611	1,119	27,179	15	194
2000	536	11,293	90	745	1,178	35,631	16	223
2001	536	13,498	167	1,219	1,244	16,895	21	159
2002	641	14,325	227	1,370	1,516	21,318	33	236
2003	603	15,830	267	2,391	1,802	19,097	64	609
Total	16,064	252,457	3,952	18,431	29,631	440,481	840	5,546

Notes: 1) The cases and amount of branches are excluded. Amount is in million US$.
2) The amount is converted into US$ by using average exchange rate.

<Appendix Table 2> Trends of Korean FDI to China by Industries

	Manufacturing				Non-manufacturing			
	World		China		World		China	
year	Cases	Amount	Cases	Amount	Cases	Amount	Cases	Amount
1988	69	85	1	0.1	102	131	0	0
1989	148	280	7	6	122	292	0	0
1990	196	485	22	15	144	474	2	0.7
1991	279	606	63	41	166	510	6	1
1992	345	658	160	117	152	562	10	24
1993	520	560	355	251	168	704	26	12
1994	1,099	1,489	703	581	389	814	138	53
1995	953	2,049	651	714	375	1,087	100	127
1996	1,030	2,815	637	715	435	1,600	96	188
1997	883	1,857	549	495	441	1,792	83	232
1998	374	2,320	220	586	237	2,410	40	93
1999	683	1,667	411	291	405	1,614	46	60
2000	1,065	1,492	668	520	1,000	3,488	100	15
2001	1,255	3,756	891	540	867	1,288	142	43
2002	1,557	1,648	1,152	842	874	1,803	196	110
2003	1,741	1,930	1,360	1,268	1,001	1,755	282	171
Total	12,197	23,697	7,850	6,982	6,878	20,324	1,267	1,130

Note: Amount is in million US$.

<Appendix Table 3> Trends of Japanese FDI to China

year	World		China	
	Cases	Amount	Cases (%)	Amount (%)
1989	6,589	62,976	126 (1.9)	409 (0.7)
1990	5,863	62,148	165 (2.8)	380 (0.6)
1991	4,564	45,417	246 (5.4)	629 (1.4)
1992	3,741	35,521	490 (13.1)	1,107 (3.1)
1993	3,488	37,116	700 (20.1)	1,747 (4.7)
1994	2,478	42,920	636 (25.7)	2,690 (6.3)
1995	2,863	48,204	770 (26.9)	4,200 (8.8)
1996	2,501	46,634	365 (14.6)	2,438 (5.2)
1997	2,495	50,970	258 (10.3)	1,876 (3.7)
1998	1,637	45,657	114 (7.0)	1,191 (2.6)
1999	1,744	73,671	79 (4.5)	840 (1.1)
2000	1,717	47,165	106 (6.2)	970 (2.1)
2001	1,786	30,662	189 (10.6)	1,380 (4.5)
2002	2,164	35,944	263 (12.2)	1,722 (4.8)
2003	2,411	35,168	332 (13.8)	3,063 (8.7)
Total	46,041	700,173	4,839 (10.5)	24,642 (3.5)

Notes: 1) Amount is in US$ million.
2) The amount is converted into US$ by using average exchange rate.
3) The percentage share of Chinese cases and amount to the cases and amounts to the world is in parenthesis.

Source: Online database of the Ministry of Finance of Japan.

<Appendix Table 4> Trends of Korean FDI to China

year	World		China	
	Cases	Amount	Cases(%)	Amount(%)
1988	171	216	1 (0.6)	10 (4.6)
1989	270	573	7 (2.6)	6 (1.1)
1990	340	959	24 (7.1)	16 (1.7)
1991	445	1,116	69 (15.5)	42 (3.8)
1992	497	1,219	170 (34.2)	141 (11.6)
1993	688	1,263	381 (55.4)	264 (20.9)
1994	1,488	2,304	841 (56.5)	634 (27.5)
1995	1,328	3,136	751 (56.6)	841 (26.8)
1996	1,465	4,415	733 (50.0)	903 (20.5)
1997	1,324	3,649	632 (47.7)	728 (20.0)
1998	611	4,730	260 (42.6)	679 (14.4)
1999	1,088	3,281	457 (42.0)	351 (10.7)
2000	2,065	4,980	768 (37.2)	671 (13.5)
2001	2,122	5,045	1,033 (48.7)	583 (11.6)
2002	2,431	3,451	1,348 (55.5)	952 (27.6)
2003	2,742	3,684	1,642 (59.9)	1,438 (39.0)
Total	19,075	44,021	9,117 (47.8)	8,259 (18.8)

Note: Amount is in US$ million.
Source: Online database of the Export Import Bank of Korea.