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How do the Location Determinants of Vertical FDI and Horizontal FDI Differ?

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Abstract

Distinguishing between vertical and horizontal foreign direct investment (FDI), this paper examines how the location determinants of the two types of FDI differ. Based on a conditional logit model and data on Japanese foreign affiliates, the main findings are that the most important determinant for horizontal FDI is a large market, whereas labor costs play a significant role in the case of vertical FDI. Concerning the effect of tariffs, geographical distance, and labor quality on the location decision, this study obtains results that differ from those of previous studies on the determinants of location choice of Japanese multinationals. First, tariffs and distance have opposite effects on the location decisions in the case of horizontal and vertical FDI. Second, labor quality has a positive effect only on the location decision of horizontal FDI.

Key Words: horizontal FDI, vertical FDI, location decision, Japan's FDI.

1. Introduction

Foreign direct investment (FDI) from developed economies, including Japan, has substantially contributed to the rapid industrialization of Asian developing economies, such as China, India, and the Association of South East Asian Nations (ASEAN) countries in the 1990s and the 2000s through the transfer of financial, technological and managerial resources. Because of these benefits of FDI, developing economies have been keen to promote inward FDI and scholars have studied what characteristics of host countries or regions are key in the location decision of multinational enterprises (MNEs).

Theoretical studies on FDI suggest that foreign investment in the manufacturing sector can be classified into two categories according to its motivation.[1] The first is "vertical FDI," (VFDI) which MNEs conduct in order to take advantage of international factor-price differences. This type of FDI creates intra-firm vertical divisions of labor. For example, attracted by cheap labor in ASEAN countries and China, many Japanese electric machinery makers established assembly plants in these countries. In the case of vertical FDI, factor-price differences are an important determinant in the location decision. The second type of FDI is "horizontal FDI," (HFDI) which is conducted to gain access to local markets. For instance, Japanese automobile makers started up factories in the US and the EU in order to jump trade barriers, save on transportation costs and adapt their products and services to the local market. This type of FDI creates intra-firm horizontal divisions of labor. That is, foreign affiliates tend to play a similar role in the host region as their parent firms in the home region. In the case of horizontal FDI, market size and trade costs are important determinants in the location decision.

How location decisions differ in the case of HFDI and VFDI is of considerable importance both for host countries and MNEs. On the one hand, for host countries, a better

[1] For a theoretical analysis of FDI motivations, see Dunning (1993), Brainard (1997) and Markusen (2002).

understanding of the location determinants of FDI may help them to design policies to attract FDI. For example, in order to increase technology transfer and spillovers from FDI, developing countries make efforts to attract HFDI by various means, such as promoting local market growth and raising the quality of labor.[2] For MNEs, on the other hand, being clear about the different factors to take into account in the case of HFDI and in the case of VFDI can help them to make a more informed location decision. For example, Japanese MNEs can choose China as a location not only for HFDI but also for VFDI because China has a double location advantage: it has a growing local market and lower labor costs.

With regard to FDI by US firms, there are a number of studies that have examined the relationship between multinationals' activities and host country characteristics (e.g., Kumar 1994; Markusen and Maskus 1999, 2001; Hanson, Mataloni and Slaughter 2001; and Shatz 2004). Kumar (1994), for example, analyzed the determinants of production for export by estimating the share of exports to Japan in the total sales of US foreign affiliates in 40 countries. He found that countries with lower wage costs and higher levels of infrastructure were favored for export-orientated FDI. Markusen and Maskus (1999), on the other hand, conducted an empirical analysis on how production for local sales (HFDI) and production for exports (VFDI) were related to country characteristics. They draw the conclusion that local market size was more important for production for local sales than for production for exports sales, while host country skilled-labor scarcity was important for export production relative to production for local sales. Moreover, investment cost barriers in the host country had a greater negative impact on production for exports than on production for local sales. In a follow-up study, Markusen and Maskus (2001) found that host country trade costs had a strong positive effect on HFDI. Hanson,

[2] In the case of HFDI, foreign affiliates carry out the same production activities as the parent firm. HFDI therefore is likely to engender more technology transfer and spillovers than VFDI.

Mataloni and Slaughter (2001), meanwhile, conducted OLS estimations to explore the expansion strategies of US multinational firms, dividing FDI into three types, export-platform FDI, outsourcing FDI and distribution-oriented FDI. They found that export-platform FDI tended to be located in countries which were smaller, less protectionist, and had lower taxes; outsourcing FDI appeared to be most common in countries with relatively low average labor productivity; host country tax policies influenced the location choice of distribution-oriented and production-oriented FDI. More recently, Shatz (2004) examined the impact that country characteristics had on the location choice of export-oriented FDI in developing countries by U.S. multinationals. He divided export-oriented foreign direct investment into two types according to the sales destination, that is, vertical export-oriented FDI for the purpose of exporting back to the home country, and horizontal export-oriented FDI for the purpose of exporting to third countries. His main findings were that export-oriented FDI was related to favorable host country geography, while horizontal export-oriented FDI was related to liberal policies toward multinationals. Labor costs and taxes – traditional location determinants – also proved important to one or both types of export-oriented FDI.

Regarding Japanese FDI, there is a considerable number of studies that have examined the location decisions of Japanese firms, typically using conditional-logit models (e.g., Urata and Kawai 1999, Fukao and Chung 1996, Wakasugi 1997, Tokunaga and Ishii 1995, and Fukao and Yue 1997). Although their approaches sometimes differ – Wakasugi (1997), for example, focused on location determinants at the regional level, while Urata and Kawai (1999) were interested in comparing the determinants of location choice of small and medium-sized enterprises (SMEs) on the one hand and large firms on the other – their results show some commonalities. That is, low wage rates, the availability of good infrastructure, the presence of a large local market, and industrial agglomeration had statistically significant positive effects on

the location decision made by Japanese firms. Moreover, Fukao and Chung (1996) found that countries with low risk attracted Japanese manufacturing FDI, while Urata and Kawai's (1999) study revealed the differences in location determinants between SMEs and large firms, with SMEs being more sensitive to local conditions than large firms in their location decision. This was especially true in the case of investments in developing countries, where factors such as the availability of low-wage labor, well-developed infrastructure and industrial agglomeration played a much larger role for SMEs than for large firms.

However, despite the relatively large number of studies on the location determinants of Japanese FDI, none of these have examined the relationship between location choices and the different motives underlying vertical and horizontal FDI. Nevertheless, some of the previous studies have obtained results that are consistent with the above-mentioned theoretical considerations regarding the role of investment motives in determining location decisions. Fukao and Chung (1996), for instance, examined the determinants of location choice of Japanese MNEs in the textile, general and precision machinery, electric machinery, and transportation equipment industries. In their results, wages had a strong impact on the location choice in the electric machinery and textile industries where vertical FDI is common, while local market size was a strong influence on the location decision in the transportation equipment industry, where horizontal FDI is common. Urata and Kawai (1999) arrived at similar results. However, investment motives and types – vertical or horizontal – may differ even within the same industry, but previous empirical analyses have hardly investigated how investment motives affect the determinants of location decisions.

In order to examine this issue, we divide Japanese overseas subsidiaries into two groups using information on the destination of their sales. We separately estimate the determinants of location choices for horizontal and vertical FDI and investigate how they differ.

This paper differentiates itself from previous studies on US MNEs in the following respects. First, the analysis here uses affiliate-level data, while the previous studies on US MNEs used data aggregated to the country level. Our study is the first to use micro data to analyze how the determinants of location choice differ for horizontal and vertical FDI. Second, this study focuses on a different theme than previous studies on US MNEs. Previous studies have analyzed the relationship between FDI patterns and country characteristics, while this study focuses on the determinants of the Japanese MNEs' location choice in accordance with FDI patterns and for this reason employs a conditional logit model. Third, this study considers more host country characteristics than previous studies and conducts empirical analyses by industry, an approach not seen in previous studies.

To explore the determinants of location decisions by type of FDI, this paper considers the location choices of Japanese MNEs with regard to 117 host countries during the period from 1989 to 2002.[3] The analysis examines the impact of the following eight host country characteristics on the location decision: labor costs, market size, the education level of labor, quality of infrastructure, Japanese firm agglomeration, country geography, tariffs, and country risk.

The main findings are that market size[4] and trade costs[5] in the host country have a strong positive impact on the location decision in the case of HFDI, while labor costs[6] and trade costs have a strong negative impact on the location choice in the case of VFDI. The findings are consistent with the above-mentioned theoretical considerations.

The remainder of this chapter is organized as follows. Section 2 presents an overview of the theory of FDI. Section 3 briefly describes the recent patterns of FDI by Japanese firms.

[3] See Table A4 for a list of the countries.
[4] Market size is proxied by host countries' GDP.
[5] Trade costs are denoted by host countries' tariff rates and geographical distance from Japan.
[6] Labor costs are proxied by host country wages.

Section 4 examines the determinants of FDI location choice by Japanese firms in view of the FDI type, using a conditional logit model. Section 5 offers concluding remarks.

2. A Brief Survey on the Theory of Multinational Firms

Broadly speaking, theories of the multinational firm can be divided into two approaches. The first is the OLI framework first proposed by Dunning (1977), which considers FDI as determined by ownership, location, and internalization advantages. The second approach divides FDI into three different models: a "horizontal model," a "vertical model," and a "knowledge capital model" (see, e.g., Helpman 1984, 1985; and Markusen 1984, 2002).

Up until the 1990s, there was no formal theory about the relationship between MNEs' activities and host and home country characteristics. For many years, economists have made efforts to build a basic theory of foreign direct investment and the multinational enterprise by embedding the multinational firm in basic trade theory in a general equilibrium framework. Early theoretical work from the 1980s (see, e.g. Helpman 1984, Markusen 1984) contains mostly uni-dimensional theories of multinationals, which focus on either horizontal or vertical FDI.

The vertical FDI model states that multinationals arise to take advantage of international factor-price differences.[7] Firms engage in two activities: headquarter services and plants production. Headquarter activities are physical or human capital intensive, while plant activities are manual labor intensive. When there are no factor-price differences across countries, the activities of both the headquarters and plants are carried out in the domestic market. When factor prices differ across countries, firms become multinationals and split the activities of

[7] See, e.g., Helpman (1984) and Helpman and Krugman (1985) for details.

headquarters and plants. Firms locate their headquarters in a country that is relatively abundant in skilled labor and production plants in countries where skilled labor is relatively scarce. Production is fragmented into different stages. Therefore, vertical FDI tends to be motivated by international differences in factor costs.

The horizontal FDI model is that multinationals arise to avoid trade barriers that make it costly to serve overseas markets through exports.[8] When trade barriers in the host country are low, a firm can undertake production at home and serve the host country market through exports. However, when trade costs are high, a firm becomes multinational to undertake the same production both at home and abroad, and serve the foreign market by producing locally instead of exporting to it. This type of FDI is called horizontal because the multinational carries out the same production activities in all countries.[9] Thus, horizontal FDI tends to be motivated by the desire to access overseas markets and by high trade costs.

Various scholars have attempted to integrate the models of horizontal and vertical FDI into a single framework Markusen et al. (1996) and Markusen (2002), for example, proposed a "knowledge-capital model," which was tested by Carr, Markusen and Maskus (2001). The knowledge-capital model allows for both vertical and horizontal firms to arise in equilibrium as a function of technology and country characteristics.

In this paper, we classify investment types based on the theoretical considerations above, that is, we distinguish between vertical FDI, which aims to exploit international factor-cost differences, and horizontal FDI, which aims to gain access to host-country markets.

[8] See, e.g., Horstmann and Markusen (1987, 1992) and Markusen and Venables (1998, 2000).
[9] The horizontal-vertical distinction goes back to Caves (1971). For a systematic treatment, see Markusen (1984) for horizontal and Helpman (1984) for vertical FDI.

3. An overview of Japan's FDI in the Manufacturing Sector

To start our analysis, we first examine the distribution of foreign affiliates, HFDI and VFDI across regions and industries for 1992 to 2002. The following subsections discuss these in turn.

3.1 The Geographical Distribution of Japan's FDI

Japanese FDI is not spread evenly around the world, but has been attracted to countries perceived to possess large open markets or a comparative advantage in resources, labor or other factors of production (Farrell 2000).

FDI by Japanese firms in the 1980s was directed largely to North America. The United States was the main recipient of Japanese FDI during this period, followed by the United Kingdom and Australia. From the early 1990s, however, the geographical orientation of Japanese FDI shifted from North America to Asia because of cheap labor in Asian countries. This trend can be seen in Table 1, which shows that the number of FDI cases in Asia rose more than threefold from 1,560 in 1992 to 4,878 in 2002. Moreover, with more than 60 percent, Asia accounts for the overwhelming share of FDI cases. The table also reveals that, in correspondence with Asian countries' economic development, Japanese FDI shifted from the Newly Industrializing Economies (NIEs) to the ASEAN countries and then to China (and Vietnam), in response to currency appreciation and rising labor costs in these countries. The share of FDI cases in China has increased significantly from 4.2 percent in 1992 to 19.9 percent in 2002.

The geographical shift in FDI locations from the 1980s and 1990s indicates that Japanese FDI in these two decades followed very different patterns. In the 1980s, Japanese FDI was mostly concentrated in the high-income countries (developed countries). That Japan MNEs

located most production in similar, high-income economies suggests that such FDI was largely of a horizontal nature, driven by the desire to gain market access than by factor differences. But, in the 1990s, Japanese FDI became increasingly concentrated in Asian developing countries. That Japanese MNEs are shifting their activities toward low-income countries suggests that much of the FDI during this decade was of the vertical variety where location decisions are driven by factor-cost difference.[10] That this interpretation is correct is confirmed by Table 2, which shows that VFDI by Japanese MNEs is heavily concentrated in Asia.

Insert Tables 1 and 2

3.2 The Sectoral Distribution of Japan's FDI

We next examine Japanese foreign affiliates' operations along industry lines, examing three industries that have played a major role in Japanese FDI: the textile, the electric machinery, and the transportation equipment industry.

Because of trade friction with industrialized countries and lost production advantages in Japan, Japan's textile industry moved abroad, to Indonesia, Thailand, Brazil and the United States. In the 1990s, China was the main destination (Lu 1994). The Japanese textile industry uses the comparative advantages of these countries in the region or beyond, which is consistent with VFDI. Moreover, Table 3 shows that FDI in the textile industry is of the vertical type.

Moreover, Japan's two main manufacturing sectors – automobiles and electronics, whose global competitiveness is strong – now carry out a large part of their production outside Japan. As shown in Table 4, the number of FDI cases in both the transportation equipment and the electric machinery industry increased substantially during the 1990s. As for patterns in

[10] However, FDI in developing countries could also be of the horizontal variety, since China for instance, is enjoying rapid growth and hence offers a rapidly expanding market.

terms of FDI types, Table 3 shows that VFDI is more common in the electric machinery industry and HFDI more common in the transportation equipment industry.

Insert Tables 3 and 4

In recent decades, the Japanese electric machinery industry has relocated a major part of its labor-intensive production to other countries, particularly to Asia, in the search of cost advantages. This can be confirmed from Table 5, which shows that the number of investment cases of the electric machinery industry in Asia increased from 402 in 1992 to 1219 in 2002.

Insert Table 5

Japanese FDI in the transportation equipment industry has involved extensive investment in overseas production to serve host markets and to export to third countries. As previous studies have shown, HFDI is common in the transportation equipment industry. For example, famous Japanese car manufacturers like Honda, Nissan and Toyota have established plants in the UK. These are investments made solely to serve the European market and avoid tariffs and other trade barrier. But at the same time, VFDI also exists in the transportation equipment industry. As shown in Table 5, the Japanese transportation equipment industry has expanded greatly overseas in recent decades and the number of FDI cases in Asia has increased from 192 in 1992 to 619 in 2002. Japanese car manufacturers increasingly relocated production either to cut costs or to avoid trade barriers.

3.3 Motivations behind Japan's FDI

The global distribution of Japanese FDI by industry and by region is influenced by the changing investment motives of MNEs.

Using the results of the *Kaigai Jigyo Katsudo Kihon (Doko) Chosa* (*The Survey on Overseas Business Activities*, hereafter the METI survey) conducted by the Ministry of Economic, Trade and Industry (METI), we review the details of motivations behind Japanese FDI.

The METI survey contains questions about the motivation underlying Japanese MNEs' foreign investments and offers respondents a choice among twelve different answers.[11] The respondents were asked to list the three main motives or fewer. Here, the main motives for Japanese MNEs which influence the pattern of Japanese FDI distribution are discussed. First, for Japanese MNEs, the most common motive is the use of cheap local labor, especially for foreign affiliates in Asia. Second, a large number of Japanese MNEs identify local sales as one of their main motives for FDI. Third, exports to Japan and third countries are also an important motive for overseas investments, although this motive is more relevant in the case of FDI in Asia than in other regions. The difference in the motives for investing in the United States and in Asia can be discerned from Table 6, which shows that the local sales ratio in the former is much higher than in the latter. The high ratio of local sales suggests that Japanese MNEs aim at overcoming trade costs or barriers and at locating production closer to consumers in the United States, which has a much larger market than the Asian countries. In contrast, the low local sales ratio in Asia indicates that Japanese FDI here is motivated by wage- and resource-considerations

[11] The answers respondents can choose from with regard to investment motives are: (1) To secure raw materials and resources; (2) overseas production is more advantageous on the cost side; (3) it was difficult to maintain the price competitiveness of production in Japan and the reduction of costs through overseas production is indispensable; (4) to continue to supply parts, etc., to Japanese assembly manufacturers, etc., who undertake production overseas; (5) to attempt the sales of maintenance and expansion in the host country (6) to attempt to maintain and expand sales to third countries; (7) to re-import to Japan; (8) to receive earnings and dividend, etc.; (9) to avoid exchange risks; (10) to avoid trade friction; (11) research and development in the host country; and (12) other.

for the production for export.

Insert Table 6

The proportion of Japanese manufacturing FDI directed to the NIEs averaged 23 percent from 1951 to 1979, but then fell to around 5 percent in the following decades. Moreover, ASEAN received nearly a third of Japan's manufacturing FDI until the late 1980s when investment moved to the industrialized countries. This investment was intended to serve local markets in order to offset trade frictions and barriers. Major changes have occurred in the orientation of Japanese manufacturing FDI since the 1950s, from its earlier focus on labor-intensive light manufacturing behind tariff walls in ASEAN and Latin America, to a surge of FDI into the US. This was followed by the revival of Asia as a location for Japanese manufacturing FDI (Farrell 2000).

As conditions in individual host countries have changed, so the motives of Japanese FDI have also changed, a development that is particularly visible in the case of in China. When China first became a major recipient of Japanese FDI, most investment went into labor-intensive manufacturing activities. Labor costs initially played a major role in the investment decision. However, wage rises in China's coastal regions have increasingly discouraged such investment. Thus, along with economic development and rapid growth of the domestic market in China, most investors are increasingly aiming maintaining and expanding local markets – a trend that can be confirmed from the rising local sales ratio in China in Table 6.

The different investment motives have lead to a diversification of locations of Japanese HFDI and VFDI among host countries. But how does the location decision with regard

to HFDI differ from that with regard to VFDI in detail? In order to address this question, we conduct an empirical analysis on the differences between the determinants of location choice in the case of HFDI and of VFDI.

4. The Location Decision of Japanese Multinationals and Host Country Characteristics

Multinationals' choice of FDI locations is typically influenced by a host of factors such as host country resource endowments, political stability, market size, familiarity, regulatory openness, government incentives, distance and market structure (Dunning 1993). What emphasis do Japanese MNEs place on the country-specific factors in the case of HFDI and VFDI?

In the following subsections, we present our empirical model for estimation, discuss the expected signs on the estimated coefficients based on theoretical considerations, and discuss the estimation results.

4.1 The Model

First, we present the empirical model to examine the location choice of Japanese FDI in the manufacturing sector. Our investigation focuses on the period from 1989 to 2002 (t=14) and 117 host countries (M=117). From a theoretical point of view, we would expect the location choice to be determined by the expected relative profitability for different host countries. We assume that firms are rational actors and select the location (country) that is expected to yield the highest profit. Here, we suppose a manufacturing firm takes M countries into consideration and chooses country s in year t.

$$\ln II_{m,t} = \text{Max} \{ \ln II_{s,t} : s=1,\ldots, M \} \qquad (1)$$

Then the profit maximization function in logarithmic form can be written as

$$\ln \Pi_{s,t} = \beta' \chi_{s,t} + \varepsilon_{s,t} \qquad (2)$$

where $\chi_{s,t}$ is a vector of observable characteristics of country s in year t, β' is a vector of estimated coefficients, and $\varepsilon_{s,t}$ is a random disturbance term reflecting the error term.

As demonstrated by McFadden (1973), assuming that $\varepsilon_{s,t}$ are independently and identically distributed with Weibull density functions, we may derive the probability of country m being chosen by firm in year t as follows:

$$P_{m,t} = \exp(\beta' \chi_{m,t}) / \Sigma_{s=1}^{M} \exp(\beta' \chi_{s,t}) \qquad (3)$$

Expressing the frequency of the country s being selected in year t by Japanese firm $W_{s,t}$ (s=1… m, t=1,…, T), we obtain the probability of observing such FDI pattern as equation:

$$L = \Pi_{t=1} \Pi_{s=1} P_{m,t} W_{s,t} \qquad (4)$$

This type of model is called a conditional logit model, and the parameters β' that indicate the characteristics of potential host countries to Japanese FDI are estimated by the maximum likelihood estimation method, which maximizes the likelihood function.

4.2 The Determinants of the Location Decision

Generally speaking, host country location advantages that are likely to play a role in attracting FDI by Japanese enterprises include the availability of cheap labor, the presence of a large local market, macroeconomic stability, the availability of infrastructure and supporting industries, and investor-friendly FDI policies. However, the importance firms attach to the different host country characteristics vary, primarily because FDI types vary. For HFDI, two principal host country characteristics are important. The first is a large market because horizontal FDI is mainly motivated by the desire to access the host market. If the market is small, there is little incentive to establish a plant locally. Instead, firms would serve that market

through exports. The second one is high trade costs because high trade costs prevent firms from serving that country through exports. If there were no trade costs, firms would concentrate production in one location and serve other markets through exports. Trade costs depend on a wide range of factors, including transportation costs, tariffs, quotas, etc.

The location characteristics conducive for VFDI differ from those for HFDI and principally concentrate on factor price differentials and low trade costs. In order to exploit factor price differences across countries, firms divide production into discrete processes and locate individual processes in the country that provides the most favorable environment. For example, skilled-labor intensive goods are normally produced in skilled-labor-abundant countries, while unskilled-labor final assembly is usually carried out in a country abundant in low-wage unskilled labor (Markusen 2002). Production fragmentation leads to trade between headquarters and overseas plants. Overseas plants import some knowledge-intensive intermediate goods from headquarters and then export the final products back to headquarters. The trade between headquarters and overseas plants is encouraged by low trade costs. VFDI therefore is encouraged by factor-price difference and low trade cost.

Before presenting the results of the empirical analysis, we consider the role of each of the potential determinants of the location decision for HFDI and VFDI and the expected signs of estimated coefficients on each explanatory variable in the light of economic theory. Such a detailed discussion is helpful because we expect the sign and the magnitude of the coefficients on variables to differ for HFDI and VFDI. There are two main expectations based on the considerations above. The first is that market size should have a positive effect on the location decision for both HFDI and VFDI, but the effect should be stronger in the case of HFDI. The second expectation is that labor costs should have a negative effect on the location decision for both HFDI and VFDI, but the effect should be stronger for VFDI. What follows is a detailed

discussion of the explanatory variable used in the regression analysis and their expected signs[12].

(1) Wages: Wages are used to denote the labor costs in a host country. One of the most important motives of Japanese manufacturing FDI is to utilize low-cost labor in the host country. Therefore, the sign of the wage variable is expected to be negative. We use the average wage paid by Japanese foreign affiliates by industry and country.

The location choice of VFDI may be particularly sensitive to labor costs because VFDI is mainly aimed at factor-price difference for production in host countries, especially labor costs. Austin (1990) noted that wage cost advantages are a primary reason that businesses integrate developing countries into their global production strategy. The fact that multinational firms locate most production in similar, high-wage economies may be consistent with FDI being driven more by the market access motive than by wage differences (Brainard 1997; Carr, Markusen and Maskus 2001). Therefore, we expect the estimated coefficient on wages to be larger for VFDI than for HFDI. The wage data are from the METI survey.

(2) Market size: Gaining access to the local market is one of the most important motives underlying FDI and the coefficient on market size, proxied here by purchasing power parity-adjusted GDP, is expected to be positive.

Because HFDI is mainly aimed at the local market, the location decision in the case of HFDI is likely to be more sensitive to market size. As a result, we hypothesize that the magnitude of the coefficient on GDP should be greater in the case of HFDI than in the case of VFDI. The data are

[12] The definitions of the variables and expected signs of coefficients are summarized in Table A1, while summary statistics and the correlation matrix for these variables are presented in Tables A2 and A3.

taken from *World Development Indicators 2004*.

(3) Skills: This variable seeks to capture the relative abundance of skilled labor in the host country. A shortage of skilled labor was found to be a serious problem for Japanese enterprises (Urata and Kawai 1999). One would therefore expect Japanese FDI to be attracted to an economy with high quality labor. Given the difficulty in measuring the quality of labor, we use the tertiary education enrollment ratio as a proxy for the skill level of labor. The skill level is expected to have a positive impact on the FDI location choice.

Theory suggests that in the case of VFDI, headquarters' activities stay in the capital-rich or high-skill countries and headquarters' services are exported, while production plant activities move to capital-poor or low-skill countries and final goods are exported from the host country. Thus, we predict skills to have a stronger impact on the location decision for HFDI than for VFDI. It is also possible that skills may have no impact on the location decision for VFDI. The data are obtained from *World Development Indicators 2004*.

(4) Infrastructure: Infrastructure represents another important determinant of MNEs' location choice. In previous studies, various indicators have been used for the measurement of infrastructure, such as the availability of electricity, transportation and communication facilities, and so forth. In this paper, we use the level of electricity generation per person as a proxy for infrastructure, because most Japanese manufacturing firms regard the availability of electricity as a key factor for producing high quality products (Urata 1999). We expect the coefficient on this variable to be positive. We believe good-quality infrastructure is important for the location choice in the case of both HFDI and VFDI. Nevertheless, the location decision with regard to

VFDI may be more sensitive to the quality of infrastructure than that with regard to HFDI, because the former has alternative choices for production. The data are obtained from *World Development Indicators 2004*.

(5) Agglomeration: Japanese firm agglomeration is likely to be a favorable factor in the location choice of Japanese firms. For a newly entering firm, the fact that many Japanese affiliates exist in the host country demonstrates that the investment environment is favorable. Moreover, it is easier for a Japanese firm to procure parts and intermediate materials efficiently and obtain useful information about the local market from other Japanese affiliates. We measure the extent of Japanese firm agglomeration by the number of Japan foreign affiliates by industry and by country. We expect the estimated coefficients to be positive for both HFDI and VFDI.

Agglomeration of Japanese firms should be more important for VFDI, because firms undertaking vertical FDI are more dependent on linkages with other Japanese firms in the host county. Therefore, we expect the magnitude of the coefficient on the agglomeration variable to be larger for VFDI than for HFDI. The data are obtained from the METI survey.

(6) Country risk: Japanese MNEs avoid countries with higher risks. Here, we measure country risk by subtracting country creditability points from 100. We expect the estimated coefficient to be negative.

Country risk, while frequently mentioned as an important factor in FDI surveys, generally is not significant in statistical studies examining local market-orientation. However, Contractor (1990) found a positive relationship between countries' political ratings and FDI for developing

countries. Because of their higher mobility, export-oriented investors may be more sensitive to country-risk factors than local market-oriented investors (Douglas and Rolfe 1993). Therefore, we expect the estimated coefficient on country risk to be larger for VFDI than for HFDI. Here, we measure country risk by using the "country credibility point" score published by the *Institutional Investor* magazine in its Yearbook and subtracting these points from 100.

(7) Distance: Another factor that can affect trade costs is transportation costs and we use distance to proxy these. The variable is calculated as the distance from the capital city of the host country to Tokyo. Concerning the impact of distance on the location decision of FDI, previous studies have concluded that distance encourages FDI. But, here, more specifically, we hypothesize that distance encourages HFDI. Greater distance means higher transportation costs and in turn increases trade costs. It encourages firms to produce goods abroad instead of serving host markets through export.

Distance is expected to have a positive effect on the location choice for HFDI. But in the case of VFDI, foreign affiliates carry out production in the host country and then export products to Japan and other countries. Greater distance increases transportation cost. Transportation costs are expected to have a negative effect on VFDI since they make exporting output back home more costly (Markusen 2002). Moreover, low transportation costs and short distances to markets are expected to boost export-oriented FDI (Shatz 2004).

An additional aspect is that since Japanese overseas affiliates tend to more heavily rely on expatriate managers, and tend to be more tightly controlled by the head office, than their Western counterparts, flying time is very important, especially when they undertake VFDI. A

shorter distance means that managers and technicians can visit overseas affiliates more easily. As a result, we expect the sign of the estimated coefficient on transportation costs for VFDI to be the opposite of that for HFDI. The data are calculated from http://www.chemical-ecology.net/java/capitals.htm

(8) Tariffs: As a proxy for trade barriers and costs, we use tariff rates by country obtained from *World Development Indicators 2004*. High host country tariffs indicate high trade barriers or trade costs. Such barriers should encourage investments to serve the local market, so the hypothesized sign is positive on the coefficient in the case of HFDI. On the other hand, in the case of VFDI, the coefficient should be negative because high tariffs raise trade costs. Thus, we expect the signs of the estimated coefficients on the tariff variable to be the opposite for VFDI and HFDI.

The estimations are conducted for the manufacturing sector overall and separately for the electric machinery and transportation equipment industries. In addition, we perform separate analyses on Asia only for the manufacturing sector overall and the electric machinery industry. In order to examine whether host country characteristics have different impacts on HFDI and VFDI location choices, we include a VERTICAL dummy (VER representing VFDI for all explanatory variables).[13] The vertical dummy equals 1 when the local sales ratio of an individual firm is less than the average local sales ratio for all firms; otherwise it is 0.

A few remarks regarding the way that HFDI and VFDI are distinguished in this study are in order, because of the potential for endogeneity and reverse causality problems between the FDI location choice, local sales and exports. For example, in the case of VFDI, a foreign affiliate naturally has a high export ratio in a small country with low wages. Therefore, there

[13] We set HFDI as the base, because recent empirical work concludes that most real-world FDI is horizontal, not vertical (Hanson, Mataloni and Slaughter 2001).

may exist a reverse causality here: the high export ratio of the foreign affiliate is the result not of the country being chosen as an export base but of it simply being a small country with low wages. In the same way, in the case of HFDI, there may also exist a reverse causality between the local sales ratio and the location choice for FDI. Therefore, distinguishing HFDI and VFDI based on information on the local sales ratio may lead to some estimation biases

However, the METI survey contains a question regarding the function of foreign manufacturing affiliates, which help us to distinguish the purpose of a foreign investment. This question concerns the role of a foreign affiliate within the parent firm's global division of labor, and respondents were asked to choose between three answers regarding that role: (1) the division of labor with the parent firm within a production process of commodities (*koteikan bungyo* with Japan); (2) the division of labor with other firms located in other countries within a production process of commodities (*koteikan bungyo* with other countries); and (3) the foreign affiliate conducts start-to-finish production (*ikkan seisan*). Obviously, *kouteikan bungyo* and *ikkan seisan* respectively coincide with VFDI and HFDI.

Most likely the basic role of an affiliate within the parent firm's global division of labor is determined before or simultaneously with the location choice and it will be difficult for parent firms to change this role afterward. Therefore, the endogeneity and reverse causality problems would not be very serious, if we use this survey information to distinguish between HFDI and VFDI. Unfortunately, however, we cannot use this information to distinguish between HFDI and VFDI in our analysis because this information on foreign affiliates' role is available only for limited years (every three years) and the response rate to this question is low. However, in order to verify the validity of our use of the local sales ratio as a proxy of affiliates' roles in production, we check the correlation between the two for those foreign affiliates for which information both on the local sales ratio and a survey response on the affiliates' role are

available by conducting a regression using a ROLE dummy, which equals 1 when affiliates conduct start-to-finish production (*ikkan seisan*) and 0 otherwise. The results are: in the case of HFDI, the estimated coefficient on the local sales ratio is 0.7441 (z-value 5.93) and in the case of VFDI, the estimated coefficient on the local sales ratio is –1.4581 (z-value –9.04). The results show that affiliates tend to have a high local sales ratio when they conduct start-to-finish production (*ikkan seisan*), which is consistent with HFDI. In contrast, affiliates tend to a have a low local sales ratio when they are involved in the division of labor in the production process of commodities (*koteikan bungyo*).

5. Empirical Results

The estimation results are shown in Tables 7 and 8. Table 7 shows the basic regression results with the VERTICAL dummy, while Table 8 shows the regression results only for VFDI, which are for comparison with the results for HFDI in Table 7. The signs of the individual coefficients almost match our expectations, except for those on country risk and infrastructure in the case of HFDI.

As we expected, the results suggest that market size is the most important determinant of the location decision for HFDI, while labor costs are a more important determinant for the location decision in the case of VFDI.

Comparing the results in Table 7 with those in Table 8, we can observe several important differences between the coefficients on variables for VFDI and HFDI, suggesting that the determinants of location choice differ for the two kinds of FDI. The results for the individual variables are discussed in turn:

Insert Tables 7 and 8

(1) Wages: In Table 7, of the coefficients on the WAGE variable for HFDI, three show a positive sign and three a negative one. In the estimations for manufacturing industry overall, and the transportation equipment industry in Asia, the coefficients are positive but not significant, while in the case of manufacturing industry in Asia, the coefficient is not only positive, but also significant. In the estimations for the electric machinery industry for the entire sample and for the electric machinery industry in Asia, the coefficients are negative and significant. And in the estimation for the transportation industry in Asia, the coefficient on WAGE is negative but not significant. These results show that wage cost has a negative effect on the location choices of Japanese FDI in the electric machinery industry. Moreover, the coefficients on VER*WAGE are all negative and significant. These results show that the coefficients on the wages for VFDI are larger than those for HFDI in all estimations, which can be verified by comparing the results for HFDI in Table 7 and those for VFDI in Table 8. We are thus able to confirm that wages have a strong negative impact on the location choice for VFDI. These results show that location choice for VFDI is more sensitive to wages than that for HFDI. The results are consistent with our estimation in Table 2 that Asia accounts for a large share of Japan's worldwide VFDI. In addition, the results are consistent with those obtained by Fukao and Chung (1996), who found that wages have a strong impact on the location choice in the electric machinery industry where vertical FDI is common.

(2) Market size: In Table 7, the coefficients on the market size variable (MARKET SIZE) have a positive sign and, as expected, are significant for HFDI in all three estimations for the total sample, Moreover, the coefficients on the VER*MARKET SIZE are all negative and significant.

These results show that the estimated coefficients on MARKET SIZE for HFDI are larger than those for VFDI, which can be verified by comparing the results for HFDI in Table 7 with the results for VFDI in Table 8. The results thus show that the host country market is a more important factor for the location choice for HFDI than for VFDI. Moreover, the results also show that the influence of the local market is stronger in the transportation equipment industry where horizontal FDI is more common.

However, in the estimations for Asia, most of the coefficients on the market size variable for HFDI (in Table 7) and VFDI (in Table 8) are negative and significant. These results show that Japanese MNEs do not place emphasis on the market when they choose FDI locations in Asian developing countries.

(3) Skills: In Table 7, the coefficients on SKILL are positive and significant, except in the estimations for Asia for all manufacturing and the transportation equipment industry, while the coefficients on VER*SKILL are all negative and significant. In Table 8, the coefficients on SKILL are all negative and significant. All these results bring out an interesting contrast in that the skill level of labor has a significant positive impact in the case of HFDI and a negative impact in the case of VFDI. Our results are different from those in previous studies, which suggested that the skill level of labor had a positive impact on the FDI location choice of Japanese MNEs. Our finding indicates that Japanese firms aiming at the market of a host country also assign importance to the availability of high labor skills when making their location choice. By contrast, those aiming at cheap production factors are more interested in low-skilled low-wage labor. This contrasting result for HFDI and VFDI also reflects the combination of different motivations regarding the use of local labor by Japanese firms. This

pattern can be found in all estimations except that for the transport equipment industry in Asia.

(4) Tariffs: In previous studies, tariffs were found to have a positive impact on the location decision. However, the results obtained here suggest that tariffs have opposing effects on HFDI and VFDI.

Tariffs are a form of trade costs between the home country and host countries. High tariffs increase trade costs. High tariffs encourage tariff-jumping HFDI and discourage export-oriented VFDI. We can confirm this from the coefficients on the tariff variable, which are significantly negative for VFDI and significantly positive for HFDI.

(5) Infrastructure: The estimated coefficients on the infrastructure variable are all positive and significant in the case of VFDI (VER*INFRASTRUCTURE in Table 7 and in Table 8). In contrast, in the case of HFDI, the estimated coefficients unexpectedly are negative. These opposing results indicate that infrastructure is more important for VFDI than for HFDI, because good infrastructure helps to decrease production costs in the case of VFDI, which aims at using cheaper production materials and produce at low costs. Production for export may be more sensitive to production costs in host countries because the firm can choose an alternative location to serve a broader market.

(6) Agglomeration: The estimated coefficients on the agglomeration variable are positive and significant in the case of both HFDI and VFDI. The results illustrate the importance of linkages with Japanese firms.

Furthermore, the estimated coefficients on the agglomeration variable are all larger for VFDI than for HFDI, showing that VFDI is more sensitive to Japanese firm agglomeration than HFDI. The reason is that Japanese firms undertaking VFDI are strongly dependent on linkages with Japanese firms within their *keiretsu* in the host country, while Japanese firms undertaking HFDI have high local sales orientations and have extended linkages not only in terms of sales but also in terms of procurement of inputs with local firms in the host country. Thus, Japanese MNEs undertaking HFDI are less dependent on linkages with Japanese firms than those undertaking VFDI.

(7) Distance: As expected, distance has the opposite impact on the location decision in the case of VFDI and that of HFDI. For VFDI, the coefficients on the distance variable are negative and significant. The greater the distance is, the less VFDI is conducted. On the other hand, for HFDI, the coefficients on the distance variable are positive and significant in the regressions for all countries, indicating that greater distance encourages FDI, but not in those only for Asia. In the regression for Asia, the coefficients on the distance variable are significantly negative. Thus, there is a negative relationship between distance and the HFDI location choice. This can be explained by the fact that almost all the FDI by Japanese MNEs in Asia is of the vertical type.

(8) Country risk: Previous studies have shown that Japanese firms tend to avoid investing in countries with high risks. Our results seem to contradict this conclusion. For the case of HFDI, the coefficients on the country risk variable are actually positive and significant in all estimations for Asia (as well as in the estimation for the transportation equipment industry worldwide), while for VFDI, the VER*COUNTRY RISK is negative and significant only for all manufacturing in Asia (Table 7). Similarly, in Table 8 for VFDI, many of the estimated

coefficients are positive and significant. The results seem to suggest that the location decision of Japanese VFDI and HFDI is somehow positively related to country risk. However, this does not necessarily mean that Japanese multinationals seek out risky countries and more likely is a reflection of the fact that they tend to invest in developing Asian countries, which are inherently riskier than developed countries.

6. Conclusions

In this paper, we used recent detailed micro data on Japan multinationals to consider the determinants of location choice of HFDI and VFDI, examining in particular how the determinants of the location decision for VFDI and HFDI differ. The results fit well with theoretical considerations on HFDI and VFDI in terms of their economic and statistical significance.

This comparative analysis revealed that a large market is the most important determinant of the location decision for HFDI, whereas, low labor costs are the most important factor for the VFDI location decision. As for the effect of tariffs, distance and labor skills on location choice, the analysis produced new and more differentiated accounts. First, tariffs are shown to have a positive effect on the location decision for HFDI and a negative effect on the location decision for VFDI. Second, greater distance between the home country and host countries encourages HFDI and discourages VFDI. Finally, there is an interesting difference in the impact of the level of local skills in that it has an important positive impact on Japanese firms' location choice for HFDI, but not for VFDI.

The empirical results of the determinants of FDI location choice indicate that firms aiming at export production assign importance to production conditions such as labor costs, the

quality of infrastructure, etc., when making their location decision, whereas firms prioritizing local sales naturally emphasize market size.

We find that Japanese VFDI is more concentrated in countries with lower wage costs, smaller markets, and geographically closer to Japan, and in industries involving separable high-skill and low-skill tasks. For example, Japanese firms are mainly interested in production for export in electric machinery industry in Asia. However, Japanese MNEs are undertaking both HFDI and VFDI in China now because the country offers both a large market for differentiated goods and an abundant supply of low-cost skilled and unskilled labor.

References

Austin, J. (1990) *Managing in Developing Countries*. New York: Free Press

Brainard, S.L. (1997) "An Empirical Assessment of the Proximity-Concentration Trade-Off between Multinational Sales an Trade," *American Economic Review*, 87(4), 520-544.

Caves, R.E. (1971) "International Corporations: The Industrial Economics of Foreign Investment," *Economica*, 38(149), 1-27.

Caves, R.E. (1995) *Multinational Enterprise and Economic Analysis*, second edition, Cambridge University Press, Cambridge.

Contractor, F.J. (1990) "Do Government Policies towards Foreign Investment Matter? An Empirical Investigation of the Link between National Policies and FDI Flows," *Working Paper Series*, Rutgers University.

Douglas, P.W. and R.J. Rolfe (1993) "The Location of Export-Oriented Foreign Direct Investment in the Caribbean Basin," *Journal of International Business Studies*, 24(1), 121-144.

Dunning, J.H. (1993) *Multinational Enterprises and the Global Economy*, Addison Wesley, New York.

Farrell, R. (2000) "Japanese Foreign Direct Investment in the World Economy 1951-1997," *Pacific Economic Papers*, No.299, The Australian National University.

Feenstra, R.C. and G.H. Hanson (1996) "Foreign Investment, Outsourcing and Relative Wages," in R.C. Feenstra, G.M. Grossman, and D.A. Irwin (eds.), *Political Economy of Trade Policy: Essays in Honor of Jagdish Bhagwati*,, MIT Press, Cambridge, MA.

Fukao, K. and H. Chung (1996) "Chokusetsu Toshi Aitekoku no Kettei Yoin: Wagakuni Seizogyo ni Kansuru Jissho Bunseki [The Determinants of FDI Recipients: An Analysis of Japanese Manufacturing Industry]," *Financial Review*, 38, 1-31 [in

Japanese].

Fukao, K. and X. Yue (1997) “Denki Meka no Ricchi Sentaku [The Locational Selection of Japanese Electronics Firms],” *Mita Gakkai Zasshi [Mita Journal of Economics]*, 90(2), 11-39 [in Japanese].

Hanson G.H., R.J. Mataloni, Jr., and M.J. Slaughter (2001) “Expansion Strategies of U.S. Multinational Firms,” in D. Rodrik and S. Collins (eds.), *Brookings Trade Forum*: 2001, Brookings Institution Press, Washington, D.C..

Head, K., J. Reis, and D. Swenson (1995) “Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments in the United States,” *Journal of International Economics* 38(3), 223-247.

Helpman, E. (1984) “A Simple Theory of International Trade with Multinational Corporations,” *Journal of Political Economy*, 92(3), 451-471.

Helpman, E. and P.R. Krugman (1985) *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*, MIT Press, Cambridge, MA

Horstmann, I.J. and J.R. Markusen (1987) “Strategic Investments and the Development of Multinationals,” *International Economic Review*, 28(1), 109-21.

Horstmann, I.J. and J.R. Markusen (1992) “Endogenous Market Structures in International Trade,” *International Economic Review*, 32(1/2), 109-29.

Shatz, H.J. (2004) “US Multinational Affiliate Exports from Developing Countries,” *Journal of Economic Geography*, 4(3), 323-344.

Kumar, N. (1994) “Determinants of Export Orientation of Foreign Production by U.S. Multinationals: An Inter-country Analysis,” *Journal of International Business Studies*, 25(1), 141-156.

Lu, W. (1994) “The International of Japanese Textile Production Networks,” in E.M.Doherty (ed.), *Japanese Investment in Asia*, The Asia Foundation, San Francisco.

Markusen, J.R. (1984) “Multinationals, Multi-plant Economies, and the Gains from Trade,” *Journal of International Economics*, 16(3-4), 205-226.

Markusen, J.R. (2002) *Multinational Firms and the Theory of International Trade*, MIT Press, Cambridge, MA.

Markusen, J.R. and K.E. Maskus (1999) “Multinational Firms: Reconciling Theory and Evidence,” *Working Paper* 7163, National Bureau of Economic Research, Cambridge, MA.

Markusen, J.R. and K.E. Maskus (2001) “General-Equilibrium Approaches to the Multinational Firm: A Review of Theory and Evidence,” *Working Paper*, No. 8334, National Bureau of Economic Research, Cambridge, MA.

Markusen, J.R. and A.J. Venables (1998) “Multinational Firms and the New Trade Theory,” *Journal of International Economics*, 46(2), 183-203.

Markusen, J.R. and A.J. Venables (2000) “The Theory of Endowment, Intra-industry and Multinational Trade,” *Journal of International Economics*, 52(2), 209-234.

Markusen, J.R., A.J. Venables, D.B. Konan and K. Zhang (1996) “A Unified Treatment of Horizontal Direct Investment, Vertical Direct Investment, and the Pattern of Trade in Goods and Services,” *Working Paper* 5696, National Bureau of Economic Research, Cambridge, MA.

McFadden, D. (1973) "Conditional Logit Analysis of Qualitative Choice Behavior," in P. Zaremka (ed.), *Frontiers in Econometrics*, Academic Press, New York.

Ministry of Economy, Trade and Industry (METI). (1996-2002a*). Kaigai Jigyo katsudo Kihon (Doko) Chosa (The Survey on Overseas Business Activities*), METI, Tokyo [in

Japanese].

Tokunaga, S. and R. Ishi (1995) "Nihon Kigyo no Gurobaru oyobi Higashi Ajia niokeru Chokusetsu Toshi Kettei ni Kansuru Keiryo Bunseki: Kondisshonaru Logit Moderu niyoru Takokuseki Kigyo no Ricchi Sentaku Bunseki [An Econometric Analysis of the Determinants of Japanese FDI in the World and in East Asia: An Application of the Conditional Logit Model to the Locational Choice of Multinational Enterprises]," in K. Ohno and Y. Okamoto (eds.), *EC, NAFTA, Higashi Ajia to Gaikoku Chokusetsu Toshi: Tojo Kokueno Eikyo*, 133-167, The Institute of Developing Economies, Tokyo [in Japanese].

Urata, S. and H. Kawai (1999) "The Determinants of the Location of Foreign Direct Investment by Japanese Small and Medium-sized Enterprises," *Economic Analysis* No. 158, Economic and Social Research Institute, Cabinet Office.

Wakasugi, R. (1997) "Nihon Kigyo no Chokusetsu Toshi: Shijo Yoin to Kigyo Tokushuteki Yoin no Jissho Bunseki [FDI by Japanese Firms: An Empirical Investigation of Market Characteristics and Firm-Specific Characteristics]," *Mita Gakkai Zasshi [Mita Journal of Economics]*, 90(2), 40-58 [in Japanese].

Watanabe, S. (1993) "Growth and Structural Changes of Japanese Overseas Direct Investment: implications for Labour and Management in Host Countries'," in P.P. Bailey, A. Parisotto and G. Renshaw (eds.), *Multinationals and Employment*, International Labour Office, Geneva.

Wheeler, D. and A. Mody (1992) "International Investment Location Decisions: The Case of U.S. Firms," *Journal of International Economics*, 33(1-2), 57-76.

Woodward, D. P. (1992) "Locational Determinants of Japanese Manufacturing Startups in the United States," *Southern Economic Journal*, January, 690-708.

World Bank (2004) *World Development Indicators* (CD-ROM), World Bank, Washington, D.C..

Table 1. Distribution of Japanese FDI by region/country

Region	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number of cases											
Asia	1,560	2,348	2,976	2,929	3,688	3,885	3,828	4,178	4,465	4,218	4,878
China	131	383	597	738	977	1,052	1,041	1,165	1,256	1,220	1,542
ASEAN	670	952	1,149	1,116	1,409	1,484	1,469	1,564	1,676	1,599	1,778
NIEs	703	953	1,154	998	1,169	1,183	1,138	1,247	1,311	1,185	1,314
Europe	468	682	776	675	817	813	795	910	985	860	959
Western Europe	356	516	597	508	617	613	602	695	739	638	702
North America	799	1,089	1,186	1,055	1,252	1,274	1,220	1,320	1,444	1,302	1,425
United States	740	1,008	1,097	974	1,160	1,176	1,128	1,211	1,338	1,221	1,333
South America	180	223	239	214	248	261	263	263	285	260	272
World	3,103	4,474	5,322	5,012	6,170	6,401	6,277	6,852	7,374	6,822	7,744
Share (%)											
Asia	50.3	52.5	55.9	58.4	59.8	60.7	61.0	61.0	60.6	61.8	63.0
China	4.2	8.6	11.2	14.7	15.8	16.4	16.6	17.0	17.0	17.9	19.9
ASEAN	21.6	21.3	21.6	22.3	22.8	23.2	23.4	22.8	22.7	23.4	23.0
NIEs	22.7	21.3	21.7	19.9	18.9	18.5	18.1	18.2	17.8	17.4	17.0
Europe	15.1	15.2	14.6	13.5	13.2	3.1	12.7	13.3	13.4	12.6	12.4
Western Europe	11.5	11.5	11.2	10.1	10.0	9.6	9.6	10.1	10.0	9.4	9.1
North America	25.7	24.3	22.3	21.0	20.3	19.9	19.4	19.3	19.6	19.1	18.4
United States	23.8	22.5	20.6	19.4	18.8	18.4	18.0	17.7	18.1	17.9	17.2
South America	5.8	5.0	4.5	4.3	4.0	4.1	4.2	3.8	3.9	3.8	3.5
World	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. NIES includes Hong Kong, Korea, Singapore, and Taiwan. Western Europe includes France, Germany, Italy, Netherlands, and the United Kingdom. Other Countries are
Source: METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities).*

Table 2. Distribution of HFDI and VFDI by region

Unit: No. of cases.

Region	FDI	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
ASIA	Horizontal FDI	33	15	79	128	110	84	18	15	14	8	14	**518**
	Vertical FDI	57	202	214	237	120	86	53	54	71	116	180	**1390**
ASEAN	Horizontal FDI	26	8	66	105	72	54	0	2	0	0	0	**333**
	Vertical FDI	3	30	12	9	30	20	20	19	27	36	32	**238**
China	Horizontal FDI	0	0	0	0	0	0	0	0	0	0	0	**0**
	Vertical FDI	41	144	178	200	77	47	25	24	32	61	129	**958**
NIEs	Horizontal FDI	1	4	6	8	9	6	5	8	13	5	10	**75**
	Vertical FDI	12	27	23	28	12	19	8	9	11	15	16	**180**
United States	Horizontal FDI	24	33	40	49	52	56	25	31	42	42	24	**418**
	Vertical FDI	0	0	0	0	0	0	0	0	0	0	0	**0**
Western Europe	Horizontal FDI	7	13	16	13	10	8	11	15	9	9	15	**126**
	Vertical FDI	6	8	2	10	12	9	13	6	5	11	3	**85**
World	Horizontal FDI	74	74	144	208	186	159	68	68	76	64	61	**1182**
	Vertical FDI	73	223	235	264	150	109	75	72	88	137	202	**1628**

Note: ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. NIES includes Hong Kong, Korea, Singapore, and Taiwan. Western Europe includes France, Germany, Italy, Netherlands, and the United Kingdom. Other Countries are presented in Table A4

Source: Authors' calculation based on METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities)*.

Table 3. Distribution of horizontal FDI and vertical FDI by industry

Unit: No. of cases

Industry	FDI	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total	Ratio VFDI/HFDI
Electric Machinery	Horizontal FDI	14	17	22	55	35	35	20	18	25	4	20	265	
	Vertical FDI	19	41	54	75	21	28	23	21	40	37	37	396	1.49
Transportation equipment	Horizontal FDI	13	11	34	45	54	38	20	14	18	19	11	277	
	Vertical FDI	11	17	16	38	20	17	10	17	19	37	40	242	0.87
Textiles	Horizontal FDI	2	1	12	8	10	6	1	1	2	1	0	44	
	Vertical FDI	17	62	47	31	12	11	4	1	4	2	12	203	4.61

Source: Authors' calculations.

Table 4. Distribution of Japanese FDI by industry

Industry	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number of cases											
Textiles	240	378	460	381	509	549	504	499	501	404	498
Electric Machinery	784	1,076	1,220	1,217	1,420	1,504	1,469	1,585	1,800	1,551	1,860
Transportation Equipme	421	540	621	669	839	904	893	931	1,027	1,084	1,164
General Machinery	380	604	768	687	858	865	841	1,004	1,023	912	1,006
Total Manufacturing	3,103	4,474	5,322	5,012	6,170	6,401	6,277	6,852	7,374	6,822	7,744
Share(%)											
Textiles	7.7	8.4	8.6	7.6	8.2	8.6	8.0	7.3	6.8	5.9	6.4
Electric Machinery	25.3	24.1	22.9	24.3	23.0	23.5	23.4	23.1	24.4	22.7	24.0
Transportation Equipme	13.6	12.1	11.7	13.3	13.6	14.1	14.2	13.6	13.9	15.9	15.0
General Machinery	12.2	13.5	14.4	13.7	13.9	13.5	13.4	14.7	13.9	13.4	13.0
Total Manufacturing	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities).*

Table 5. Number of Japanese FDI cases by region/country and by industry

Region	Industry	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
		Number of cases										
Asia	**Textiles**	155	276	344	293	401	428	399	401	397	355	412
	Electric machinery	402	558	701	749	858	934	915	998	1116	1025	1219
	Transportation equipment	192	249	302	337	442	476	474	490	532	560	619
	General machinery	144	256	333	323	423	427	420	497	512	490	567
	Total Manufacturing	*1,560*	*2,348*	*2,976*	*2,929*	*3,688*	*3,885*	*3,828*	*4,178*	*4,465*	*4,218*	*4,878*
-ASEAN	**Textiles**	62	81	98	75	92	105	102	97	100	96	97
	Electric machinery	166	216	253	269	323	357	344	372	418	381	422
	Transportation equipment	101	136	157	159	212	225	218	233	251	264	300
	General machinery	38	70	81	82	113	114	107	142	143	132	147
	Total Manufacturing	*670*	*952*	*1,149*	*1,116*	*1,409*	*1,484*	*1,469*	*1,564*	*1,676*	*1,599*	*1,778*
-NIES	**Textiles**	50	65	70	49	67	71	69	72	66	49	57
	Electric machinery	203	272	315	295	328	338	325	350	379	334	398
	Transportation equipment	57	72	82	81	94	96	88	91	98	100	98
	General machinery	93	146	189	162	190	185	195	211	218	195	208
	Total Manufacturing	*703*	*953*	*1,154*	*998*	*1,169*	*1,183*	*1,138*	*1,247*	*1,311*	*1,185*	*1,314*
-China	**Textiles**	40	129	171	164	230	239	216	219	218	200	242
	Electric machinery	25	59	119	174	189	211	216	239	276	270	354
	Transportation equipment	12	18	37	66	89	96	101	101	107	122	141
	General machinery	12	36	59	74	109	114	104	128	136	143	190
	Total Manufacturing	*131*	*383*	*597*	*738*	*977*	*1,052*	*1,041*	*1,165*	*1,256*	*1,220*	*1,542*
Europe	**Textiles**	32	41	43	35	40	47	41	40	41	12	33
	Electric machinery	141	190	202	178	222	209	208	221	256	192	239
	Transportation equipment	57	79	89	90	109	111	121	128	141	151	162
	General machinery	83	137	192	157	180	185	168	223	220	184	182
	Total Manufacturing	*468*	*682*	*776*	*675*	*817*	*813*	*795*	*910*	*985*	*860*	*959*
-Western Europe	**Textiles**	19	25	31	21	25	30	25	27	27	10	22
	Electric machinery	176	244	285	233	294	282	266	315	329	266	287
	Transportation equipment	36	46	53	58	68	71	79	84	91	89	92
	General machinery	69	113	161	126	150	154	139	186	181	156	150
	Total Manufacturing	*356*	*516*	*597*	*508*	*617*	*613*	*602*	*695*	*739*	*638*	*702*
North America	**Textiles**	17	21	24	21	25	26	21	17	20	11	17
	Electric machinery	172	239	235	215	245	258	239	260	309	240	294
	Transportation equipment	132	160	170	172	215	238	210	234	264	280	280
	General machinery	119	165	189	162	199	202	205	229	236	198	215
	Total Manufacturing	*799*	*1,089*	*1,186*	*1,055*	*1,252*	*1,274*	*1,220*	*1,320*	*1,444*	*1,302*	*1,425*
-United States	**Textiles**	16	18	23	20	23	23	18	15	18	10	15
	Electric machinery	159	224	219	202	231	243	225	246	295	231	285
	Transportation equipment	120	148	157	160	199	219	198	216	245	263	261
	General machinery	103	144	170	145	181	182	185	207	214	183	195
	Total Manufacturing	*740*	*1,008*	*1,097*	*974*	*1,160*	*1,176*	*1,128*	*1,211*	*1,338*	*1,221*	*1,333*
South America	**Textiles**	26	29	37	23	33	33	30	26	27	18	24
	Electric machinery	48	59	48	44	58	64	69	66	74	58	67
	Transportation equipment	24	31	41	43	46	51	60	52	61	62	66
	General machinery	26	31	33	29	35	33	31	36	34	25	26
	Total Manufacturing	*180*	*223*	*239*	*214*	*248*	*261*	*263*	*263*	*285*	*260*	*272*

Note: ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. NIES includes Hong Kong, Korea, Singapore, and Taiwan. Western Europe includes France,
Source: Authors' calculations based on METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities).*

Table 6. Ratio of local sales by region/country

Region	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ASEAN	62.6	54.9	65.7	69.7	65.7	59.3	45.5	41.7	43.6	46.0	47.8
China	47.0	35.2	32.3	47.9	50.4	49.2	52.0	55.2	54.1	51.6	59.3
NIES	57.0	48.7	48.2	52.4	60.0	50.8	59.5	56.8	55.7	51.6	52.2
United States	80.1	65.3	84.6	80.2	83.3	83.3	87.8	84.0	84.2	87.2	91.2
Western Europe	61.2	60.1	63.7	53.0	61.0	53.2	65.0	68.1	59.0	49.5	62.2

Note: ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. NIES includes Hong Kong, Korea, Singapore, and Taiwan. Western Europe includes France, Germany, Italy, Netherlands, and the United Kingdom. Other Countries are presented in Table A4

Source: Authors' calculations based on METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities).*

Table 7. Determinants of the location choice for vertical and horizontal FDI: VER dummy

Variable	All Manufacturing	Electric Machinery Industry	Transportation Equipment Industry	Asia - All Manufacturing	Asia - Electric Machinery Industry	Asia - Transportation Equipment Industry
MARKET SIZE	0.382	0.629	0.265	-0.146	0.245	-0.297
	[12.97]***	[10.04]***	[3.61]***	[-3.25]***	[2.81]***	[-2.78]***
TARIFFS	0.206	0.175	0.040	1.215	0.669	1.096
	[7.39]***	[3.02]***	[0.78]	[14.97]***	[5.16]***	[6.83]***
SKILL	0.486	0.690	0.294	-0.033	0.546	-0.413
	[9.08]***	[6.23]***	[2.27]**	[-0.44]	[4.11]***	[-2.22]**
COUNTRY RISK	-0.013	-0.121	0.251	0.685	0.463	0.762
	[-0.24]	[-1.12]	[1.90]*	[5.33]***	[2.41]**	[2.27]**
DISTANCE	0.019	0.144	0.217	-0.722	-0.327	-0.813
	[0.42]	[1.35]	[1.84]*	[-10.24]***	[-2.06]***	[-3.57]***
INFRASTRUCTURE	-0.339	-0.276	-0.111	-0.550	-0.414	-0.186
	[-10.69]***	[-4.20]***	[-1.60]	[-10.60]***	[-4.54]***	[-1.66]*
AGGLOMERATION	0.765			1.492		
	[24.55]***			[24.93]***		
eAGGLOMERATION		0.596			0.895	
		[9.01]***			[8.28]***	
tAGGLOMERATION			0.903			1.945
			[11.56]***			[11.39]***
WAGE	0.039			0.252		
	[0.84]			[3.71]***		
eWAGE		-0.316			-0.542	
		[-3.89]***			[-4.98]***	
tWAGE			-0.035			0.238
			[-0.37]			[1.33]
VER*MARKET SIZE	-0.335	-0.574	-0.232	-0.841	-0.874	-0.380
	[-9.21]***	[-7.98]***	[-2.26]***	[-8.04]***	[-6.40]***	[-2.00]**
VER*TARIFFS	-0.404	-0.428	-0.281	-1.530	-1.122	-1.611
	[-10.99]***	[-5.76]***	[-3.92]***	[-15.62]***	[-7.02]***	[-7.75]***
VER*SKILL	-1.266	-1.437	-0.828	-0.770	-1.208	-0.615
	[-16.73]***	[-9.78]***	[-4.58]***	[-6.38]***	[-6.08]***	[-2.17]**
VER*COUNTRY RISK	0.182	0.398	0.232	-0.538	0.197	0.279
	[1.60]	[1.88]*	[0.86]	[-2.58]***	[0.56]	[0.39]
VER*DISTANCE	-0.464	-0.599	-0.894	-1.186	-1.355	-1.106
	[-6.69]***	[-4.12]***	[-5.60]***	[-6.57]***	[-4.90]***	[-3.09]***
VER*INFRASTRUCTUF	0.922	0.700	0.568	0.652	0.381	0.960
	[14.99]***	[6.12]***	[4.19]***	[6.67]***	[2.58]***	[3.52]***
VER*WAGE	-0.547			-1.408		
	[-7.85]***			[-12.06]***		
VER*eWAGE		-0.016			-0.316	
		[-0.14]			[-1.84]*	
VER*tWAGE			-0.330			-1.175
			[-2.21]***			[-3.66]***
VER*AGGLOMERATIO	0.120			0.510		
	[2.80]***			[4.28]***		
VER*eAGGLOMERATION		0.405			0.975	
		[4.64]***			[5.48]***	
VER*tAGGLOMERATION			0.108			0.091
			[0.92]			[0.36]
Log likelihood	-8859.02	-2135.59	-1645.87	-3729.38	-990.17	-570.90
Chi Squared	14841.73	3786.53	2139.45	13301.73	3171.13	1857.19
Number of Obs.	314493	79238	56153	200946	50769	31068

Note: The figures in parentheses are t-statistics. *, **, *** indicate statistical significance at the 10%, 5%, 1% level, respectively.

Table 8. Determinants of the location choice for Vertical FDI

Variable	All Manufacturing	Electric Machinery Industry	Transportation Equipment Industry	Asia - All Manufacturing	Asia - Electric Machinery Industry	Asia - Transportation Equipment Industry
MARKET SIZE	0.047	0.055	0.034	-0.986	-0.630	-0.676
	[2.21]**	[1.55]	[0.47]	[-10.44]***	[-5.98]***	[-4.31]***
TARIFFS	-0.198	-0.253	-0.241	-0.315	-0.453	-0.515
	[-8.27]***	[-5.44]***	[-4.82]***	[-5.75]***	[-4.85]***	[-3.9]***
SKILL	-0.780	-0.747	-0.534	-0.803	-0.662	-1.028
	[-14.59]***	[-7.73]***	[-4.24]***	[-8.47]***	[-4.48]***	[-4.82]***
COUNTRY RISK	0.169	0.277	0.483	0.147	0.660	1.040
	[1.69]*	[1.52]	[2.07]**	[0.90]	[2.24]**	[1.63]*
DISTANCE	-0.445	-0.455	-0.678	-1.909	-1.682	-1.919
	[-8.55]***	[-4.60]***	[-6.29]***	[-11.49]***	[-7.41]***	[-6.96]***
INFRASTRUCTURE	0.583	0.425	0.457	0.102	-0.033	0.773
	[11.06]***	[4.53]***	[3.92]***	[1.23]	[-0.29]	[3.11]***
AGGLOMERATION	0.885			2.002		
	[29.84]***			[19.42]***		
eAGGLOMERATION		1.001			1.870	
		[17.60]***			[13.22]***	
tAGGLOMERATION			1.011			2.036
			[11.52]***			[11.22]***
WAGE	-0.508			-1.156		
	[-9.73]***			[-12.17]***		
eWAGE		-0.332			-0.858	
		[-3.88]***			[-6.46]***	
tWAGE			-0.366			-0.936
			[-3.19]***			[-3.50]***

Note: The figures in parentheses are t-statistics. *, **, *** indicate statistical significance at the 10%, 5%, 1% level, respectively.

Table A1. List of variables

Variable name	Definition	Source	Predicted sign for Horizontal FDI	Predicted sign for Vertical FDI
MARKET SIZE	PPP GDP in log value	*World Development Indicators 2004*	+ (> | VFDI |)	+
TARIFFS	Tariff rates in log value	*World Development Indicators 2004*	+	-
SKILL	Tertiary education enrollment ratio in log value	*World Development Indicators 2004*	+	+/ no ?
COUNTRY RISK	100 minus country creditability points in log value	Institutional Investor yearly	-	- (> | HFDI |)
DISTANCE	Distance from host country capital to Tokyo in log value	http://www.wcrl.ars.usda.gov/cec/java/capitals.htm	+	-
AGGLOMERATION	Number of Japanese manufacturing affiliates in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	+ (> | VFDI |)	+
tAGGLOMERATION	Number of Japanese affiliates in transportation equipment industry in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	+ (> | VFDI |)	+
eAGGLOMERATION	Number of Japanese affiliates in electric machinery industry in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	+ (> | VFDI |)	+
WAGE	Average wage of manufacturing foreign affiliates in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	-	- (> | HFDI |)
eWAGE	Average wage of foreign affiliates in electric machinery industry in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	-	- (> | HFDI |)
tWAGE	Average wage of foreign affiliates in transportation equipment industry in log value	METI, *Kaigai Jigyo Katsudo Kihon Chosa*	-	- (> | HFDI |)
INFRASTRUCTURE	Level of electricity generation per person in log value	*World Development Indicators 2004*	+	- (> | HFDI |)

Table A2. Summary statistics for explanaory variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
MARKET SIZE	403516	10.927	1.935	5.503	16.148
TARIFFS	442586	1.022	1.802	-8.831	4.320
SKILL	442586	2.524	1.238	-1.252	4.578
COUNTRY RISK	433716	3.266	1.509	0	4.605
DISTANCE	438734	8.966	1.288	0	9.830
AGGLOMERATION	366776	1.675	1.958	0	7.341
tAGGLOMERATION	380860	0.823	1.462	0	5.869
eAGGLOMERATION	401745	0.689	1.206	0	5.572
WAGE	442586	-0.106	1.312	-5.371	5.452
eWAGE	442586	-0.103	1.325	-5.364	5.514
tWAGE	442586	-0.093	1.310	-5.364	5.452
INFRASTRUCTURE	442586	5.820	3.427	0	10.345

Table A3. Correlation between variables

Varialbe	MARKET SIZE	TARIFFS	SKILL	COUNTRY RISK	DISTANCE	AGGLOMERATION	tAGGLOMERATION	eAGGLOMERATION	WAGE	eWAGE	tWAGE	INFRASTRUCTURE
MARKET SIZE	1											
TARIFFS	-0.2428	1										
SKILL	0.5736	-0.3707	1									
COUNTRY RISK	0.1495	0.1659	-0.0151	1								
DISTANCE	-0.2771	0.0411	-0.1482	0.0927	1							
AGGLOMERATION	0.8178	-0.2356	0.5192	0.0259	-0.4411	1						
tAGGLOMERATION	0.6924	-0.1752	0.4102	-0.0271	-0.4807	0.9412	1					
eAGGLOMERATION	0.7507	-0.0953	0.3916	0.0152	-0.3948	0.9112	0.871	1				
WAGE	0.1522	-0.2544	0.4727	-0.1312	0.2304	0.0635	0.0227	-0.002	1			
eWAGE	0.1428	-0.2539	0.4606	-0.1276	0.266	0.0394	-0.0094	-0.0201	0.976	1		
tWAGE	0.1482	-0.2551	0.4611	-0.1241	0.1917	0.0883	0.0578	0.0062	0.9644	0.9392	1	
INFRASTRUCTURE	0.6392	-0.305	0.6894	0.3782	-0.0788	0.5214	0.4113	0.3829	0.3261	0.3186	0.3189	1

Table A4. The list of countries used in the analysis

NORTH AMERICA	ASIA	EUROPE	OCEANIA	AFRICA
United States	India	United Kingdom	Australia	Egypt
Canada	Pakistan	France	Fiji	Morocco
SOUTH AMERICA	Bangladesh	Germany	New Zealand	Zimbabwe
Mexico	Sri Lanka	Italy	New Caledonia	Liberia
Panama	Myanmar	Netherlands	Papua New Guinea	Tanzania
El Salvador	Malaysia	Belgium	Western Samoa	Sudan
Brazil	Thailand	Ireland	**MIDDLE EAST**	Nigeria
Argentina	Indonesia	Switzerland	Iran	Cote d'Ivoire
Paraguay	Philippines	Portugal	Israel	Madagascar
Chile	Taiwan	Spain	Kuwait	Kenya
Peru	Singapore	Austria	Lebanon	Ethiopia
Dominican Republic	Korea	Norway	Saudi Arabia	Zambia
Venezuela	Hong Kong	Denmark	United Arab Emirates	Uganda
Bolivia	China	Sweden	Afghanistan	Ghana
Bahamas, The	Macao	Hungary	Bahrain	Cameroon
Colombia	Vietnam	Finland	Qatar	Zaire
Guatemala	Cambodia	Luxembourg	Syria	Rwanda
Ecuador	Laos	Greece	Iraq	Gabon
Nicaragua	Nepal	Malta		Sierra Leone
Costa Rica	Brunei	Yugoslavia		Gambia
Trinidad and Tobago		Iceland		Mauritania
British Bermuda		Turkey		Senegal
Puerto Rico		Poland		Swaziland
Honduras		Romania		Libya
Suriname		Cyprus		Guinea
Jamaica		Russia		Niger
Guyana				Tunisia
Uruguay				

Source: METI, *Kaigai Jigyo Katsudo Kihon Chosa (Basic Survey on Overseas Business Activities).*