Characteristics and Effects of Japan's Inward FDI

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Kyoji Fukao*
Hitotsubashi University
Keiko Ito
Senshu University
Hyeog Ug Kwon
Hitotsubashi University

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* Correspondence: Kyoji Fukao, Institute of Economic Research, Hitotsubashi University, Naka 2-1, Kunitachi, Tokyo 186-8603 JAPAN. Tel.: +81-42-580-8359, Fax.: +81-42-580-8333, e-mail: k.fukao@srv.cc.hit-u.ac.jp.

1. Introduction

Though the Japanese economy finally seems to be recovering after having stagnated since the early 1990s, many of the underlying problems remain. Therefore, in order to accelerate structural adjustments and achieve a full-scale economic recovery, the Japanese government has launched various policy packages, including the promotion of inward foreign direct investment (FDI). According to economic theory, FDI is a form of long-term international capital movement which is accompanied by investors' intangible assets (such as the accumulated technological knowledge through R&D or marketing know-how based on past advertising activity) and it is expected that the recipient country will benefit from such inflows.[1] Although FDI traditionally has not been considered economically important for Japan because it is the world's largest trade surplus country, the potential benefits of FDI and the contribution it can make to Japan's economy in the areas of employment, demand, capital investment, and productivity have recently gained attention. In his general policy speech to the Diet on January 31, 2003, Prime Minister Junichiro Koizumi promised to increase efforts to attract inward FDI with the aim of doubling the cumulative amount of investment within the next five years. Although foreign investment in Japan has increased rapidly in the past few years, the FDI stock is still very small when compared with that in other developed economies.

Despite the importance of the topic, reliable statistics on and analyses of inward FDI in Japan are very limited. Moreover, in the absence of any meaningful empirical studies on the subject, some observers have argued that Japan does not need more FDI (Werner 2003, *Nihon Keizai Shinbun* 2003). Like FDI in other developed economies, the largest part of recent inflows to Japan took the form mergers and acquisitions (M&As). The critics fear that inward M&As are dominated by "vulture" funds seeking to reap quick profits by taking advantage of troubled firms (*Nihon Keizai*

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[1] See, for example, Caves (1982) and Dunning (1992) on the standard theory of foreign direct investment.

Shinbun 2003). Another argument is that some inward M&As are in fact aimed at acquiring advanced technologies (Werner 2003) rather than transferring and employing intangible assets in Japan. However, according to quantitative studies on corporate performance in Japan, such as Fukao and Murakami (2003), Kimura and Kiyota (2003), and Murakami and Fukao (2003), foreign-owned firms tend to show higher productivity than domestically-owned firms in Japan. If foreign-owned firms are performing better than domestic ones, one would expect that the Japanese economy overall will benefit from more inward FDI. Foreign firms' financial resources and know-how could help struggling Japanese firms out of financial and management difficulties. Moreover, domestically-owned firms' economic performance may be improved by technological spillovers from foreign-owned firms and/or intensified competition in the market.

This paper aims to examine whether concerns such as those about a "technological drain" have any foundation or whether Japan does indeed benefit from the transfer of intangible assets of foreign firms. To this end, we compare the performance of foreign-owned and domestically-owned firms, using micro data on Japanese firms in the manufacturing sector for the period 1994–2000. Our method of investigation is based on the following reasoning: if foreign-owned firms in Japan possess technologies that are superior to those of their domestically-owned counterparts, then this should manifest itself in higher total factor productivity (TFP). In this case, Japan benefits from inward FDI. There is, of course, the possibility that foreign-owned firms may enjoy greater productivity because foreign firms pick firms with higher TFP as M&A targets. In order to take account of this possibility, we also test whether foreigners have tended to acquire firms that already enjoy higher TFP, or whether the acquired firms' productivity improved after the take-over.

The paper is organized as follows: the next section presents an overview of recent inward FDI trends in Japan using newly constructed statistics by detailed industry; section 3 compares the

performance of foreign-owned and domestically-owned firms; section 4 tests whether foreign firms choose domestically-owned firms with higher TFP as their M&A targets and whether the performance of Japanese firms improved after they were acquired by a foreign firm; section 5, finally, summarizes our results and considers the policy implications of this study.

2. An Overview of Inward FDI in Japan

2.1 Recent Trends in Japan's Inward FDI

Inward FDI in Japan is extremely low when compared with other countries. Based on Japan's balance of payment statistics, the ratio of the inward FDI stock to GDP in 2000 was only 1.1 percent (figure 2.1a).[2] This ratio for Japan is one-eleventh of that of the U.S. and one-twenty-eighth of that of the U.K. It is much less than that of neighboring countries such as South Korea and China. Moreover, Japan's outward FDI is much larger than its inward FDI (figure 2.1b). And while foreign firms make significant contributions to fixed capital formation and employment in other countries, this is not the case in Japan: for example, in the manufacturing sector in the U.K. and France, more than 30 percent of total fixed asset formation is conducted by foreign-affiliated companies and nearly 30 percent of workers are employed by foreign-affiliated companies (figures 2.1c and 2.1d). Compared with these figures, the share of foreign-affiliated firms in capital formation and employment is extremely low in Japan.

INSERT Figure 2.1 and Figure 2.2

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[2] Currently, capital reserves by foreign-owned firms are not included in the direct investment liabilities in Japan's international investment position statistics. The Ministry of Finance and the Bank of Japan are planning to include these in the statistics from the end of 2005. According to estimates by the Bank of Japan, this statistical change would increase Japan's inward FDI position by 2.9 trillion yen as of the end of 2002. We hope the government will not claim that Japan has achieved the aim of doubling the cumulative amount of inward FDI as a result of this statistical manipulation.

Figure 2.2 shows the size of employment by foreign-affiliated companies in Japan and the size of overseas employment by Japanese-affiliated firms. The growth in overseas employment by Japanese firms far exceeds employment by foreign firms in Japan, and is accelerating. At the present rate, job creation by foreign firms falls far short of the jobs lost as a result of Japanese companies' moving abroad.

In the five years from 1997 to 2002, however, Japan experienced an FDI boom in the newly deregulated finance/insurance, telecommunications, service, and retail/wholesale industries (figure 2.3). In the manufacturing sector, the machinery industry (mainly in the automotive field) and the chemical industry (mainly in the pharmaceutical sector) also saw strong FDI inflows. However, 72% of the investment during this period went into non-manufacturing industries, which is in striking contrast to the period from 1950 to 1995, when 54% of all investment went into the manufacturing sector. According to the direct investment data in Japan's balance of payments statistics, inward FDI into Japan rose 2.7-fold to 9.4 trillion yen on a net foreign assets basis during the five years from 1997 to 2002.[3, 4, 5]

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[3] The balance of payments statistics can be downloaded from the Bank of Japan web site <www.boj.or.jp>. We should note that from the end of 1996, Japan's international investment position statistics reflect the following changes in the compilation methodology of financial derivatives and securities lending: (1) financial derivatives are categorized as an independent item (not as one of the sub-items under portfolio investment) in accordance with methodological changes in the 5th edition of the IMF's *Balance of Payments Manual*; and (2) securities lending is excluded from portfolio investment and other investment.

[4] In recent years, globalization has brought a wave of large-scale M&As to Japan involving companies such as AT&T, Cable and Wireless, GE Capital and Ripplewood. M&As in Japan were also driven by the growing excess capacity resulting from the prolonged domestic recession, which prompted both domestic and foreign investors to choose acquisition over investment in new facilities. However, the bust of the IT bubble in the U.S., the Enron scandal and the Iraq war have taken the steam out of the global M&A boom.

[5] During the first half of 2003, FDI into Japan was 42% lower than during the same period in the

2.2 Japan's International Transactions by Detailed Industry

In this subsection, we look at Japan's international transactions—both FDI and cross-border trade—at the 3-digit industry level, relying mainly on newly compiled data based on the *Establishment and Enterprise Census* for 2001 conducted by the Japan Ministry of Public Management, Home Affairs, Posts and Telecommunications. These statistic are comparable with the inward FDI data for 1996 compiled by Ito and Fukao (2003a; 2003b).[6]

According to Ito and Fukao (2003a; 2003b), Japanese-affiliates of foreign firms (JAFF) with 33.4% or more foreign ownership employed 485,000 workers in all industries in 1996. Because the total number of domestic workers was 63 million, only 0.77 percent of total domestic workers were employed by JAFF at that time. According to our new statistics for 2001, JAFF with 33.4% or more foreign ownership employed 756,000 workers in all industries. That is, the number of workers employed by JAFF increased by approximately 271,000 workers from 1996 to 2001. The largest share of the increase—228,000 out the 271,000 additional workers employed by JAFF—is attributable to the service sector. On the other hand, the total number of domestic workers decreased by more than 2.6 million to 60 million in 2001. Consequently, the share of the number of workers employed by JAFF in the total number of domestic workers increased to 1.26 percent in 2001. Although this is still very low, it nevertheless represents a substantial increase in the number of workers employed by JAFF.

Table 2.1 shows various measures which represent Japan's international transactions at the 3-digit industry level. In the manufacturing sector (panel A of table 2.1), the share of the number of

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previous year. Further large-scale deregulation will be necessary to attract more FDI, though such an effort does not appear to be on the government agenda today.

[6] Our data compilation follows that in Ito and Fukao (2003a, 2003b), where the methodology of data compilation and details on the *Census* and other FDI statistics for Japan can be found.

workers employed by JAFF in the total number of domestic workers increased from 1.36 to 1.97 during the period 1996–2001. The drugs & medicines and motor vehicles & parts sectors show a remarkable increase in this share, while it has not changed much in most of the other industries. On the other hand, in the service sector (panel B of table 2.1), the share increased from only 0.65 to 1.14. The rise is distributed across a large number of industries, such as financial intermediary services and insurance, telecommunications, research institutes (natural sciences), advertising, computer programming, information services, personnel supply services, other business services, and eating and drinking places. This suggests that the presence of JAFF is expanding in many different service industries in Japan.

INSERT table 2.1 and table 2.2

Another indication of the historically low level of inward FDI and the recent change is provided by a comparison of Japan's inward FDI with its outward FDI (table 2.1). In the case of the manufacturing sector, the imbalance between the activities of JAFF and those of FAJF (foreign affiliates of Japanese firms) is substantial. In terms of employment size, the JAFF/FAJF ratio was 0.095 (=1.36/14.29) in 1996. Assuming that the activities of FAJF in terms of employment remained unchanged, the JAFF/FAJF ratio would have been 0.138 (=1.97/14.29) in 2001. In the service sector, the imbalance between the activities of JAFF and those of FAJF is much smaller. In 1996, the JAFF/FAJF ratio was 0.344 (=0.65/1.89), and again assuming that the activities of FAJF in terms of employment remained unchanged in 2001, this would have increased to 0.603 (=1.14/1.89).

Next, we examine Japan's cross-border transactions of goods and services at a detailed industry level using table 2.1. The ratio of imports to total domestic output in the manufacturing sector expanded noticeably from 1995 to 2000; the rise is attributable to the increase in the import/output ratio for machinery industries and electrical equipment industries. In the case of the service sector, the average import/output ratio declined slightly from 2.11% in 1995 to 2.05% in

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2000. The corresponding ratio for exports increased only slightly in both the manufacturing and the service sectors.

Next we compare inward FDI and imports in Japan with those in the United States, using tables 2.1 and 2.2. In the case of the United States, the ratio of the number of workers employed by the U.S. affiliates of foreign firms (USAFF) to the total number of domestic workers is about 11% in the manufacturing sector and approximately 4% in the service sector. Thus, in both sectors, this ratio is much higher than in Japan.[7] Interestingly, however, the ratio did not change much in the U.S. during the period from 1992 to 1997, while in Japan the ratio increased 1.4-fold in the manufacturing sector and 1.8-fold in the service sector between 1996 and 2001. Nevertheless, at 1.97%, the ratio of workers employed by foreign-owned affiliates in Japan's manufacturing sector in 2001 was still less than one-fifth of the corresponding ratio for the U.S. of 10.78%.

While this represents a large gap, there are good economic reasons why FDI penetration in Japan's manufacturing sector and hence the share of workers employed by foreign affiliates is low. In cases where cross-border transactions in goods and services are not difficult, multinational corporations will choose the location with the lowest production costs. Since Japan's wage rates and land are prices relatively high, Japan probably has a locational disadvantage for manufacturing industries except those in which proximity to consumers plays an important role.

In contrast, the low level of inward FDI in Japan's service sector is a more serious issue. Since many services are untradable, Japanese customers cannot enjoy the advanced services foreign firms may offer if foreign firms do not establish affiliates in Japan. When compared with the U.S., inward FDI in Japan—despite the recent increase—has been limited to a small number of industries in the

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[7] We should note that the definition of the cut-off capital participation rate differs for Japan and the United States. In the case of the U.S. statistics on USAFF, the data include only those affiliates where a single foreigner owns 10% or more. On the other hand, in the case of Japan, our data on JAFF include all those affiliates where one or several foreigners own 33.4% or more in total.

service sector. Some industries, such as medical services, education, electricity, gas, and water supply have been "sanctuaries" where almost no inward FDI has occurred. As we can see in panel B of table 2.1, the FDI restrictiveness index shows that the Japanese economy is still closed in some industry such as electricity, gas, transportation, postal services, medical services, health and hygiene, etc.[8]

When we compare the ratio of imports to total domestic output in Japan and the U.S., the ratio for Japan was 2.11% in 1995 and 2.05% in 2000 for the service sector as a whole, which is almost the same level as the corresponding U.S. ratio of 2.07% (panel B of tables 2.1 and 2.2).

Summarizing the observations above, the number of workers employed by JAFF has increased fairly rapidly in recent years, particularly in the service sector, though the share of workers employed by JAFF in total domestic workers is still low when compared with the United States.[9]

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[8] Barriers against FDI often go beyond questions of "national treatment" to more fundamental issues of market access. For example, market entry in areas such as medical services and education is restricted even for Japanese companies. For more details on inward FDI in Japan's non-manufacturing sector, see Fukao and Ito (2003) and Ito and Fukao (2003a, 2003b).

[9] According to our estimation results of a simple gravity model for the regional distribution of U.S. outward FDI, U.S. FDI in Japan in the manufacturing sector is extremely low (see appendix 1). In the manufacturing sector, sales by U.S. firms in Japan were more than 60% less than the predicted value in 1994 and more than 50% less than the predicted value in 2001, even after controlling for the language difference. In terms of capital outflows, annual average U.S. capital outflows into Japan were approximately 85% less than the predicted value in 1994–98 and more than 90% less than the predicted value in 1999–2002 in the manufacturing sector. In the non-manufacturing sector, the estimated coefficient on the Japan dummy was not statistically significant though it took a negative value. Although sales by U.S. firms in Japan were 18% less than the predicted value in 1994 in the non-manufacturing sector, they were only 8% less than the predicted value in 2001, after controlling for the language difference. Moreover, in terms of capital outflows, annual average U.S. capital outflows into Japan were more than 50% less than the predicted value in 1994–98 but they were only 7% less than the predicted value in 1999–2002 in the non-manufacturing sector.

3.   TFP Comparison of Foreign-Owned and Domestically-Owned Firms

In this section, we compare the TFP level and other performance indicators of foreign-owned and domestically-owned firms, using micro data of Japanese firms in the manufacturing sector for the period of 1994–2000. Quite a number of studies, on various countries, have dealt with this topic. These typically show that labor tends to be more productive in foreign-affiliated companies than in domestic companies.[10] However, this is generally due to a greater concentration of capital investment; total factor productivity (TFP) analysis indicates that foreign firms' productivity is not necessarily higher if differences in capital intensity are taken into account.[11]

A study that has examined the relationship between ownership and firms' performance indicators (such as the capital-labor ratio, real value-added and TFP) is that by Kimura and Kiyota (2003), which used the same data source as the present paper. Their data covers the 1994–1998 fiscal years. Their study showed that foreign-ownership has a positive impact on the growth rate of real value-added, the rate of return to capital, and TFP. Compared with their analysis, our study is more sharply focused on the TFP level as a measure of performance and measures TFP using a more sophisticated approach. Moreover, this paper examines a longer period (1994–2000) and investigates how out-in and in-in M&As affect the performance of invested firms.[12]

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[10]   See, for example, Blomstrom and Sjoholm (1998) on Indonesia.

[11]   Studies coming to this conclusion include Ramstetter (2002) and Ito (2002b) on Indonesia and Ito (2002a) on Thailand.

[12]   The approach used here also tries to deal with the following shortcomings of Kimura and Kiyota's (2003) paper. First, they set the cut-off capital participation rate for their definition of foreign-owned firms either at 10% or at 33.4%. In the case of the 10% cut-off rate, their data on foreign-owned firms include all those affiliates of which one or several foreigners owned 10% or more in total. A substantial amount of stocks issued by Japanese top firms is owned by foreign institutional investors as portfolio investment. By setting their cut-off ratio as low as 10%, their data probably include such portfolio investments. In order to avoid this risk, we use the 33.4% cut-off ratio. In addition, we also use a narrower definition, in which only firms majority-owned by a single

Data Source and Definition of Nationality

We use the firm-level panel data underlying the *Basic Survey of Japanese Business Structure and Activities* conducted annually by the Ministry of Economy, Trade and Industry (METI).[13] The survey covers all firms with at least 50 employees or 30 million yen of paid-in capital in the Japanese manufacturing, mining and commerce sectors. We use the data for manufacturing firms. Our data covers the period of 1994–2000 (1994–2001 in the case of the analysis in section 4). After some screening of the data our unbalanced panel data consists of 93,880 observations.[14]

In the survey, firms were asked what percentage of their paid-in capital was owned by foreigners and whether they had a foreign parent owning more than fifty percent of the firm. Based

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foreign firm are regarded as foreign-owned firms. Second, they used the book-value of capital as capital inputs. As is well known, there may be a huge gap between the book-value of capital and real capital stock, though the latter is more appropriate as input data for TFP analysis. The third shortcoming of their study is that they used value-added instead of gross output as their output measure. As Baily (1986) has shown, value-added-based TFP may differ from gross-output-based TFP, which is commonly used in theoretical and empirical studies. Fourth, Kimura and Kiyota derived real value-added using the value-added deflator of the SNA statistics, which is based on a relatively aggregated industry classification. Their approach risks underestimating the TFP growth of firms in high-tech industries, where output prices decline more rapidly. Compared with their approach, we use the more disaggregated deflator of the I-O tables. Fifth, as the benchmark for the TFP comparison they used a single hypothetical firm which was derived by taking the average of manufacturing firms from all industries. Since the cost shares of each input take quite different values among industries, there is a risk of large approximation errors in their approach. We use a different hypothetical firm for each industry.

[13] The compilation of the micro-data of the METI survey was conducted as part of the project "Foreign Direct Investment in Japan" at Cabinet Office, Government of Japan.

[14] We exclude all observations with zero values of material costs, compensation of employees, and tangible fixed assets from our data set. We also exclude observations with an extremely high or low capital-labor ratio. By this screening process, the number of observations declined by about 8% in comparison with our original set of observations.

on this information, we determine whether a firm is foreign-owned. We use the following two definitions of foreign-owned firms: a broad definition, where one or several foreigners own 33.4% or more of the firm's paid-in capital in total, and a narrow definition, where firms are majority-owned by a single foreign firm. It should be noted, though, that there are several Japanese firms, where more than one third of issued stocks are owned by foreign institutional investors as portfolio investments,[15] and there is therefore a risk that our broad definition includes such firms.[16]

"Entry" and "Exit" of Foreign-Owned Firms

Table 3.1, which is based on our data, shows how the presence of foreign-owned firms in Japan's manufacturing sector increased in 1994–2000. Let us see how the presence of foreign-owned firms has expanded, using our broad definition of foreign-owned firms. Their number grew from 195 in 1994 to 236 in 2000. During the same period, the sales of foreign-owned firms nearly doubled from 12.2 trillion yen to 23.7 trillion yen. 62 foreign-owned firms exited and 73 foreign-owned firms newly entered in this period.[17] 61 domestically-owned firms in 1994 had become foreign-owned by 2000. We regard these firms as having been acquired by foreign firms.

INSERT table 3.1

The increase in foreign-owned firms' market share was mainly caused by these 61 M&As. The total sales of these 61 firms amounted to 14.1 trillion yen in 2000, which is greater than the total

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[15] According to the *Nihon Keizai Shinbun* (2004), the number of Japanese listed firms in which foreign institutional investors held more than 40% of issued stocks as portfolio investment increased from four at the end of March 2003 to nine at the end of March 2004.

[16] If we had access to the firm name list of the *METI Survey*, we would be able to exclude such firms. Unfortunately, we did not have such access.

[17] As already mentioned, the METI survey covers only those firms in the manufacturing and the commerce sector that are of a size that is greater than the cut-off level. Thus, our data on firms that "entered" includes firms which expanded or changed their main business.

increase in foreign-owned firms' sales of 11.5 trillion yen in the 1994–2000 period. We will examine these out-in M&A cases more closely in the following section.

To sum up the above results, the expansion of the market presence of foreign-owned firms was caused primarily through M&As and the growth of incumbents. In comparison, the contribution of greenfield investments was negligible.

Table 3.2 shows the distribution of foreign-owned firms by industry. Foreign-owned firms can be predominantly found in "high-tech" industries, such as drugs and medicines, other chemical products, miscellaneous machinery and machine parts, and electric communication equipment and related products.

INSERT table 3.2

Measurement of TFP

In this paper we measure each firm's TFP level using the method developed by Good, Nadiri, and Sickles (1997). This method is based on Caves, Christensen, and Diewert's (1982) "hypothetical firm" approach, which measures TFP as the gap between (1) the deviation of a firm's output level from the industry average output level and (2) the summation of the deviations of the firm's input level of production factor i from the industry average input level of that factor multiplied by the simple mean of the firm's cost share of that factor and the industry average cost share of that factor for all the production factors. This index is particularly useful for a comparison of the productivity level of more than two firms in one particular period. However, this method is not suitable for inter-temporal comparisons.

Good, Nadiri, and Sickles (1997) overcome this problem by combining the "chain index" approach with the "hypothetical firm" approach of Caves, Christensen, and Diewert (1982). They achieve this by assuming a hypothetical firm for each cross-sectional comparison and then chaining

the hypothetical firms together over time. The productivity index thus obtained is particularly useful because it provides a consistent way of summarizing the cross-sectional distribution of firms' TFP and the inter-temporal change of distribution over time. Aw, Chen, and Roberts (1997), Fukao and Ito (2002), and Hahn (2000) applied this approach to data of the manufacturing sector either at the firm level or at the plant level for Taiwan, Japan and Korea, respectively.

Using the industry classification of the METI survey, we divided our data into 59 manufacturing industries. For each industry we measured the TFP level of firm f at time t by

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\begin{aligned}
\ln TFP_{ft} = (\ln Y_{ft} - \overline{\ln Y_t}) + \sum_{s=1}^{t} (\overline{\ln Y_s} - \overline{\ln Y_{s-1}}) \\
- [\sum_{i=1}^{n} \frac{1}{2}(S_{ift} + \overline{S_{it}})(\ln X_{ift} - \overline{\ln X_{it}}) + \sum_{s=1}^{t} \sum_{i=1}^{n} \frac{1}{2}(\overline{S_{is}} + \overline{S_{is-1}})(\overline{\ln X_{is}} - \overline{\ln X_{is-1}})]
\end{aligned}
\tag{1}
$$

where Y_{ft} denotes the output level of firm f in year t and X_{ift} represents the input level of factor i at firm f in year t. S_{ift} stands for the cost share of input i at firm f in year t. Upper bars indicate the average value of that variable over all firms in that industry.

Data Prepared for the Calculation of TFP

We used each firm's total sales and cost of intermediate inputs as nominal gross output and nominal intermediate input data. We derived the deflator for each industry's gross output and intermediate input from the Bank of Japan's *Wholesale Price Statistics* and *Corporate Price Statistics*.

As physical capital stock, only nominal book value data are available in the METI survey. We compiled a converter from book value to real capital stock using investment flow data in METI's *Report on Industry Statistics*, which is based on the *Census of Manufactures*. First, we aggregated

the data on investment in fixed assets for 1970–2000 in the *Report on Industry Statistics* into our 30

industries and then deflated them using the gross domestic capital formation deflator (plant and

equipment) in the *Annual Report on National Accounts* released by the Cabinet Office, Government

of Japan. We used the depreciation rates of the JIP database at the two-digit level (Fukao, Inui,

Kawai, and Miyagawa 2003)[18] and estimated the real physical capital stock for 1994–1998 by the

perpetual inventory method. We used the ratios of real capital stock and the book value of capital

reported in METI's *Report on Industry Statistics*, which we aggregated into our 59 industries, as our

converter. In order to derive the cost share of capital, we used the capital cost data of the JIP

database at the two-digit level (35 industries).

As labor input, we multiplied each firm's total number of workers by the sectoral

working-hours from the Cabinet Office's *SNA Statistics*. We were not able not take account of

differences in labor quality among firms, though it seems fair to assume that foreign firms probably

tend to employ more educated workers. Our estimates of foreign-owned firms' TFP level might be

biased upwards as a result of this neglect of the labor quality.

Figure 3.1 compares the histograms of foreign-owned and domestically-owned firms' TFP.

This figure shows that foreign-owned firms tend to have substantially higher TFP levels than

domestically-owned firms. The histograms are based on pooled data and determinants of TFP level

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[18] The JIP Database was compiled by those four authors, several economists at ESRI, and graduate students from Keio, Hitotsubashi, Tsukuba and other universities as part of an ESRI (Economic and Social Research Institute, Cabinet Office, Government of Japan) research project. The detailed result of this project is reported in Fukao, Miyagawa, Kawai, Inui (2004). The database contains annual information on 84 sectors, including 49 non-manufacturing sectors, from 1970 to 1998. These sectors cover the whole Japanese economy. The database includes detailed information on factor inputs, annual nominal and real input-output tables, and some additional statistics, such as R&D stock, capacity utilization rate, Japan's international trade statistics by trade partner, inward and outward FDI, etc. at the detailed sectoral level. An Excel file version (in Japanese) of the JIP Database is available on ESRI's web site.

other than foreign ownership are not taken into account. Therefore, our interpretation carries the risk of being biased. For example, suppose that the average TFP level grows over time and the market presence of foreign-owned firms is on the increase. Then foreign-owned firms in pooled data tend to have higher TFP than domestically-owned firms even when there is no cross-sectional gap in TFP between foreign-owned and domestically-owned firms. In order to avoid this kind of bias, we conduct a regression analysis.

INSERT Figure 3.1

Comparison of Performance by Regression Analysis

We regress firm's performance on the foreign-ownership dummy and firms' other characteristics. As a first step, we use only the industry and year dummies.[19]

Our main results (using the narrow definition of foreign-owned firms) are as follows (table 3.3a).

INSERT tables 3.3a and 3.3b

1）   Foreign-owned firms' TFP is about 8% higher and their current profit-sales ratio 1.5 percentage point higher.

2）   Foreign-owned firms enjoy slightly higher TFP growth.

3）   Foreign-owned firms spend proportionately more on R&D per worker. They also have a significantly higher capital-labor ratio. Probably because of this, the labor productivity of foreign-owned firms is higher than that of domestically-owned firms.

4）   There is no significant difference between domestically-owned and foreign-owned firms in

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[19] In the case of regression with the TFP level as the dependent variable, we also included a cross terms of the year dummy and the industry dummy in order to control for differences in average TFP growth rates.

the growth rates of real sales and employment. But foreign-owned firms show a significantly lower growth rate of tangible assets.

5）　　　　Average wages at foreign firms are 1.28 million yen higher per year.

Using the broad definition of foreign-owned firms (table 3.3b), we obtain similar results.

Empirical Model of the Determinants of TFP

As we have seen, foreign-owned firms tend to conduct more R&D and pay higher wage rates. Although their TFP level is significantly higher than that of Japanese firms, this difference might be caused not by the inflow of knowledge from their parent firms but by their own R&D activities and the (potentially) higher quality of their labor. In order to test which of the above two hypotheses is correct, we estimate an empirical model of the determinants of each firm's TFP level and TFP growth rate. Descriptive statistics of the main variables used in this regression are presented in table 3.4, while the regression results of this empirical model are reported in table 3.5. The model is estimated by OLS using pooled data for 1994–2000.

INSERT tables 3.4 and 3.5

Again, foreign-owned firms display a TFP level about 5% higher than that of Japanese firms even after controlling for other factors such as R&D intensity, the percentage of non-production workers, years passed since the firm was established, and firm size (sales) in addition to industry differences (industry dummies) and observation year (table 3.5a).

When we add firm dummies to the regression model, the gap between the TFP level of foreign-owned firms and Japanese firms becomes insignificant. This result suggests that the strong correlation between foreign ownership and the TFP level is at least partly the result of the higher TFP level of the firms later acquired by foreign firms. We will study this issue in more detail in the

next section.

Table 3.5c shows that foreign-owned firms have a TFP growth rate 1.4–1.8% higher than that of Japanese firms even after controlling for other factors. But again in the fixed effect models this positive correlation between foreign ownership and TFP growth rate becomes insignificant.

Using regional dummies for parent firms' location, we also tested whether firms owned by U.S. or European firms show a better performance than firms owned by firms from other regions. In addition, we tested whether firms majority-owned by foreign firms had a better performance than other foreign-owned firms (table 3.5b and table 3.5d). We found that firms with a U.S. or a European parent show a better performance than firms with parents from other regions. We also found that firms majority-owned by foreign firms show a better performance than other foreign-owned firms. However, these relationships disappear in the fixed effect models.

The overall comparison between foreign-owned and domestically-owned firms in this section shows that foreign-owned companies had a 5% higher TFP, and higher returns on capital. Moreover, they displayed a higher capital-labor ratio and R&D investment per worker. They also enjoyed a higher TFP growth rate. Probably reflecting the higher levels of capital intensity and technology, foreign-owned companies showed higher labor productivity and wage rates as well. But in the fixed effect models we could not find a significant positive correlation between foreign ownership and the TFP level (TFP growth rate).

4. Selection Model and Dynamic Effects of Mergers and Acquisitions

As we have discussed in the previous section, there are two possible theoretical explanations for the positive correlation between foreign ownership and productivity. One potential explanation is that foreign-owned firms enjoy greater productivity because foreign firms choose firms with higher TFP as their M&A targets. We call this mechanism the selection effect. The alternative explanation is

that Japanese firms that were acquired by foreign firms receive new technologies and management skills from their foreign owners and this technology transfer boosts their TFP. We call this mechanism the technology-transfer effect.

In order to answer which one of the two effects is responsible for the positive correlation between foreign ownership and productivity, we will conduct two empirical tests in this section. First, we estimate a Probit model explaining whether a firm is chosen as an M&A target based on its TFP level and other characteristics. Secondly, we test whether the TFP of Japanese firms that were acquired by foreign firms improves after the investment.[20]

Data Used

We use data of manufacturing firms for the years 1994–2001 from the same source as in section 3. Following our broad and narrow definition of foreign ownership above, we distinguish between firms in which several foreigners acquire 33.4% or more of the equity, and firms in which a single foreign firm takes a majority stake. In order to compare out-in M&As with in-in M&As (M&As involving only domestic firms), we define in-in M&As as cases where one firm, which did not have a parent firm with majority ownership in time $t–1$, comes to have a domestic parent firm with majority ownership in time t. This definition of in-in M&As resembles our narrow definition of out-in M&As.[21]

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[20] In many countries, exporting firms tend to a have higher productivity than non-exporting firms. Several studies, such as Bernard and Jensen (1999) and Hahn (2004), have tried to discover whether exporting improves productivity (learning) and/or whether more productive firms export (self-selection). These studies provide important insights that have helped us formulate our approach in this section.

[21] Because of data limitations, there are several inconsistencies in our definition of M&As. Cases, where a firm changes its parent firm from one Japanese firm to another Japanese firm, are not included in our in-in M&As. What is more, cases where a foreign-owned firm acquires majority

Table 4.1 shows the number of out-in and in-in M&A cases in our data. We have 143 cases of broadly defined out-in M&As, 67 cases of narrowly defined out-in M&As, and 1,362 cases of in-in M&As.

INSERT table 4.1

Are Good Firms Chosen as M&A Targets?

Using our panel data of manufacturing firms for 1994–2001, we estimated a Probit model explaining whether a firm is chosen as an M&A target based on its TFP level and other characteristics. The dependent variables are the broadly defined out-in M&A dummy, the narrowly defined out-in M&A dummy, and the in-in M&A dummy. Each M&A dummy variable takes value one when this type of M&A occurs. As explanatory variables, we use the logarithm of the TPF level, the growth rate of TFP, firm size (the number of workers), the current profit/sales ratio, the total liability/total asset ratio, year dummies, and industry dummies. All the explanatory variables are values at the period (time $t-1$) preceding the M&A transaction (time t).

Table 4.2 shows the estimation results. The determinants of M&As are surprisingly different for out-in M&As and in-in M&As. In the case of out-in M&As, firms with higher TFP, a higher profit rate, and of a larger size are chosen as targets. In the case of in-in M&As, firms with a lower profit rate, larger liabilities, and of a smaller size are chosen as targets. In both cases, the growth rate of firms' TFP (from t-2 to t-1) does not have any significant effect on the selection.

INSERT table 4.2

These results imply that foreign firms acquire Japanese firms that already at the time of acquisition show a better performance. It thus seems that at least some part of the higher TFP of

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ownership of an independent firm are included in our *in-in* M&As rather than being counted as an *out-in* M&A.

foreign-owned firms is caused by the selection effect. In contrast, in-in M&As tend to display characteristics of rescue measures. One possible explanation is that in-in M&As in Japan are mainly conducted within vertical and horizontal *keiretsu* networks and financially distressed small firms are salvaged by other member firms through M&As.

Does M&A Improve the Performance of Target Firms?

In this subsection, we examine the technology-transfer effect by estimating how the performance of out-in and in-in M&A target firms changes after the acquisition. We estimate the following model:

$$
Y_{f,t+\tau} - Y_{f,t-1} = \alpha + \beta_1 outinM \& ADummy_{f,t} + \beta_2 ininM \& ADummy_{f,t}
$$
$$
+ \sum_i \gamma_i X_{i,f,t-1} + \sum_j \delta_j IndustryDummy_{j,f,t} + \sum_T \theta_T YearDummy_{T,f,t} + \varepsilon_{f,t} \qquad (2)
$$

where $Y_{f,t}$ denotes the performance of firm f in year t. As $Y_{f,t}$ we use the logarithm of the TFP level, the logarithm of the number of workers, and the current profit/sales ratio. It is quite likely that it takes several years for technology-transfer effects to manifest themselves and in order to take account of this time lag, we study the effects two years ($\tau=1$) and three years ($\tau=2$) after the acquisition. As explanatory variables, we use out-in and in-in M&A dummies in year t, the values of the three performance variables (the logarithm of the TFP level, the logarithm of the number of workers, and the current profit/sales ratio) in year t-1, the R&D/sales ratio, the total liability/total sales ratio, industry dummies, and year dummies. In the case of the estimation where changes in employment are the dependent variable, we used sales per worker as an additional explanatory variable in order to take account of labor hoarding. As out-in M&A dummies, we used both the broad and narrow definition of out-in M&A. The narrowly defined M&A dummy takes value one if firm f becomes majority-owned by a foreign firm.

The regression results on the effects two years ($\tau=1$) after the acquisition are reported in table

4.3, while the results on the effects three years ($\tau=2$) after are reported in table 4.4.

INSERT tables 4.3 and 4.4

The results indicate that out-in M&As improve target firms' TFP level and current profit/sales ratio. It seems that out-in M&As where a single foreign firm acquires majority-ownership (the narrow definition) tend to have larger and more statistically significant positive effects on these performance indicators than out-in M&As where one or more foreign firms do not become majority-owners (the broad definition). Compared with out-in M&As, in-in M&As bring a smaller and slower improvement in target firms' TFP level and there is no improvement in the current profit/sales ratio. The impact of out-in M&As on target firms' employment is also sharply different from that of in-in M&As. In the case of in-in M&As, there is a significant and positive effect on employment two years after the acquisition, while in the case of out-in M&As, the effect on employment is negative but insignificant.

Overall, we found some evidence showing that target firms' TFP improved as a result of out-in M&As. Compared with in-in M&As, out-in M&As bring a larger and quicker improvement in TFP and the profit rate but, at least in the short-run (i.e. two years after the acquisition) do not increase employment at the target firms.

5. Conclusions

Our analysis of inward FDI has shown that FDI penetration in Japan (the number of workers employed by JAFF in total domestic workers) increased substantially in recent years though the inward FDI penetration is still low compared with the United States. The increase in FDI penetration in Japan during the period 1996–2001 was more pronounced in the service sector than in the manufacturing sector. What is more, the growing presence of foreign companies was distributed across a wide spectrum of service industries (though important exceptions, "sanctuaries," remain). In

the manufacturing sector, the drugs & medicines and motor vehicles & parts sectors show a remarkable increase in the share of workers employed by JAFF in total domestic workers, while in most other industries this share remained largely unchanged.

Taking these observations as our point of departure, we investigated the economic performance both of foreign-owned and of domestically-owned firms and tried to evaluate whether Japan benefits from the transfer of intangible assets of foreign firms.

The overall comparison between foreign-owned and Japanese companies shows that foreign-owned companies enjoyed 5% higher TFP as well as higher earnings and returns on capital. They also displayed a higher capital-labor ratio and higher R&D intensity. Reflecting their higher TFP and labor-saving production patterns, foreign-owned companies showed higher labor productivity and wage rates as well.

By estimating Probit models, we found that foreign firms acquire Japanese firms with higher TFP levels and higher profit rates. In contrast, in-in M&As seem to have the characteristics of rescue missions. Small firms with a higher total liability/total asset ratio tend to be chosen as targets of in-in M&As.

We also estimated the dynamic effects of M&As on target firms. The results indicate that out-in M&As improve target firms' TFP level and current profit/sales ratio. Compared with in-in M&As, out-in M&As bring a larger and quicker improvement in TFP and the profit rate but no increase in target firms' employment two years after the acquisition.

To sum up the above results, we found that both the selection effect and the technology-transfer effect play a role in explaining the positive correlation between foreign ownership and productivity.

Appendix 1. Estimation of the Gravity Model

In order to test whether Japan is more closed to inward FDI than other countries, we estimated a gravity model for the regional distribution of U.S. outward FDI.[22] The results are summarized in appendix table 1. The dependent variables are the logarithm of sales by nonbank foreign affiliates of nonbank U.S. firms, the logarithm of sales by nonbank majority-owned foreign affiliates (nonbank MOFAs), and the logarithm of annual average U.S. capital outflows. As explanatory variables, we use the logarithm of each recipient country's GDP, the logarithm of per capita GDP, the logarithm of the distance from the U.S., a dummy for Japan, and a language dummy variable which indicates countries where English is the predominant language.[23, 24]

Appendix table 1 shows that the estimated coefficient on the Japan dummy is negative in all cases except two. It is negative and significant in all the equations for the manufacturing sector, while it is not statistically significant in all the equations for the non-manufacturing sector. Moreover, looking at the estimated equations for the sales of services, a positive coefficient is estimated for the Japan dummy, although it is not statistically significant. These results suggest that Japan tends to be

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[22] There are several empirical studies which estimated an econometric model explaining the regional distribution of U.S. direct investment abroad and found that a Japan dummy is negative and significant. These studies are based either on data of FDI in manufacturing industries (Grubert and Mutti 1991) or on data of FDI in all industries (Eaton and Tamura 1994). Also see Lawrence (1993) and Development Bank of Japan (1997) on this issue.

[23] We also estimated the model excluding the language dummy variable. The results were very similar to those including the language dummy variable. Therefore, we report the results including the language dummy variable.

[24] The dependent and explanatory variables were constructed from the following data sources: data on sales by nonbank foreign affiliates of nonbank U.S. firms were taken from U.S. Department of Commerce (2004a); data on sales of services by nonbank MOFAs were taken from U.S. Department of Commerce (2004c); data on U.S. capital outflows were taken from U.S. Department of Commerce (2004b); data on GDP and per capita GDP were taken from World Bank (2003) and Directorate-General of Budget Accounting and Statistics (2004); and data on distance and language were taken from Haveman (2004).

more closed to inward FDI in the manufacturing sector than other countries, although we cannot conclude that Japan is significantly more closed when it comes to services (non-manufacturing). The results imply that, in the manufacturing sector, sales by U.S. firms in Japan were more than 60% less than the predicted value in 1994 and still more than 50% less than the predicted value in 2001, even after controlling for the language difference.[25]

In terms of capital outflows, annual average U.S. capital outflows into Japan were approximately 85% less than the predicted value in 1994–98 and more than 90% less than the predicted value in 1999–2002 in the manufacturing sector. In the non-manufacturing sector, the estimated coefficient on the Japan dummy was not statistically significant though it took a negative value. Although sales by U.S. firms in Japan were 18% less than the predicted value in 1994 in the non-manufacturing sector, they were only 8% less than the predicted value in 2001, after controlling for the language difference. Moreover, in terms of capital outflows, annual average U.S. capital outflows into Japan were more than 50% less than the predicted value in 1994–98 but only 7% less than the predicted value in 1999–2002 in the non-manufacturing sector.

The coefficients on the control variables generally show the expected results. Thus, the coefficients on GDP and per capita GDP are positive and strongly significant in almost all equations; the coefficient on the distance variable is negative, though it is significant only in some equations, mostly for the sales of services.[26] The coefficient on the language dummy variable takes a positive

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[25] We can calculate these figures by using the values of the estimated coefficient on the Japan dummy. For example, in the manufacturing sector, as exp(-1.041)=0.353 and exp(-0.714)=0.489, we can say that the sales by U.S. firms in Japan were approximately 35% and 49% of the predicted value in 1994 and 1999, respectively, after controlling for other factors such as GDP, per capita GDP, distance, and language.

[26] This might imply that manufacturing firms undertake FDI and establish production bases in far-away countries in order to avoid the high transportation cost incurred when exporting. In contrast, in the case of services, firms might find it easier to provide their services to countries close-by.

value in all the cases, suggesting that U.S. outward FDI tends to go to countries where English is the

main language.[27]

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[27] The coefficient is significantly positive and takes a relatively large value in the cases of the non-manufacturing sector. This suggests that language matters more in non-manufacturing (service) industry.

References

Baily, Martin Neil (1986) "Productivity Growth and Materials Use in U.S. Manufacturing," *Quarterly Journal of Economics*, pp. 185–95.

Bernard, Andrew B. and J. Bradford Jensen (1999) "Exceptional Exporter Performance: Cause, Effect, or Both?" *Journal of International Economics*, vol. 47, pp. 1-25.

Blomstrom, Magnus and Fredrik Sjoholm (1998) "Technology Transfer and Spillovers? Does Local Participation with Multinationals Matter?" *NBER Working Paper* #6816.

Caves, Douglas W., Laurits R. Christensen, and W. Erwin Diewert (1982) "Output, Input and Productivity Using Superlative Index Numbers," *Economic Journal*, vol. 92, no. 362: pp.73–96.

Directorate-General of Budget, Accounting and Statistics (2004) *Statistical Abstract of National Income*, Republic of China, retrieved from <http://www.stat.gov.tw/bs4/nis/enisd.htm>, 26 January 2004.

Fukao, Kyoji and Tomofumi Amano (2003) *Foreign Direct Investment in Japan*, mimeo, American Chamber of Commerce in Japan.

Fukao, Kyoji and Keiko Ito (2003) "Foreign Direct Investment and Services Trade: The Case of Japan," in Takatoshi Ito and Anne O. Krueger (eds.), *Trade in Services in the Asia Pacific Region*, pp. 429–480, The University of Chicago Press: Chicago and London.

Fukao, Kyoji, Tomohiko Inui, Hiroki Kawai, and Tsutomu Miyagawa (2004) "Sectoral Productivity and Economic Growth in Japan: 1970-98," forthcoming in *Productivity and Growth: East Asia Seminar on Economics Volume 13*, in Takatoshi Ito and Andrew Rose (eds.), The University of Chicago Press.

Fukao, Kyoji and Yukako Murakami (2003) "Do Foreign Firms Bring Greater Total Factor Productivity to Japan?" paper prepared for the Conference, *Rapid Economic Growth and Technology Transfers*, October 17–18, 2003, University Groningen.

Good, David H., M. Ishaq Nadiri, and Robin C. Sickles (1997) "Index Number and Factor Demand Approaches to the Estimation of Productivity," *Handbook of Applied Econometrics vol.2*: *Microeconometrics*, pp. 14-80.

Hahn, Chin Hee (2003) "Exporting and Performance of Plants: Evidence from Korean Manufacturing," *NBER Working Paper*, #10208.

Haveman, Jon (2004) *International Trade Data: Useful Gravity Model Data*, retrieved from <http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html#Gravity>, 20 January 2004.

Ito, Keiko (2002a) "Are Foreign Multinationals More Efficient? Plant Productivity in the Thai Automobile Industry," ICSEAD Working Paper Series #2002-19, The International Centre for the Study of East Asian Development: Kitakyushu.

Ito, Keiko (2002b) "Foreign Ownership and Productivity in the Indonesian Automobile Industry: Evidence from Establishment Data for 1990–1999," paper presented at the NBER Thirteenth Annual East Asian Seminar on Economics, Productivity, June 20–22, 2002, Melbourne, Australia.

Ito, Keiko and Kyoji Fukao (2003a) "Foreign Direct Investment in Japan: Empirical Analysis Based on Establishment and Enterprise Census." in Robert M. Stern (ed.), *Japan's Economic Recovery: Commercial Policy, Monetary Policy, and Corporate Governance*, the University of Michigan Press, Michigan.

Ito, Keiko and Kyoji Fukao (2003b) "Foreign Direct Investment and Trade in Japan: An Empirical Analysis Based on the Establishment and Enterprise Census for 1996," Discussion Paper Series A, No.441, Institute of Economic Research, Hitotsubashi University.

Japanese Government (1999) *1995 Input-Output Table*s, Tokyo: Management and Coordination Agency, Japanese Government.

Japanese Government (2004) 2000 Input-Output Tables, retrieved from <http://www.stat.go.jp/data/io/io00.htm>, 3 May 2004.

Kimura, Fukunari, and Kozo Kiyota (2003) "Foreign-Owned versus Domestically-Owned Firms: Economic Performance in Japan," Yokohama National University Working Paper #185.

METI (Ministry of Economy, Trade and Industry) (2001) *Dai 34-kai Gaishi-kei Kigyo Doko Chosa Gaiyo* (The Summary of the 34th Report on Trends of Business Activities by Japanese Subsidiaries of Foreign Firms), Tokyo: METI (also available at <www.meti.go.jp>).

METI (2002) *Dai 32-kai Wagakuni Kigyo no Kaigai Jigyo Katsudo* (The 32nd Report on Trends of Japan's Business Activities Abroad), Tokyo: Printing Office, Japan Ministry of Finance.

METI (2003) *Dai 36-kai Gaishi-kei Kigyo Doko Chosa Gaiyo* (The Summary of the 36th Report on Trends of Business Activities by Japanese Subsidiaries of Foreign Firms), Tokyo: METI (also available at <www.meti.go.jp>).

MITI (Ministry of International Trade and Industry) (1999) *Dai 27-kai Wagakuni Kigyo no Kaigai Jigyo Katsudo* (The 27th Report on Trends of Japan's Business Activities Abroad), Tokyo: Printing Office, Japan Ministry of Finance.

Murakami, Yukako, and Kyoji Fukao (2003) "Taigai Tainai Chokusetsu Toshi to Seizogyo Kigyo no Seisansei: Kigyo Katsudo Kihon Chosa Kohyo Deta ni Motozuku Jissho Bunseki (Outward and Inward Foreign Direct Investment and Japan's Manufacturing Industry: Empirical Analysis Based on Firm-Level Data)," Economic and Social Research Institute Discussion Paper Series, #68, Economic and Social Research Institute, Cabinet Office.

Nihon Keizai Shinbun (2003) "Haiena kara Hiro e: Gaikoku-jin Butai no Funsen" [From 'Hyenas' to Heroes: Brave Fights of a Foreign Legion], March 26, evening edition.

Nihon Keizai Shinbun (2004) "Mochikabu Hiritsu de Gaikokujin ga Taito" [Foreigners Raise Their

Ownership], May 7, morning edition.

Ramstetter, Eric D. (2002) "Does Technology Differ in Local Plants and Foreign Multinationals in Thai Manufacturing? Evidence from Translog Production Functions for 1996 and 1998," ICSEAD Working Paper Series, The International Centre for the Study of East Asian Development: Kitakyushu.

Toyo Keizai Shinpo-sha (1996) *Kaigai Shinshutsu Kigyo Soran 1996* (CD-ROM-ban) [Directory of Japanese Subsidiaries Abroad (CD-ROM)], Tokyo: Toyo Keizai Shinpo-sha.

U.S. Department of Commerce (1995a) *Benchmark Input-Output Accounts of the United States, 1992,* retrieved from <http://www.bea.doc.gov/bea/uguide.htm#_1_15>, 19 April 2000.

U.S. Department of Commerce (1995b) *Foreign Direct Investment in the United States: Establishment Data for 1992*, retrieved from
 <http://www.bea.doc.gov/bea/uguide.htm#_1_23>, 19 April 2000.

U.S. Department of Commerce (2003) *Foreign Direct Investment in the United States: Establishment Data for 1997*, retrieved from <http://www.bea.doc.gov/bea/ai/iidguide.htm#page15>, 2 May 2004.

U.S. Department of Commerce (2004a), *U.S. Direct Investment Abroad: Operations of U.S. Parent Companies and Their Foreign Affiliates (Comprehensive financial and operating data)*, retrieved from <http://www.bea.doc.gov/bea/ai/iidguide.htm#link12b>, 3 February 2004.

U.S. Department of Commerce (2004b), *U.S. Direct Investment Abroad: Balance of Payments and Direct Investment Position Data*, retrieved from
<http://www.bea.doc.gov/bea/di/di1usdbal.htm>, 21 March 2004.

U.S. Department of Commerce (2004c), *U.S. International Services: Cross-Border Trade and Sales Through Affiliates: 1986–2002*, retrieved from
<http://www.bea.doc.gov/bea/di/1001serv/intlserv.htm>, 22 February 2004.

Werner, Richard A. (2003) "Foreign Money Won't Help Japan's Economy," *The Daily Yomiuri*.

White, Halbert (1980) "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica*, 48, pp.813–838.

World Bank (2003), *World Development Indicators* (CD-ROM), World Bank.

Figure 2.1 International comparisons of inward and outward foreign direct investment

(a) Inward FDI Stock/GDP in 2000 (%)

Japan	USA	UK	Germany	France	South Korea	China
1.1	12.4	30.5	24.1	19.9	13.7	32.3

(b) Outward FDI Stock/GDP in 2000 (%)

Japan	USA	UK	Germany	France	South Korea	China
5.8	13.2	63.2	25.2	33.4	11.1	2.4

(c) Foreign-affiliated companies' share in total manufacturing sector fixed asset formation in 1998 (%)

Japan	USA**	UK	Germany**	France	South Korea**	China**
2.3		33.8		34.9		

(d) Foreign-affiliated companies' share in manufacturing sector employment in 1998 (%)

Japan	USA***	UK	Germany	France	South Korea**	China**
0.9	10.5	27.3	6.0	27.8		

Sources: UNCTAD *World Investment Report 2002 ;* OECD *Measuring Globalization 200*
* As a rule, "foreign-affiliated companies" here are those which are more than half foreign-owned.
** Data unavailable.
*** 1992 employment data (based on Ito and Fukao 2003a; 2003b)

Figure 2.2 Inward and outward foreign direct investment and domestic employment in Japan

Japan

Legend:
- Ratio of workers employed by foreign-affiliated companies to domestic employment: Japan
- Ratio of workers employed by Japanese-affiliated companies overseas to domestic employment: Japan
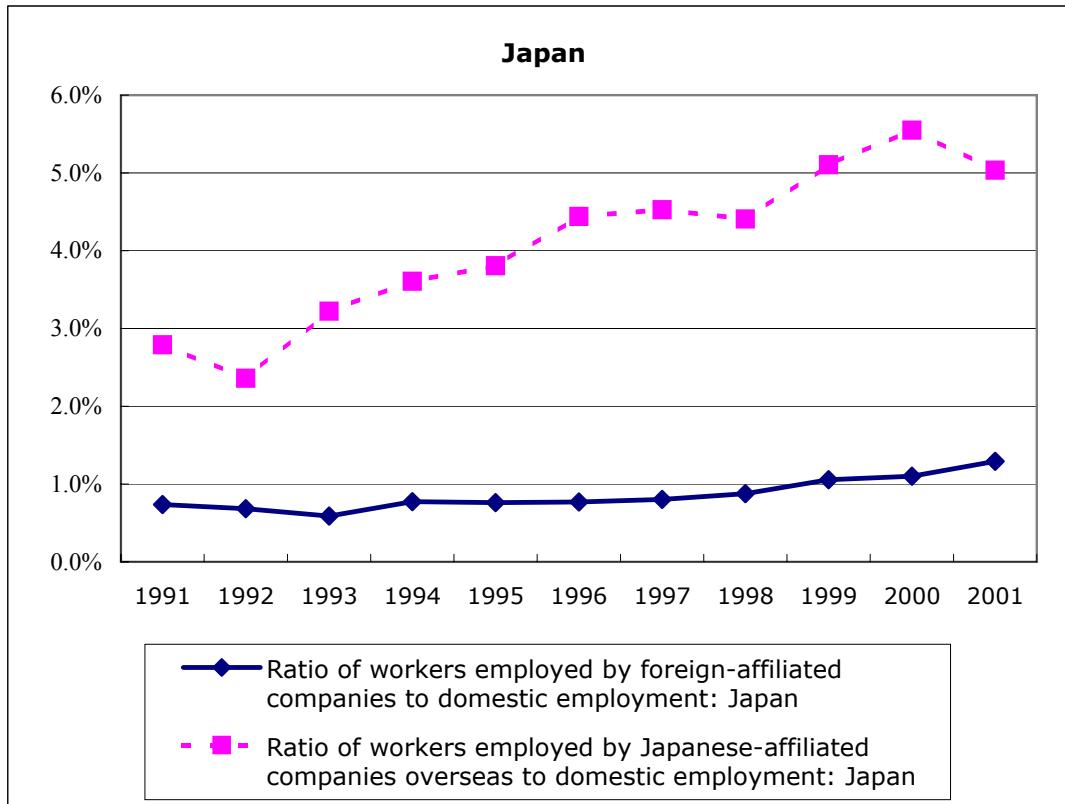
Notes:

The data on workers employed by foreign-affiliated companies in Japan for 1996 are taken from Ito and Fukao (2003a, 2003b). The data for other years are calculated using the 1996 data and the growth rate of foreign-affiliated firms' employment reported in METI (2003).

The data on workers employed by Japanese companies abroad for 1996 are taken from Ito and Fukao (2003a, 2003b). The data for other years are calculated using the 1996 data and the growth rate of Japanese-affiliated firms' employment reported in METI (2002).

Foreign affiliates of Japanese firms are defined as firms with more than a 10% Japanese ownership. Japanese affiliates of foreign firms are defined as firms with 33.4% or more foreign ownership.

Figure 2.3 Trends in FDI inflows in Japan by industry (notification basis)

(bil. yen)

Legend:
- Non-manufacturing, other
- Finance, insurance
- Telecommunications
- Shipping
- Services, other
- Trading
- Real estate
- Construction
- Manufacturing, other
- Machinery
- Metals
- Glass, ceramic, stone, and clay products
- Petroleum
- Chemicals
- Rubber and leather products
- Textiles
- Foods

Source: Japan Ministry of Finance <www.mof.go.jp>.

Table 2.1 Japan's international transactions : FDI vs. cross-border trade

<Panel A> Manufacturing sector

Fukao-Ito Code	Industry	Inward				Outward		
		Ratio of no. of workers employed by JAFF to total no. of domestic workers 1996 (%)	Ratio of no. of workers employed by JAFF to total no. of domestic workers 2001 (%)	Ratio of imports to total domestic output 1995 (%)	Ratio of imports to total domestic output 2000 (%)	Ratio of no. of workers employed by FAJF to total no. of domestic workers 1996 (%)	Ratio of exports to total domestic output 1995 (%)	Ratio of exports to total domestic output 2000 (%)
201-204	Food products	0.11	0.28	12.19	14.62	5.03	0.48	0.55
205	Beverages & tobacco	1.91	1.45	4.90	8.70	6.28	0.37	0.27
206	Prepared feed & fertilizers	0.16	0.13	0.89	10.70	6.51	0.08	0.59
207	Reeling plants & spinning mills	0.01	0.00	23.62	13.89	73.25	4.17	18.14
208	Woven & knit fabrics mills	0.00	0.00	13.59	13.89	18.73	26.21	18.14
209	Dyed & finished textiles	0.13	0.00	0.00	13.89	9.41	0.00	18.14
210	Other textile mill products	0.04	0.28	12.77	13.89	12.40	10.19	18.14
211, 212	Textile outer garments & apparel	0.20	0.21	27.83	64.21	7.48	0.62	1.09
213, 214	Sawmills & wood	0.00	0.01	22.54	31.81	2.32	0.16	0.20
215	Furniture & fixtures	0.06	0.09	6.59	12.84	0.66	1.00	1.46
216	Pulp & paper mills	0.02	0.09	8.19	7.99	8.28	2.74	3.51
217	Paper products	0.16	0.46	1.18	2.18	2.68	1.46	1.76
218-220	Publishing & printing	0.13	0.25	0.74	0.74	1.07	0.36	0.35
221	Industrial inorganic chemicals	3.66	3.48	9.58	12.22	16.58	1.11	8.53
222	Industrial organic chemicals	3.55	3.28	9.10	12.85	22.54	17.55	19.28
223	Oil products & detergents	1.96	2.97	4.44	9.45	61.86	3.36	15.93
224	Drugs & medicines	7.21	15.49	7.28	8.18	10.04	2.15	3.42
225	Toilet preparations & others	4.83	4.84	11.44	9.45	31.36	19.45	15.93
226	Petroleum refining	12.27	4.54	12.00	14.28	5.26	2.82	2.18
227	Petroleum & coal products	0.99	1.64	2.53	14.28	0.10	2.89	2.18
228	Plastic products	0.41	0.45	1.99	3.63	3.91	3.31	4.63
229	Tires & inner tubes	4.03	3.82	6.43	12.47	226.60	27.98	16.66
230	Rubber & plastic footwear	0.46	0.59	10.10	12.47	5.44	7.77	16.66
231	Leather products & fur skins	0.00	0.12	55.48	96.85	2.95	2.70	3.14
232	Glass & its products	1.24	1.13	5.60	8.91	43.99	10.70	14.17
233	Cement & its products	0.00	0.11	0.20	0.41	1.59	0.83	0.35
234	Clay, pottery & stone products	0.20	0.36	6.28	8.54	9.07	8.30	11.35
235	Blast furnace & basic steel	0.02	0.20	3.46	2.72	20.03	9.18	10.26
236	Iron & steel foundries	0.00	0.04	0.43	2.28	27.75	0.34	0.48
237	Nonferrous metals	4.37	1.34	108.04	100.38	16.81	7.42	12.84
238	Nonferrous rolling & castings	0.96	0.26	4.60	9.28	12.35	9.72	14.85
239	Fabricated structural metal	0.27	0.05	0.64	0.95	0.66	0.37	0.33
240	Miscellaneous metal work	0.35	0.31	2.78	3.86	2.74	5.00	5.92
241	Metal working machinery	0.97	0.33	2.42	9.37	8.17	24.90	35.74
242	Special industry machinery	2.16	3.54	5.19	9.37	13.65	27.14	35.74
243	Office & household machines	4.31	1.51	2.95	5.24	10.65	16.42	19.19
244	General industrial machinery	0.98	1.44	3.42	4.99	4.61	18.84	18.32
245	Electrical industrial machinery	1.38	0.81	6.12	12.39	6.82	22.79	29.20
246	Household electric appliances	0.52	0.60	3.19	12.52	147.76	5.01	23.03
247	Communication equipment	0.68	0.86	3.56	6.72	36.60	24.44	8.75
248	Electric equipment & computers	7.94	5.24	15.74	30.93	5.71	28.43	34.24
249	Electronic parts & devices	2.11	2.74	9.60	16.78	27.11	31.26	34.55
250	Miscellaneous electric equipment	3.13	4.92	7.57	6.34	31.52	24.80	31.29
251	Motor vehicles & parts	4.72	10.82	3.19	3.23	42.05	20.64	25.40
252	Miscellaneous transport equipment	4.56	0.63	9.12	12.47	6.02	28.02	37.60
253, 256	Miscellaneous precision instruments	0.65	1.28	14.65	27.36	7.43	17.13	30.63
254	Optical instruments & lenses	0.11	0.34	12.77	27.36	22.71	41.40	30.63
255	Watches, clocks & parts	0.00	0.00	42.62	27.36	30.77	40.75	30.63
257	Ordnance & accessories	0.00	0.00	8.07	27.24	0.00	0.13	10.72
258	Miscellaneous manufacturing	0.60	0.87	34.73	27.24	6.41	10.36	10.72
Manufacturing Total		**1.36**	**1.97**	**7.63**	**11.19**	**14.29**	**11.66**	**14.88**

Note: FAJF: Foreign Affiliates of Japanese Firms (10% or more Japanese-owned), JAFF: Japanese Affiliates of Foreign Firms (33.4% or more foreign-owned).

The ratio of imports to total domestic output and the ratio of exports to total domestic output for Japan are calculated based on the 104-sector input-output tables. The figures for these ratios will be revised when the input-output tables by detailed industry are available

Sources: Compiled from micro-data of the *Establishment and Enterprise Census* for 1996 and for 2001, MITI (1999); Japanese Government (1999, 2004

Table 2.1 Japan's international transactions : FDI vs. cross-border trade

--- Continued ---

<Panel B> Service sector

Fukao-Ito Code	Industry	Inward					Outward		
		Ratio of no. of workers employed by JAFF to total no. of domestic workers 1996	Ratio of no. of workers employed by JAFF to total no. of domestic workers 2001	Ratio of imports to total domestic output 1995	Ratio of imports to total domestic output 2000	FDI restrictiveness index (a frequency measure based on the GATS schedule) 1994	Ratio of no. of workers employed by FAJF to total no. of domestic workers 1996	Ratio of exports to total domestic output 1995	Ratio of exports to total domestic output 2000
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
301	Construction and civil engineering	0.05	0.06	0.34	0.56	0.00	0.70	0.70	0.81
302	Electricity	0.02	0.00	0.00	0.00	1.00	0.12	0.15	0.16
303	Gas supply	0.00	0.00	0.05	0.05	1.00	0.08	0.01	0.01
304	Steam and hot water supply	0.00	0.00	0.00	0.05	0.63	0.00	0.00	0.01
305	Water supply	0.00	0.00	0.02	0.01	0.25	0.00	0.11	0.10
306	Sewerage systems	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.10
307	Sanitary services	0.00	0.00	0.00	0.00	0.25	0.01	0.01	0.01
308	Wholesale trade	2.31	2.78	3.32	3.46	0.25	5.85	4.87	4.63
309	Retail trade	0.29	0.51	0.03	n.a.	0.25	0.66	0.05	n.a.
310	Financial intermediary services	1.47	3.86	2.98	0.97	0.50	13.37	1.78	1.04
311	Life insurance	1.46	8.36	2.60	0.97	0.50	3.28	0.09	1.04
312	Casualty insurance	3.97	18.14	1.87	0.97	0.50	18.41	2.41	1.04
313	Other insurance services	0.18	0.63	n.a.	0.97	0.00	n.a.	n.a.	1.04
314	Real estate	0.02	0.10	0.01	0.00	1.00	1.38	0.01	0.00
315	Railway transportation	0.00	0.00	1.30	2.01	1.00	0.01	0.30	0.48
316	Road passenger transportation	0.00	0.05	1.26	0.32	1.00	0.01	0.21	2.44
317	Road freight transportation	0.05	0.17	0.00	0.32	0.63	0.27	0.03	2.44
318	Water transportation	1.42	1.36	20.96	40.61	1.00	17.34	19.53	35.97
319	Air transportation	17.26	16.50	46.36	52.74	1.00	12.61	14.23	21.46
320	Storage facility services	0.41	0.26	0.00	0.00	0.25	5.18	0.01	2.55
321	Supporting services for transport	1.02	1.42	18.78	3.63	0.53	4.34	16.72	9.01
322	Postal service	0.00	0.00	0.35	0.67	1.00	0.00	0.43	0.28
323	Telecommunications	0.22	3.11	0.68	0.67	0.75	0.19	0.39	0.28
324	Broadcasting	0.21	0.36	0.00	0.00	1.00	0.52	0.00	0.00
325	Education	0.05	0.06	0.00	0.00	0.15	0.00	0.00	0.00
326	Research institutes (natural sciences)	2.95	8.83	1.71	0.32	1.00	0.00	1.14	0.18
327	Research institutes (soc. sci. & humanities)	0.00	0.10	2.15	0.32	0.00	0.00	1.25	0.18
328	Medical services	0.02	0.04	0.00	0.00	1.00	0.01	0.00	0.00
329	Health and hygiene	0.01	0.03	0.00	0.00	1.00	0.11	0.00	0.00
330	Private non-profit organization services	0.00	0.00	0.84	1.43	0.00	0.00	1.01	0.80
331	Advertising	1.20	3.05	4.85	1.43	1.00	3.23	1.47	1.58
332	Computer programming & software	1.97	3.10	1.42	1.43	0.00	1.02	0.66	1.58
333	Information services	1.63	2.53	6.77	1.43	0.25	40.74	3.33	1.58
334	Goods & equipment rental & leasing	0.95	1.22	2.33	1.13	0.17	3.65	1.06	0.88
335	Automobile renting	0.34	1.14	0.00	1.13	0.50	1.76	0.00	0.88
336	Automobile repairing	0.12	0.07	0.00	0.00	0.00	0.31	0.00	0.00
337	Machine repairing	2.23	1.21	0.00	0.00	0.25	0.49	0.00	0.00
338	Building maintenance services	0.01	0.92	0.00	3.52	0.50	0.23	0.00	2.04
339	Legal & accounting services	0.00	0.11	5.87	3.52	0.00	0.01	2.18	2.04
340	Civil eng. & construct. services	0.07	0.07	3.11	3.52	0.25	0.01	2.45	2.04
341	Personnel supply services	1.19	6.48	0.00	3.52	0.13	0.12	0.01	2.04
342	Other business services	0.67	2.37	3.02	3.52	0.63	2.98	2.10	2.04
343	Amusement & recreation services	0.13	1.01	1.62	2.00	0.35	0.52	0.20	0.33
344	Eating and drinking places	1.58	2.36	4.17	3.52	0.06	0.55	0.56	0.26
345	Hotels and lodging places	0.20	0.46	23.31	20.21	0.13	4.46	3.97	4.22
346	Individual education facilities	0.23		0.03	0.04	0.00	0.01	0.01	0.12
347	Other personal services	0.02	0.08	0.04	0.04	1.00	0.06	0.01	0.12
348	Agricultural services	0.00	0.00	0.00	0.00	0.50	0.18	0.00	0.00
349	Social insurance & welfare	0.02	0.00	0.00	0.00	1.00	0.00	0.00	0.00
350	Unclassified services	0.01	0.04	n.a.	n.a.	1.00	n.a.	n.a.	n.a.
Services Total		**0.65**	**1.14**	**2.11**	**2.05**	**0.49**	**1.89**	**1.48**	**1.67**

Note: FAJF: Foreign Affiliates of Japanese Firms (10% or more Japanese-owned), JAFF: Japanese Affiliates of Foreign Firms (33.4% or more foreign-owned).
The ratio of imports to total domestic output and the ratio of exports to total domestic output for Japan are calculated based on the 104-sector input-output tables. The figures for these ratios will be revised when the input-output tables by detailed industry are available.
Sources: Compiled from micro-data of the *Establishment and Enterprise Census* for 1996 and for 2001; Toyo Keizai Shinpo-sha (1996); Japanese Government (1999, 2004). Also see Ito and Fukao (2003a, 2003b)

Table 2.2. U.S. international transactions : FDI vs. cross-border trade

<Panel A> Manufacturing sector

Fukao-Ito Code	Industry	U.S. Inward		
		Ratio of no. of workers employed by USAFF to total no. of domestic workers 1992 (%)	Ratio of no. of workers employed by USAFF to total no. of domestic workers 1997 (%)	Ratio of imports to total domestic output 1992 (%)
201-204	Food products	10.46	8.33	5.21
205	Beverages & tobacco	8.99	8.64	5.37
206	Prepared feed & fertilizers	10.06	8.73	0.96
207	Reeling plants & spinning mills	8.57	11.45	3.94
208	Woven & knit fabrics mills	4.40	12.69	12.66
209	Dyed & finished textiles	6.32	5.76	12.66
210	Other textile mill products	12.55	5.85	13.28
211, 212	Textile outer garments & apparel	2.75	3.71	54.97
213, 214	Sawmills & wood	2.26	2.12	10.98
215	Furniture & fixtures	3.71	3.28	12.74
216	Pulp & paper mills	9.23	11.29	14.00
217	Paper products	6.95	8.60	2.46
218-220	Publishing & printing	6.56	7.83	1.81
221	Industrial inorganic chemicals	22.79	24.41	13.24
222	Industrial organic chemicals	36.49	28.32	13.24
223	Oil products & detergents	19.23	17.87	4.65
224	Drugs & medicines	33.30	31.90	21.17
225	Toilet preparations & others	20.32	17.39	6.33
226	Petroleum refining	26.79	25.06	8.53
227	Petroleum & coal products	17.81	17.82	0.65
228	Plastic products	10.41	10.03	10.58
229	Tires & inner tubes	51.07	44.86	22.71
230	Rubber & plastic footwear	13.36	25.99	10.58
231	Leather products & fur skins	5.29	3.31	134.45
232	Glass & its products	22.13	28.18	12.01
233	Cement & its products	19.39	18.53	2.12
234	Clay, pottery & stone products	18.07	19.80	27.94
235	Blast furnace & basic steel	23.86	18.93	17.96
236	Iron & steel foundries	9.97	20.31	5.72
237	Nonferrous metals	19.01	20.85	20.01
238	Nonferrous rolling & castings	14.03	6.59	7.09
239	Fabricated structural metal	6.30	6.86	1.26
240	Miscellaneous metal work	7.65	7.71	9.38
241	Metal working machinery	6.85	6.30	34.66
242	Special industry machinery	16.18	13.64	19.40
243	Office & household machines	13.11	13.71	18.79
244	General industrial machinery	9.36	14.79	16.32
245	Electrical industrial machinery	17.03	19.13	18.53
246	Household electric appliances	20.10	15.81	82.65
247	Communication equipment	19.26	13.08	12.31
248	Electric equipment & computers	9.24	9.25	53.50
249	Electronic parts & devices	12.65	12.80	28.92
250	Miscellaneous electric equipment	13.36	17.64	31.19
251	Motor vehicles & parts	11.74	15.60	34.24
252	Miscellaneous transport equipment	3.43	4.23	11.48
253, 256	Miscellaneous precision instruments	13.99	11.07	16.78
254	Optical instruments & lenses	14.27	11.50	33.06
255	Watches, clocks & parts	14.23	15.76	360.39
257	Ordnance & accessories	12.36	9.49	3.64
258	Miscellaneous manufacturing	8.68	6.79	57.72
Manufacturing Total		**11.01**	**10.78**	**16.89**

Note: USAFF: U.S. Affiliates of Foreign Firms (10% or more foreign-owned)
Sources: U.S. Department of Commerce (1995a, 1995b, 2003). Also see Appendix.

Table 2.2. U.S. international transactions : FDI vs. cross-border trade   *-- continued --*

\<Panel B\> Service sector

Fukao-Ito Code	Industry	U.S. Inward		
		Ratio of no. of workers employed by USAFF to total no. of domestic workers 1992	Ratio of no. of workers employed by USAFF to total no. of domestic workers 1997	Ratio of imports to total domestic output 1992
		(%)	(%)	(%)
301	Construction and civil engineering	1.97	1.72	0.04
302	Electricity	0.16	0.30	0.36
303	Gas supply	0.67	1.26	0.00
304	Steam and hot water supply	6.98	33.38	0.00
305	Water supply	8.69	7.51	0.00
306	Sewerage systems	8.69	33.38	0.00
307	Sanitary services	6.98	4.19	0.00
308	Wholesale trade	8.37	7.89	9.45
309	Retail trade	3.79	4.50	0.00
310	Financial intermediary services	6.62	6.10	0.25
311	Life insurance	14.34	7.61	0.49
312	Casualty insurance	14.34	7.61	0.49
313	Other insurance services	14.34	3.81	0.49
314	Real estate	1.97	1.64	0.00
315	Railway transportation	0.00	n.a.	3.63
316	Road passenger transportation	6.75	13.11	4.10
317	Road freight transportation	1.92	0.83	0.77
318	Water transportation	8.34	12.79	48.85
319	Air transportation	12.02	0.30	8.16
320	Storage facility services	1.92	11.32	0.77
321	Supporting services for transport	8.71	4.87	18.71
322	Postal service	0.00	n.a.	0.00
323	Telecommunications	0.37	9.39	3.36
324	Broadcasting	1.28	3.11	0.00
325	Education	6.44	2.32	0.84
326	Research institutes (natural sciences)	6.44	9.39	0.84
327	Research institutes (soc. sci. & humaniti	6.44	5.26	0.84
328	Medical services	2.72	1.99	0.00
329	Health and hygiene	2.72	1.99	0.00
330	Private non-profit organization services	0.00	n.a.	0.00
331	Advertising	7.55	5.27	0.44
332	Computer programming & software	4.08	3.88	0.18
333	Information services	4.08	3.88	0.18
334	Goods & equipment rental & leasing	5.36	5.03	0.00
335	Automobile renting	5.67	0.15	0.00
336	Automobile repairing	0.64	0.65	0.01
337	Machine repairing	2.88	4.37	0.00
338	Building maintenance services	7.85	4.46	0.00
339	Legal & accounting services	0.06	0.49	0.25
340	Civil eng. & construct. services	1.44	3.55	0.50
341	Personnel supply services	6.79	4.57	1.67
342	Other business services	4.10	7.69	0.45
343	Amusement & recreation services	4.32	2.44	0.24
344	Eating and drinking places	2.71	2.48	2.05
345	Hotels and lodging places	9.99	6.86	19.63
346	Individual education facilities	0.94	n.a.	0.00
347	Other personal services	1.27	2.59	0.04
348	Agricultural services	0.82	n.a.	0.10
349	Social insurance & welfare	n.a.	n.a.	n.a.
350	Unclassified services	n.a.	n.a.	n.a.
Services Total		**4.03**	**4.31**	**2.07**

Note: USAFF: U.S. Affiliates of Foreign Firms (10% or more foreign-owned)
Sources: U.S. Department of Commerce (1995a, 1995b, 2003). Also see Ito and Fukao (2003a, 2003b).

Table 3.1 "Entry" and "exit" of domestically-owned and foreign-owned firms in the manufacturing sector
(number of firms; figures in parentheses are total sales in billion yen)

Manufacturing	1994			2000		
	Total firms	Other firms	33.4% or more is owned by foreigners	Total firms	Other firms	33.4% or more is owned by foreigners
Total	13731 (250000)	13536 (238000)	195 (12200)	13486 (265000)	13250 (241000)	236 (23700)
Firms that "exited" in 1994-2000	4207 (34044)					
Breakdown of "exited" firms		4145 (31900)	62 (2124)			
Firms that "entered" in 1994-2000				3962 (32300)		
Breakdown of "entered" firms					3889 (31000)	73 (1221)
Firms that "stayed" in 1994-2000	9524 (216000)			9524 (233000)		
Breakdown of firms that "stayed" "Stayed" as domestically-owned		9330 (192200)			9330 (205700)	
"Stayed" as foreign-owned			102 (6785)			102 (8285)
Changed from domestically-owned to foreign-owned		61 (13800)				61 (14100)
Changed from foreign-owned to domestically-owned			31 (3215)		31 (4300)	

Table3.2. Distribution of foreign-owned firms by industry: Pooled data for 1994–2000

	Industry	Number of domestic firms	Number of Foreign firms			Number of firms
			(A) or (B)	(A) Majority-owned by one foreign firm	(B) 33.4% or more is owned by foreigners	
1	Foods	10968 (99.38)	68 (0.62)	39	65	11036 (100.00)
2	Textiles	6049 (99.74)	16 (0.26)	10	14	6065 (100.00)
3	Woods and furniture	2459 (99.72)	7 (0.28)	0	7	2466 (100.00)
4	Pulp and paper	3052 (99.74)	8 (0.26)	4	5	3060 (100.00)
5	Printing and publishing	5403 (99.59)	22 (0.41)	13	15	5425 (100.00)
6	Industrial chemicals and chemical fibers	2084 (93.66)	141 (6.34)	53	131	2225 (100.00)
7	Oils and paints	951 (98.14)	18 (1.86)	7	17	969 (100.00)
8	Drugs and medicines	1322 (91.17)	128 (8.83)	93	118	1450 (100.00)
9	Other chemical products	1657 (91.24)	159 (8.76)	86	141	1816 (100.00)
10	Petroleum and coal products	340 (87.86)	47 (12.14)	14	47	387 (100.00)
11	Plastic products	4512 (98.84)	53 (1.16)	19	44	4565 (100.00)
12	Rubber products	978 (98.39)	16 (1.61)	6	16	994 (100.00)
13	Ceramics	4070 (99.29)	29 (0.71)	11	24	4099 (100.00)
14	Iron and steel	2760 (99.89)	3 (0.11)	2	1	2763 (100.00)
15	Non-ferrous metals and products	2212 (98.53)	33 (1.47)	17	32	2245 (100.00)
16	Fabricated metal products	6862 (99.77)	16 (0.23)	11	10	6878 (100.00)
17	Metal working machinery	1815 (99.34)	12 (0.66)	3	10	1827 (100.00)
18	Special industry machinery	2767 (98.68)	37 (1.32)	22	27	2804 (100.00)
19	Office, service industry and household machines	1085 (98.55)	16 (1.45)	8	14	1101 (100.00)
20	Miscellaneous machinery and machine parts	5155 (97.63)	125 (2.37)	65	101	5280 (100.00)
21	Industrial electric apparatus	2798 (99.26)	21 (0.74)	3	19	2819 (100.00)
22	Household electric appliances	1180 (98.91)	13 (1.09)	6	10	1193 (100.00)
23	Communication equipment and related	2086 (98.86)	24 (1.14)	4	23	2110 (100.00)
24	Electronic data processing machine and electronic equipment	1386 (98.58)	20 (1.42)	14	17	1406 (100.00)
25	Electronic communication equipment and related products	4745 (98.34)	80 (1.66)	49	72	4825 (100.00)
26	Miscellaneous electrical machinery and supplies	1411 (97.38)	38 (2.62)	25	35	1449 (100.00)
27	Motor vehicles	6247 (98.66)	85 (1.34)	28	76	6332 (100.00)
28	Miscellaneous transportation equipment	1529 (98.14)	29 (1.86)	2	29	1558 (100.00)
29	Precision instruments	2340 (97.70)	55 (2.30)	35	46	2395 (100.00)
30	Other manufacturing	2301 (98.42)	37 (1.58)	31	20	2338 (100.00)
	Manufacturing	92524 (98.56)	1356 (1.44)	680	1186	93880 (100.00)

Figure 3.1 Histograms of firms' TFP level: Comparison between foreign-owned and domestically-owned firms.
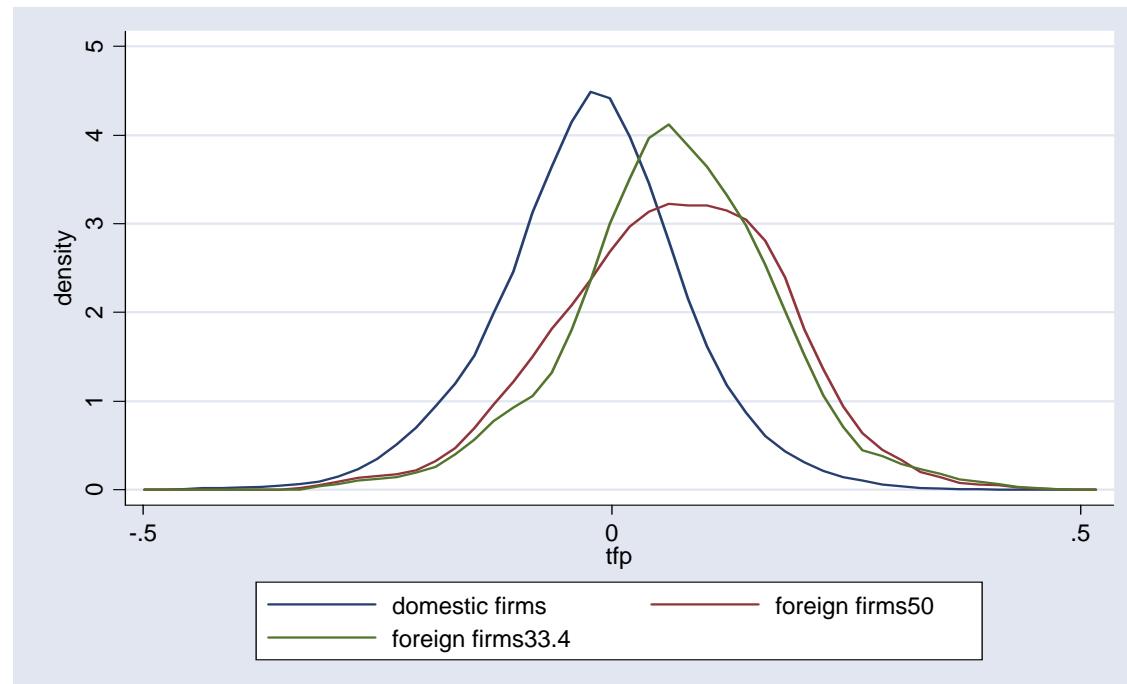
The number of pooled observations is 93880. The horizontal axis denotes the log value of firms' TFP level.

Table 3.3.a OLS estimation results: Comparison between foreign-owned (majority-owned by one foreign firm) and domestically-owned firms

	TFP level	Growth rate of TFP	Capital-labor ratio	R&D-sales ratio (%)	Current profit per worker (million yen per worker)
Foreign-ownership dummy (majority-owned by one foreign firm)	0.0773 *** (18.35)	0.0037 (1.09)	2.7577 *** (4.00)	0.0065 *** (5.80)	1.4956 *** (9.79)
_cons	-0.0524 *** (-21.29)	0.0025 *** (3.03)	8.5831 *** (51.93)	0.0038 *** (20.53)	0.6475 *** (18.76)
Industry dummy	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes
Industry dummy*Year dummy	yes	no	no	no	no
No. of observations	93880	70332	93880	93880	93880

	Current profit-sales ratio (%)	Growth rate of real assets	Wage level (million yen per worker)	Growth rate of workers	Labor productivity (million yen per worker)	Growth rate of real sales
Foreign-ownership dummy (majority-owned by one foreign firm)	0.0192 *** (6.36)	-0.0230 ** (-2.00)	1.2754 *** (18.52)	0.0003 (0.03)	16.2696 *** (7.91)	0.0121 (1.17)
_cons	0.0169 *** (20.13)	0.0477511 *** (12.79)	3.4736 *** (178.78)	-0.0042 ** (-2.13)	31.9526 *** (73.06)	0.0379 *** (17.51)
Industry dummy	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes
No. of observations	93880	70332	93880	70332	93880	70332

Notes) 1.Pooled data for 1994-2000 are used.
    2. The values in parentheses are t-statistics.
    3.*P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 3.3.b OLS estimation results: Comparison between foreign-owned (33.4% or more is owned by foreigners) and domestically-owned firms

	TFP level	Growth rate of TFP	Capital-labor ratio	R&D-sales ratio (%)	Current profit per worker (million yen per
Foreign-ownership dummy	0.0809 ***	0.0064 ***	5.7805 ***	0.0073 ***	2.1479 ***
(33.4% or more is owned by	(27.92)	(2.82)	(8.53)	(8.44)	(15.40)
_cons	-0.0525 ***	0.0024 ***	8.5550 ***	0.0037 ***	0.6392 ***
	(-21.33)	(2.99)	(51.76)	(20.41)	(18.52)
Industry dummy	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes
Industry dummy*Year dummy	yes	no	no	no	no
No. of observations	93880	70332	93880	93880	93880

	Current profit-sales ratio (%)	Growth rate of real assets	Wage level (million yen per worker)	Growth rate of workers	Labor productivity (million yen per worker)	Growth rate of real sales
Foreign-ownership dummy	0.0244 ***	-0.0090	1.3031 ***	-0.0061	25.177 ***	0.0089
(33.4% or more is owned by	(11.78)	(-1.01)	(25.39)	(-1.21)	(11.41)	(1.32)
_cons	0.0168 ***	0.0478 ***	3.4702 ***	-0.0042 **	31.8494 ***	0.0379 ***
	(20.04)	(12.79)	(178.77)	(-2.11)	(72.08)	(17.49)
Industry dummy	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes
No. of observations	93880	70332	93880	70332	93880	70332

Notes) 1. Pooled data for 1994-2000 are used.
    2. The values in parentheses are t-statistics.
    3.*P=.10, **P=.05, ***P=0.1 (two-tailed test).
    4. The industry dummy corresponding to the electronic data processing machine and electronic equipment industry is omitted.
    5. The year dummy corresponding to year 1994 is omitted.

Table 3.4 Descriptive statistics of the main variables used in the regression analysis

Variable	Number of observations	Average	Standard deviation	Minimum value	Maximum value
TFP level	93880	-0.0216	0.1022	-0.4905	0.5076
Growth rate of TFP	70332	0.0058	0.0634	-0.5430	0.6132
R&D investment-sales ratio	93880	0.0086	0.0202	0.0000	1.6391
No. of years passed since established	93880	36.6372	15.0046	0.0000	110.0000
(No. of years passed since established)^2	93880	1567.42	1159.86	0.0000	12100.00
Outsourcing ratio	93880	0.1071	0.1496	0.0000	9.8890
ln(Sales)	93880	8.4190	1.2958	4.8255	16.0220
(ln(Sales))^2	93880	72.5595	23.7767	23.2855	256.7040
Share of non-production workers in total workers	93880	0.3315	0.2492	0.0000	1.0000

Table 3.5 Estimation results: determinants of TFP level and TFP growth rate
Table 3.5a Dependent variable: TFP level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign-ownership dummy (majority-owned by one foreign	0.0521 *** (18.43)	0.0488 *** (17.26)			0.0031 (0.96)	0.0031 (0.96)		
Foreign-ownership dummy (33.4% or more is owned by			0.0480 *** (11.73)	0.0426 *** (10.47)			-0.0038 (-0.76)	-0.0038 (-0.76)
Ratio of non-production workers		0.0377 *** (29.79)		0.0379 *** (29.88)		0.0003 (0.24)		0.0003 (0.24)
R&D investment-sales ratio	0.2067 *** (7.02)	0.1518 *** (5.96)	0.2107 *** (7.07)	0.1556 *** (6.04)	-0.1208 *** (-7.69)	-0.1208 *** (-7.70)	-0.1207 *** (-7.69)	-0.1207 *** (-7.69)
No. of years passed since established	-0.0007 *** (-9.43)	-0.0008 *** (-10.45)	-0.0007 *** (-9.30)	-0.0007 *** (-10.34)	0.0004 *** (3.44)	0.0004 *** (3.44)	0.0004 *** (3.45)	0.0004 *** (3.45)
(No. of years passed since established)^2	0.0000 *** (5.82)	0.0000 *** (6.37)	0.0000 *** (5.46)	0.0000 *** (6.04)	0.0000 ** (-2.11)	0.0000 ** (-2.11)	0.0000 ** (-2.12)	0.0000 ** (-2.12)
Outsourcing ratio	0.0087 *** (4.14)	0.0064 *** (3.14)	0.0083 *** (3.96)	0.0060 *** (2.96)	-0.0030 (-1.58)	-0.0030 (1.58)	-0.0030 (-1.58)	-0.0030 (-1.58)
ln(Sales)	0.1339 *** (66.71)	0.1282 *** (63.96)	0.1330 *** (66.45)	0.1273 *** (63.71)	0.2418 *** (35.21)	0.2418 *** (35.20)	0.2417 *** (35.20)	0.2417 *** (35.19)
(ln(Sales))^2	-0.0056 *** (-51.26)	-0.0053 *** (-49.00)	-0.0055 *** (-50.86)	-0.0053 *** (-48.62)	-0.0073 *** (-18.20)	-0.0073 *** (-18.20)	-0.0073 *** (-18.19)	-0.0073 *** (-18.19)
Constant	-0.7592 *** (-80.81)	-0.7419 *** (-79.25)	-0.7561 *** (-80.65)	-0.7390 *** (-79.10)	-1.5198 *** (-50.53)	-1.5199 *** (-50.53)	-1.5195 *** (-50.52)	-1.5196 *** (-50.52)
Industry dummy	yes	yes	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes	yes	yes
Industry dummy*Year dummy	yes	yes	yes	yes	yes	yes	yes	yes
Firm dummy	no	no	no	no	yes	yes	yes	yes
Number of observations	93880	93880	93880	93880	93880	93880	93880	93880
Number of groups	-	-	-	-	19652	19652	19652	19652

Notes) 1.The values in parentheses are t-statistics.
2.*P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 3.5 Estimation results: determinants of TFP level and TFP growth rate
Table 3.5b Dependent variable: TFP level

US firm dummy	0.0538 ***	-0.0106	Foreign-ownership dummy	0.0258 ***	0.0036	
	(8.82)	(-1.49)	(0.1=<FO<0.334)	(8.25)	(1.36)	
European firm dummy	0.0470 ***	0.0002	Foreign-ownership dummy	0.0496 ***	0.0034	
	(7.84)	(0.03)	(0.334=<FO<0.5)	(8.03)	(0.52)	
Other country dummy	0.0144	0.0027	Foreign-ownership dummy	0.0537 ***	0.0035	
	(1.33)	(0.24)	(0.5=<FO)	(17.05)	(0.98)	
R&D investment-sales ratio	0.2103 ***	-0.1205 ***	R&D investment-sales ratio	0.1995 ***	-0.1211 ***	
	(7.06)	(-7.68)		(6.88)	(-7.71)	
No. of years passed since	-0.0007 ***	0.0004 ***	No. of years passed since	-0.0007 ***	0.0004 ***	
established	(-9.28)	(3.44)	established	(-9.29)	(3.49)	
(No. of years passed since	0.0000 ***	0.0000 **	(No. of years passed since	0.0000 ***	0.0000 **	
established)^2	(5.44)	(-2.11)	established)^2	(5.64)	(-2.19)	
Outsourcing ratio	0.0083 ***	-0.0030 ***	Outsourcing ratio	0.0087 **	-0.0030	
	(3.98)	(-1.59)		(4.14)	(-1.57)	
ln(Sales)	0.1330 ***	0.2418 ***	ln(Sales)	0.1366 ***	0.2420 ***	
	(66.46)	(35.21)		(67.66)	(35.21)	
(ln(Sales))^2	-0.0055 ***	-0.0073 ***	(ln(Sales))^2	-0.0057 ***	-0.0074 ***	
	(-50.86)	(-18.21)		(-52.42)	(-18.23)	
Constant	-0.7560 ***	-1.5199 ***	Constant	-0.7701 ***	-1.5208 ***	
	(-80.66)	(-50.53)		(-81.61)	(-50.52)	

Industry dummy	yes	yes	Industry dummy	yes	yes
Year dummy	yes	yes	Year dummy	yes	yes
Firm dummy	no	yes	Firm dummy	no	yes
Industry dummy*Year dummy	yes	yes	Industry dummy*Year dummy	yes	yes
Number of observations	93880	93880	Number of observations	93880	63584
Number of groups	-	19652	Number of groups	-	93880

Notes) 1.The values in parentheses are t-statistics.
　　　2.*P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 3.5 Estimation results: determinants of TFP level and TFP growth rate

Table 3.5c Dependent variable: growth rate of TFP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lagged TFP level	-0.2817 ***	-0.2792 ***	-0.2825 ***	-0.2800 ***	-0.8325 ***	-0.8324 ***	-0.8325 ***	-0.8324 ***
	(-86.60)	(-86.52)	(-86.69)	(-86.62)	(-223.08)	(-222.94)	(-223.08)	(-222.94)
Foreign-ownership dummy (majority-owned by one foreign	0.0145 ***	0.0155 ***			-0.0072	-0.0076		
	(4.56)	(4.92)			(-1.15)	(-1.21)		
Foreign-ownership dummy (33.4% or more is owned by			0.0173 ***	0.0180 ***			0.0027	0.0026
			(8.10)	(8.40)			(0.71)	(0.70)
Ratio of non-production workers	0.0074 ***		0.0073 ***		0.0021		0.0021	
	(7.58)		(7.52)		(1.36)		(1.37)	
R&D investment-sales ratio	0.0234 *		0.0224 *		-0.1276 ***		-0.1278 ***	
	(1.81)		(1.74)		(-7.37)		(-7.38)	
No. of years passed since established	-0.0004 ***	-0.0004 ***	-0.0004 ***	-0.0004 ***	0.0006 ***	0.0006 ***	0.0006 ***	0.0006 ***
	(-7.24)	(-6.88)	(-7.24)	(-6.88)	(4.72)	(4.72)	(4.71)	(4.72)
(No. of years passed since established)^2	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***
	(4.57)	(4.37)	(4.69)	(4.49)	(-3.09)	(-3.07)	(-3.08)	(-3.06)
Outsourcing ratio	-0.0006	-0.0002	-0.0005	-0.0001	-0.0076 ***	-0.0079 ***	-0.0076 ***	-0.0079 ***
	(-0.41)	(-0.17)	(-0.31)	(-0.06)	(-3.36)	(-3.46)	(-3.36)	(-3.46)
ln(Sales)	0.0421 ***	0.0426 ***	0.0425 ***	0.0431 ***	0.2369 ***	0.2361 ***	0.2369 ***	0.2361 ***
	(27.92)	(28.34)	(28.14)	(28.57)	(29.16)	(29.06)	(29.16)	(29.05)
(ln(Sales))^2	-0.0017 ***	-0.0017 ***	-0.0017 ***	-0.0018 ***	-0.0063 ***	-0.0063 ***	-0.0063 ***	-0.0063 ***
	(-21.82)	(-22.16)	(-22.10)	(-22.46)	(-13.40)	(-13.26)	(-13.40)	(-13.26)
Constant	-0.2250 ***	-0.2263 ***	-0.2268 ***	-0.2282 ***	-1.5209 ***	-1.5192 ***	-1.5209 ***	-1.5192 ***
	(-31.16)	(-31.34)	(-31.36)	(-31.56)	(-42.13)	(-42.06)	(-42.13)	(-42.06)
Industry dummy	yes	yes	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes	yes	yes
Firm dummy	no	no	no	no	yes	yes	yes	yes
Number of observations	70332	70332	70332	70332	70332	70332	70332	70332
Number of groups	-	-	-	-	16471	16471	16471	16471

Notes) 1.The values in parentheses are t-statistics.
  2.*P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 3.5 Estimation results: determinants of TFP level and TFP growth rate

Table 3.5.d Dependent variable: growth rate of TFP

lagged TFP level	-0.2796 ***	-0.8325 ***	lagged TFP level	-0.2806 ***	-0.8325 ***
	(-86.53)	(-223.07)		(-86.68)	(-223.08)
US dummy	0.0183 **	-0.0043	Foreign-ownership dummy	0.0089 ***	0.0046 *
	(3.93)	(-0.49)	(0.1=<FO<0.334)	(4.05)	(1.66)
European firm dummy	0.0147 ***	-0.0097	Foreign-ownership dummy	0.0173 ***	0.0073
	(3.21)	(-1.12)	(0.334=<FO<0.5)	(4.03)	(1.05)
Other country dummy	-0.0003	-0.0081	Foreign-ownership dummy	0.0184 ***	0.0019
	(-0.03)	(-0.52)	(0.5=<FO)	(7.60)	(0.45)
R&D investment-sales ratio	0.0335 **	-0.1275 ***	R&D investment-sales ratio	0.0297 **	-0.1281 ***
	(2.54)	(-7.36)		(2.27)	(7.40)
No. of years passed since established	-0.0004 ***	0.0006 ***	No. of years passed since established	-0.0004 ***	0.0006 ***
	(-6.92)	(4.73)		(-6.87)	(4.78)
(No. of years passed since established)^2	0.0000 ***	0.0000 ***	(No. of years passed since established)^2	0.0000	0.0000 ***
	(4.37)	(-3.09)		(4.42)	(3.19)
Outsourcing ratio	-0.0003	-0.0077 ***	Outsourcing ratio	-0.0001	-0.0076 ***
	(-0.17)	(-3.38)		(-0.07)	(-3.35)
ln(Sales)	0.0429 ***	0.2370 ***	ln(Sales)	0.0444 ***	0.2374 ***
	(28.41)	(29.17)		(28.78)	(29.20)
(ln(Sales))^2	-0.0017 ***	-0.0063 ***	(ln(Sales))^2	-0.0018 ***	-0.0064 ***
	(-22.27)	(-13.41)		(-22.83)	(-13.47)
Constant	-0.2271 ***	-1.521 ***	Constant	-0.2332 ***	-1.5223 ***
	(-31.40)	(-42.11)		(-31.72)	(-42.14)

Industry dummy	yes	yes	Industry dummy	yes	yes
Year dummy	yes	yes	Year dummy	yes	yes
Firm dummy	no	yes	Firm dummy	no	yes
Number of observations	70332	70332	Number of observations	70332	70332
Number of groups	-	16471	Number of groups	-	16471

Notes) 1.The values in parentheses are t-statistics.

    2.*P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 4.1 Number of out-in and in-in M&A cases

	Out-in M&A		In-in M&A
	Foreign-ownership dummy (33.4% or more is owned by foreigners)	Foreign-ownership dummy (majority-owned by one foreign firm)	
1994–1995	7	12	228
1995–1996	5	6	218
1996–1997	13	14	291
1997–1998	63	9	169
1998–1999	29	5	177
1999–2000	9	11	119
2000–2001	17	10	160
Total	143	67	1362

Table 4.2 What firms are chosen as M&A targets? Probit analysis

Dependent variable	Out-in M&A (based on 33.4% cut-off point)			Out-in M&A (based on majority ownership by one foreign firm)			In-in M&A		
ln(TFP t-1	1.466 (3.93) ***	0.956 (2.47) **	1.053 (2.22) **	1.930 (4.05) ***	1.525 (3.28) ***	1.542 (2.47) ***	-0.027 (-0.23)	0.129 (1.05)	0.195 (1.24)
TFP growth rate: ln(TFP)t-1- ln(TFP)t-2			-0.863 (-1.29)			-0.172 (-0.18)			-0.233 (-0.98)
ln(Number of workers)t-1	0.082 (3.16) ***	0.085 (3.23) ***	0.094 (3.20) ***	0.006 (0.20)	0.007 (0.23)	0.042 (1.25)	-0.064 (-5.19) ***	-0.055 (-4.42) ***	-0.047 (-3.28) ***
(Current profit/sales)t-1		1.631 (2.29) **	1.576 (1.97) **		1.250 (1.43)	1.836 (1.74) *		-0.065 (-1.26)	-0.058 (-1.17)
(Total liability/total asset ratio)t-1		-0.038 (-0.31)	-0.065 (-0.44)		-0.013 (-0.08)	0.005 (0.03)		0.271 (9.27) ***	0.291 (8.37) ***
Constant term	-3.901 (-16.19) ***	-3.932 (-14.97) ***	-4.457 (-13.22) ***	-3.298 (-12.21) ***	-3.336 (-10.33) ***	-4.201 (-9.52) ***	-1.680 (-21.82) ***	-1.929 (-23.28) ***	-2.046 (-21.22) ***
Industry dummy (30 industries)	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample size	78167	78165	58333	67242	67240	49204	81549	81547	62802
Log pseudo-likelihood	-922.34	-918.15	-728.55	-485.76	-484.40	-339.65	-6834.39	-6802.75	-4905.44

1. The values in parentheses are z-statistics.
2. *P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 4.3 Dynamic effects of M&A: effects two years later

Dependent variable	TFP growth rate: ln(TFP)t+1-ln(TFP)t-1				Growth rate of number of workers: from t-1 to t+1				Change of (Current profits/Sales): from t-1 to t+1			
Out-in M&A dummy (based on 33.4% cut-off point)	0.011 (1.56)				-0.004 (-0.17)				0.007 (1.34)			
Out-in M&A dummy (based on majority ownership by one foreign			0.022 (2.30)	**			-0.013 (-0.44)				0.017 (2.37)	**
In-in M&A dummy	0.004 (1.78)	*	0.004 (1.75)	*	0.004 (0.56)		0.004 (0.56)		0.001 (0.54)		0.001 (0.51)	
ln(TFP)t-1	-0.316 (-60.79)	***	-0.316 (-60.78)	***	0.148 (8.27)	***	0.148 (8.27)	***	0.071 (4.31)	***	0.071 (4.31)	***
ln(number of workers)t-1	0.007 (23.65)	***	0.007 (23.67)	***	-0.022 (-27.98)	***	-0.022 (-28.00)	***	-0.001 (-3.35)	***	-0.001 (-3.34)	***
(Current Profit/Sales)t-1	-0.042 (-2.30)	**	-0.042 (-2.30)	**	0.111 (1.54)		0.111 (1.54)		-0.871 (-10.67)	***	-0.871 (-10.67)	***
(R&D/sales)t-1	0.216 (9.66)	***	0.216 (9.67)	***	0.089 (1.99)	**	0.089 (1.99)	**	0.140 (7.92)	***	0.140 (7.92)	***
Dummy for firms which do not report R&D expenditure in t-1	-0.003 (-3.72)	***	-0.003 (-3.73)	***	0.004 (2.36)	**	0.004 (2.37)	**	0.000 (-0.18)		0.000 (-0.19)	
(Total liability/total asset)t-1	-0.002 (-1.36)		-0.002 (-1.36)		-0.015 (-3.16)	***	-0.015 (-3.16)	***	-0.038 (-7.01)	***	-0.038 (-7.01)	***
(Sales/number of workers)t-1					0.000 (6.44)	***	0.000 (6.44)	***				
Constant term	-0.026 (-9.36)	***	-0.026 (-9.37)	***	0.127 (15.20)	***	0.127 (15.21)	***	0.061 (8.09)	***	0.061 (8.09)	***
Industry dummy (30 industries)	yes				yes				yes			
Year dummy	yes				yes				yes			
Sample size	62804				62804				62804			

1. The values in parentheses are t-statistics based on White's method.
2. *P=.10, **P=.05, ***P=0.1 (two-tailed test).

Table 4.4 Dynamic effects of M&A: effects three years later

Dependent variable	TFP growth rate: ln(TFP)t+2- ln(TFP)t-1				Growth rate of number of workers: from *t* -1 to *t* +2				Change of (Current Profit/Sales): from t-1 to t+2			
Out-in M&A dummy (based on 33.4% cut-off point)	0.017 (2.05)	**			-0.001 (-0.05)				0.008 (1.16)			
Out-in M&A dummy (based on majority ownership by one foreign			0.018 (1.66)	*			-0.032 (-0.64)				0.016 (1.90)	*
In-in M&A dummy	0.010 (3.59)	***	0.010 (3.59)	***	0.014 (1.81)	*	0.015 (1.84)	*	0.000 (0.08)		0.000 (0.05)	
ln(TFP)t-1	-0.369 (-72.08)	***	-0.369 (-72.08)	***	0.189 (8.72)	***	0.189 (8.73)	***	0.063 (4.76)	***	0.063 (4.76)	***
ln(number of workers)t-1	0.009 (24.71)	***	0.009 (24.73)	***	-0.030 (-29.28)	***	-0.030 (-29.29)	***	-0.001 (-3.08)	***	-0.001 (-3.07)	***
(Current Profit/Sales)t-1	-0.031 (-2.64)	***	-0.031 (-2.64)	***	0.119 (1.41)		0.119 (1.41)		-0.903 (-13.64)	***	-0.903 (-13.64)	***
(R&D/sales)t-1	0.238 (7.81)	***	0.238 (7.81)	***	0.220 (3.32)	***	0.220 (3.33)	***	0.128 (6.30)	***	0.128 (6.29)	***
Dummy for firms which do not report R&D expenditure in t-1	-0.003 (-3.48)	***	-0.003 (-3.49)	***	0.009 (4.08)	***	0.009 (4.08)	***	-0.001 (-0.92)		-0.001 (-0.92)	
(Total liability/total asset)t-1	0.000 (-0.23)		0.000 (-0.25)		-0.020 (-3.17)	***	-0.019 (-3.17)	***	-0.038 (-7.05)	***	-0.038 (-7.05)	***
(Sales/number of workers)t-1					0.000 (6.18)	***	0.000 (6.44)	***				
Constant term	-0.051 (-17.30)	***	-0.051 (-17.32)	***	0.178 (17.11)	***	0.178 (17.11)	***	0.060 (9.14)	***	0.060 (9.14)	***
Industry dummy (30 industries)	yes				yes				yes			
Year dummy	yes				yes				yes			
Sample size	49556				49556				49556			

1. The values in parentheses are t-statistics based on White's method.
2. *P=.10, **P=.05, ***P=0.1 (two-tailed test).

Appendix Table 1. Determinants of the sales of U.S. firms' foreign affiliates: cross-country estimation based on gravity models (OLS estimation)

\<Panel A\>

	Dependent variables: ln (Sales by affiliates)					
	Nonbank affiliates of nonbank US parents				Nonbank MOFAs[a]	
	Manufacturing, 1994	Manufacturing, 2001	Non-manufacturing, 1994	Non-manufacturing, 2001	Sales of services, 1994	Sales of services, 2001
ln GDP	1.028	0.885	0.631	0.621	0.440	0.610
	(7.78)***	(9.84)***	(5.67)***	(8.19)***	(2.80)**	(3.90)***
ln (per capita GDP)	0.258	0.368	0.410	0.402	0.764	0.420
	(1.76)*	(2.95)***	(2.83)***	(3.57)***	(5.67)***	(3.58)***
ln (distance from U.S.)	-0.247	-0.201	-0.146	-0.202	-0.431	-0.383
	(-0.87)	(-0.86)	(-0.78)	(-1.22)	(-2.96)***	(-2.73)**
Japan dummy	-1.041	-0.714	-0.197	-0.079	0.009	0.016
	(-2.64)**	(-2.68)**	(-0.63)	(-0.33)	(0.02)	(0.04)
Language dummy	0.012	0.150	0.568	0.812	0.076	0.620
	(0.03)	(0.48)	(1.81)*	(3.73)***	(0.18)	(2.00)*
_cons	-4.067	-1.431	4.098	5.233	6.773	5.736
	(-1.09)	(-0.70)	(1.60)	(3.42)***	(1.46)	(1.22)
No. of observations	42	49	39	48	28	30
R-squared	0.815	0.768	0.768	0.761	0.789	0.735
Root MSE	0.921	0.841	0.724	0.708	0.794	0.723

\<Panel B\>

	Dependent variables: ln (Capital outflows)			
	Manufacturing, 1994-98 average	Manufacturing, 1999-2002 average	Non-Manufacturing, 1994-98 average	Non-Manufacturing, 1999-2002 average
ln GDP	0.864	0.919	0.550	0.525
	(6.34)***	(6.02)***	(3.73)***	(4.02)***
ln (per capita GDP)	0.119	0.341	0.292	0.490
	(0.74)	(1.89)*	(2.21)**	(2.88)***
ln (distance from U.S.)	-0.636	-0.184	-0.371	-0.278
	(-2.46)**	(-0.53)	(-1.61)	(-1.09)
Japan dummy	-1.895	-2.417	-0.720	-0.071
	(-5.07)***	(-4.96)***	(-1.45)	(-0.14)
Language dummy	0.467	0.569	0.941	1.002
	(1.29)	(1.26)	(2.97)***	(2.70)**
_cons	1.250	-5.895	6.237	4.555
	(0.47)	(-1.18)	(1.40)	(1.70)*
No. of observations	48	41	46	41
R-squared	0.537	0.599	0.470	0.560
Root MSE	1.250	1.254	1.137	1.154

[a] Nonbank MOFAs refers to nonbank Majority Owned Foreign Affiliates.

Notes: The numbers in parentheses are t-statistics based on White's robust standard errors (White 1980).

*P=.10, **P=.05, ***P=.01

GDP and per capita GDP are in current U.S. dollars.

Sources: Authors' calculations.