International Production/Distribution Networks in East Asia and Domestic Operations: Evidence from Japanese Firms<sup>\*</sup>

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#### 1. Introduction

In East Asia, international production/distribution networks began to be formulated in the 1990s and further developed in recent years, which was accompanied by drastic increases in vertical back-and-forth transactions of parts and components.<sup>1</sup> Japanese firms have been major players in the networks. Since the late 1990s in particular, Japanese investment in East Asia has accelerated; as Figure 1 describes, an upward trend is vividly observed for direct investment position of Japan in East Asia based on the balance of payments statistics. Moreover, a predominant portion of the investment is in manufacturing sectors; the manufacturing share of Japanese direct investment position for 2006 is 72 percent for East Asia as a whole, 78 percent for China, 82 percent for the Association of Southeast Asian Nations (ASEAN) 4 including the Philippines (86 percent), Indonesia (77 percent), Thailand (79 percent), and Malaysia (89 percent), and 57 percent for Newly Industrializing Economies (NIEs) 4 including Taiwan (73 percent), Korea (59 percent), Singapore (64 percent), and Hong Kong (30 percent).

## == Figure 1==

Outsourcing and off-shoring in lower-income countries by multinational enterprises (MNEs) raise concerns about activities in high-income countries. A popular argument claims that domestic employment and operations may shrink due to the relocation of economic activities taking advantage of a large wage gap between developed and developing countries. In particular, the fear of losing jobs, in both manufacturing and services sectors, and possible disruptive effects on wealthier society seem to be strong in journalistic as well as intellectual literature in Europe and North America.<sup>2</sup> However, even in the case when foreign direct investment (FDI) is pursuing inexpensive labor in developing countries, the effect of FDI on domestic operations is not necessarily negative; it depends on to what extent the cost reduction through FDI

<sup>&</sup>lt;sup>1</sup> See Kimura and Ando (2005), Ando and Kimura (2006), Ando (2006), and Kimura (2006) for empirical analyses and established facts on production/distribution networks in East Asia. For theoretical framework for production sharing, see the fragmentation theory; Jones and Kierzkowski (1990) and Arndt and Kierzkowski (2001).

<sup>&</sup>lt;sup>2</sup> See for example Samuelson (2004) and Blinder (2006).

allows the firm to strengthen its competitiveness and whether the firm maintains activities at home that are complementary to operations abroad, sometimes further shifting their activities to the procurement of specialized parts and components, headquarters functions, and the development of new products. Figure 2 illustrates an example of complementary operations. When a firm realizes cost reduction by fragmentation with FDI in lower income countries, for instance, it may be able to sell more products at cheaper prices than before. Larger sales requires an increase in the production of both final goods and intermediate inputs including specialized parts and components (P&C), as well as larger research and development (R&D) activities for new products and more extensive headquarter (HQ) services. If the firm shifts home activities to those that are complementary to activities abroad, it would rather expand domestic employment even if it might reduce employment in assembly lines.

# == Figure 2 ==

As Becker, Ekholm, Jackle, and Muendler (2005) address, the effect of FDI on labor market at home is inherently an empirical issue. Their analysis of German MNEs for 2000 and Swedish MNEs for 1998 finds that affiliate employment abroad tends to substitute for parent employment. Blomstrom, Fors, and Lipsey (1997) demonstrate that affiliate production in developing countries has a stronger negative effect on parent employment in the U.S. for 1989, while Swedish parents employ more labor at home for 1970-1994.<sup>3</sup> Rather than focusing on MNEs only as in the previous literature including above-mentioned studies, Federico and Minerva (2008) assess the impact of Italy's outward FDI in the period between 1996 and 2001, comparing employment growth at home, relatively to the national industry average.

Japan has for long been a typical country with "hollowing-out (Kūdōka)"

<sup>&</sup>lt;sup>3</sup> See Brown and Spletzer (2005) for the relationship between off-shoring and mass layoffs in the U.S. The recent study by Ebenstein, Harrison, McMillan, and Phillips (2009) links industry-level data on offshoring activities of U.S. MNEs, import penetration, and export shares with individual level worker data and measures the impact on the wages of domestic workers. They find that offshoring to high wage countries is positively correlated with U.S manufacturing employment while offshoring to low wage countries is negatively associated.

concerns since the mid-1980s, reflecting the rapid development of international division of labor in East Asia. In particular, Japan is located in the neighborhood of extremely attractive China and has recently been expanding manufacturing operations there. Fukao and Amano (2004) provide an extensive literature survey on the effect of outward FDI by Japanese firms on skill composition in labor demand at home at the macro level, at the industry level,<sup>4</sup> and at the firm level, suggesting possible job creation or at least job retainment on the side of skilled labor with globalizing corporate activities.<sup>5</sup> At the same time, they emphasize the importance of further comprehensive research at the firm level.

The paper attempts to investigate globalizing activities of Japanese firms, with a particular emphasis on East Asia, and their domestic operations by using comprehensive firm-level panel data including both firms with and without operations abroad, unlike most of the previous studies using data only for MNEs. More specifically, we compare domestic operations of firms expanding foreign operations with those of firms not expanding foreign operations. How do firms expanding foreign operations differ, compared with other firms, in reorganizing domestic operations in terms of employment, establishments and affiliates at home, and export/import activities? In doing so, we also examine both cases that include firms who expand foreign operations with their first FDI during the sample period and that do not, in order to see whether any difference exists among globalizing firms, depending

<sup>&</sup>lt;sup>4</sup> Also see Ito and Fukao (2005) for the analysis at the detailed industry level. They use the share of vertical intra-industry trade as a broad outsourcing measure and find that vertical intra-industry trade, particularly vertical intra-industry trade with Asia, raises the skill intensity calculated as the share of those working as professional and technical or managerial and administrative in the period of 1988-2000. This may reflect the fact that vertical FDI in Asia consists of the transfer of low-skilled production work to the region while high-skilled employees remain at home. They address that Japanese manufacturing industries realized skill upgrading as a result of the international division of labor with Asian economies.

<sup>&</sup>lt;sup>5</sup> Head and Ries (2002) investigate the influence of offshore production by Japanese multinationals on domestic skill intensity at the firm level, using Toyo Keizai's survey on Japanese Overseas Investment 1992-1993 (1070 firms), and find that additional foreign affiliate employment in low-income countries raise skill intensity expressed as non-production share of the wage bill at home. For other studies on the effect of offshoring on the skill composition of domestic labor demand at the firm level, see Ekholm and Hakkala (2006) with evidences from Sweden and Hijzen, Gorg, and Hine (2005) with evidences from the United Kingdom.

on conducting their first FDI or not.<sup>6</sup> By analyzing these patterns, we would like to discuss whether the hollowing-out of industries exists directly due to globalizing activities, whether domestic operations and foreign operations are substitutive or complementary, and whether trade and FDI are substitutes or complements at the firm level. In particular, we are interested in the implication of production fragmentation, typically in machinery industries, for retaining domestic operations through assigning different activities at home and abroad.

The rest of this paper is organized as follows: section 2 provides data description of micro data employed in our paper and descriptively examines patterns of globalizing activities of Japanese firms and their domestic operations. Then, section 3 quantitatively investigates those patterns, employing logit and ordinary least squares (OLS) regression analyses, and section 4 concludes.

## 2. Japanese investment in East Asia at the firm level: overview

#### 2.1 Data description

The analysis in sections 2 and 3 is based on the firm-level statistics, which is conducted by the Ministry of Economy, Trade, and Industry (METI), Government of Japan (the former name was the Ministry of International Trade and Industry (MITI)): *The Basic Survey of Business Structure and Activity*. This database provides detailed information on (parent) firms located in Japan as well as the number, industry, and regional location of their foreign affiliates with no less than 20 percent Japanese ownership. Note that the location of foreign affiliates is not identified on the country basis; the questionnaires from *the 1997F/Y Basic Survey* include only East Asia, North America, and Europe as regional categories.<sup>7</sup>

The samples in the survey cover firms with more than 50 workers, capital of

<sup>&</sup>lt;sup>6</sup> Hijzen, Inui, and Todo (2007) investigate the causal effect of becoming a multinational or establishing the first foreign affiliate during the sample period between 1995 and 2002, on home performance, by adopting propensity matching techniques in combination with a difference-in-difference estimator. They find that Japanese outward FDI tends to strengthen the economic activities in terms of output and employment, but not productivity.

<sup>&</sup>lt;sup>7</sup> "East Asia" includes all Asian countries east of Pakistan. Note that Japanese FDI to South Asia is pretty small in this period.

more than 30 million yen, and establishments in mining, manufacturing, wholesale/retail trade, and restaurants. Our industry classification is presented in Table A.1. Our study employs this survey for the latest available seven years containing the data from 1998 to 2004.

#### 2.2 Characteristics of Japanese firms investing in East Asia

This subsection investigates globalizing patterns of Japanese firms, with a particular emphasis on firms investing in East Asia. To shed light on the features for East Asia, we compare them with firms investing in North America and Europe. Table 1 presents the number of 1) all sized firms and 2) small and medium enterprises (SMEs) with affiliates in East Asia/North America/Europe and the number of affiliates in East Asia/North America/Europe by the industry of parent firms and by the industry of affiliates.<sup>8</sup> In 2004, 4,590 out of 28,340 firms located in Japan (in the data set) have affiliates abroad. Among them, 3,847 firms have affiliates in East Asia. That is, over 80 percent of the Japanese firms going abroad have at least one affiliate in East Asia.

== Table 1 ==

Japanese manufacturing parent firms, particularly machinery parent firms, are active investors in East Asia; almost 70 percent of the Japanese firms with affiliates in East Asia are in the manufacturing sector and close to half of them are in machinery industries. Moreover, Japanese manufacturing affiliates, regardless of the industries of their parent firms, account for 61 percent of the total Japanese affiliates in the region, while 39 percent for North America and 34 percent for Europe.

A parent firm often conducts various types of operations at the same time and establishes foreign affiliates in order to conduct a subset of those activities.<sup>9</sup> Japanese manufacturing parent firms have 73 percent of their total affiliates in East Asia in the manufacturing sector. The corresponding portion is even higher for manufacturing SMEs; 84 percent of their affiliates in East Asia are manufacturing. Such investment

<sup>&</sup>lt;sup>8</sup> SMEs are here defined as firms with regular workers of less than 300.

<sup>&</sup>lt;sup>9</sup> The industrial classification is based on the largest activities in terms of the value of sales. See Table A.2 in the Appendix for the sector matching between industries of parent firms and affiliates in terms of the number of affiliates.

patterns by SMEs reflect a typical strategy for firms involved in manufacturing activities, aimed at supplying intermediate goods for other firms and/or for their own affiliates and forming a critical mass of industrial clusters in the manufacturing sector. Japanese manufacturing parent firms also have non-manufacturing affiliates in East Asia (27 percent of total affiliates of manufacturing firms), particularly in the wholesales sector (18 percent) to establish distribution networks by internalizing wholesale trade activities.

In contrast with the case of East Asia, the share of manufacturing affiliates of manufacturing parent firms is low, and the share of their non-manufacturing affiliates is as high as 51 percent for the case of North America and 58 percent for the case of Europe. It indicates that Japanese manufacturing investment in North America or Europe aims at selling their products or producing goods to be sold there, rather than being involved in dense vertical production chains as is the case in East Asia.

Table 2 in turn presents globalizing patterns of Japanese firms in the two-period balanced panel data for 1998-2004. Although the expansion of globalizing activities at the firm level may be measured in various ways, this paper regards an increase in the number of foreign affiliates or affiliates in a specific region as the indication of globalizing activities.<sup>10</sup> During the six years, 12 percent of firms in all industries and 15 percent of manufacturing firms in the sample enlarge their activities aboard. Very close to these proportions, 11 percent of firms in all industries and 14 percent of manufacturing firms in the sample expand their operations in East Asia.<sup>11</sup> It suggests that most of the Japanese globalizing firms in the sample period enlarge their

<sup>&</sup>lt;sup>10</sup> Matsuura and Nagata (2005) investigate patterns of domestic job creation and destruction by Japanese firms by decomposing them into three types of firms, that is, those without foreign operations, those expanding operations abroad, and those shrinking operations abroad. They employ unbalanced panel data from 1991-2002 and use the number of workers of manufacturing affiliates abroad to distinguish those expanding operations abroad from those shrinking.

<sup>&</sup>lt;sup>11</sup> These ratios are lower for North America and Europe: 7 percent and 4 percent of the firms in all industries and 9 percent and 6 percent of manufacturing firms, respectively. In addition, most of these firms just start operations in these regions during the sample period, unlike the case of East Asia; the ratios for those expanding operations excluding those with first FDI in North America and Europe are less than 0.5 percent. Furthermore, almost all of them enlarge their activities in East Asia at the same time. See Table A.3 in the Appendix for the matrix between globalizing patterns in East Asia and other regions.

activities in East Asia, contributing to further development of production/distribution networks in East Asia, particularly in the manufacturing sector. This paper thus places a focus on their expanding activities, mainly manufacturing, in East Asia.

Interestingly, many firms that establish their affiliates for the first time in East Asia during the sample period are SMEs; the share of SMEs in terms of the number is 63 percent for all sectors and 62 percent for the manufacturing sector. Their active FDI certainly contributes to the development of vertical production chains in the region.

While some firms globalize their activities, how Japanese firms reorganize domestic operations? In the period 1998-2004, 60 percent of the firms in the balanced panel dataset reduce domestic employment, and aggregate employment in the domestic market drops, mainly in the manufacturing sector (Table 3). The shrinkage of employment has a gradual but steady trend in the manufacturing sector. Even in the manufacturing sector, however, the share of firms reducing domestic employment is relatively low for firms expanding operations in East Asia (61 percent), particularly those starting operations in East Asia (by establishing their first affiliate in the region during the sample period) (55 percent), compared with those retreating operations or remaining intact in East Asia (by withdrawing (some of) their affiliates or simply maintaining their affiliates in the region) (69 percent to 75 percent) and those without entry in the region (63 percent). The average growth rate of domestic employment at the firms level is not low for manufacturing firms expanding operations in East Asia than those not; the average growth rate at the firm level during the six years is 0.0 percent for those with expansion in East Asia as a whole (5.7 percent for firms conducting the first FDI in the region and -5.7 percent for the rest), while it is -2.1 percent for those without entry in East Asia, -8.5 percent and -16.3 percent (exit) for those with shrinkage, and -7.6 percent for those intact.<sup>12</sup>

<sup>&</sup>lt;sup>12</sup> In the following regression analysis of detecting the effect of expanding operations in East Asia on domestic operations, we conservatively use the other firms, including firms both with and without having affiliates in East Asia, as a control group. MNEs not expanding operations in East Asia (i.e., excluding non-MNEs) could also be a control group though the results are likely to be even stronger in such a case.

== Table 3 ==

Moreover, the share of firms reducing domestic employment is much lower for SMEs expanding operations in East Asia than for those not expanding activities in East Asia; for manufacturing SMEs, the ratios are 51 percent for SMEs expanding operations in East Asia (56 percent for those expanding further and 49 percent for those with the first FDI in the region) while 61 percent for those with no entry, 67 percent for those shrinking, 69 percent for those with exit, and 62 percent for those remaining. Furthermore, SMEs expanding operations in East Asia, including those in the manufacturing sector, have much higher average growth rates of domestic employment and indeed contribute to net domestic job creation at the aggregate level.<sup>13</sup>

Besides, firms establishing their first affiliates in East Asia during the sample period, regardless of whether manufacturing or not and whether SMEs or not, increase in the number of domestic establishments and domestic affiliates as well, rather than diminishing domestic operations. All of the above-mentioned features indicate that intensified globalizing activities of Japanese firms through FDI particularly in East Asia might be complements of domestic operations, rather than substitutes, and reduce direct negative impacts on employment, establishments, and affiliates at home. We need formal econometric analysis with a control of firm size and other variables to confirm these features.

3. Globalizing corporate activities and domestic operations at the firm level

This section quantitatively analyzes patterns of globalizing activities of Japanese firms, focusing on their domestic operations and transactions with foreign markets. Given the fact that most Japanese firms expanding operations abroad activate their operations in East Asia as discussed in the previous section, this section investigates how these firms with expanding activities in East Asia reorganize domestic

<sup>&</sup>lt;sup>13</sup> Large firms may reduce domestic operations by themselves and outsource some processes of productions to other firms, particularly SMEs. In that case, it would be more likely for SMEs to hire new employment at home, resulting in the increase in domestic employment for SMEs.

operations and export/import activities compared with other firms, employing logit/OLS regression analyses.

#### 3.1 Empirical method and data

The equation for our logit/OLS estimation analyses is as follows:

$$Y_{t_0}^{t} = \beta_0 + \beta_1 X_{t_0}^{t} + \beta_2 S_{t_0} + \beta_3 K L_{t_0} + \beta_4 E X_{t_0} + \beta_5 R D_{t_0} + \beta_6 A D_{t_0} + \beta_7 F C_{t_0} + \varepsilon,$$

where  $Y_{t_0}^t$  expresses a change in domestic operations or a change in export/import activities with East Asia from base year  $t_0$  to the targeted year t. As for domestic operations, 0/1 binary variables are used for a change in domestic employment, in the number of domestic establishments, and in the number of domestic affiliates;  $Y_{t_0}^t$  is one if a firm does not reduce domestic employment/the number of domestic establishments/the number of affiliates and is zero otherwise. Another variable for a change in domestic employment,  $Y_{t_0}^t$ , a growth rate of domestic employment, is also used. As for export/import activities with East Asia, a change in the ratio of exports to/imports from East Asia in total sales/purchases is applied;  $Y_{t_0}^t$  is a difference obtained by subtracting the ratio for the base year from the ratio for the targeted year.

 $X_{t_0}^t$  is a binary variable for expanding corporate activities in East Asia;  $X_{t_0}^t$  is one if a firm increases in the number of affiliates in East Asia from the base year to the targeted year and is zero otherwise.<sup>14</sup> Regarding domestic operations, if a firm increases (does not decrease) domestic employment/ the number of domestic establishments/the number of domestic affiliates with their globalizing activities, or their activities in East Asia are complements of domestic operations, the coefficient for  $X_{t_0}^t$  is going to be positive. In the case of transactions with East Asia, if a firm expanding operations in East Asia relatively intensifies transactions with that region, the coefficient for  $X_{t_0}^t$  is expected to be positive. In particular, if FDI and exports are complements rather than substitutes, the coefficient is expected to be positive. Although firms expanding operations in East Asia basically include those that start

<sup>&</sup>lt;sup>14</sup> Although the marginal impact of an increase in one (or more) affiliate(s) abroad may be different between large firms and SMEs, such a difference if any would be partially controlled in regression analyses with the size of firms as one of the control variables.

operations during the sample period in the region (wider definition), the case of firms expanding operations in East Asia excluding those firms (narrower definition) is also examined to check whether the results would significantly change or not.

Other independent variables are included as conventional control variables for the base year: the size of firm in terms of the number of regular workers in Japan (natural log)  $(S_{t_0})$ , the capital-labor ratio in terms of tangible assets per regular workers (natural log)  $(KL_{t_0})$ , the foreign sales ratio (in total sales)  $(EX_{t_0})$ , an in-house R&D expenditure ratio (in total sales)  $(RD_{t_0})$ , the advertisement expenditure ratio (in total sales)  $(AD_{t_0})$ , and the foreign capital ratio  $(FC_{t_0})$ ; these are all for domestic (parent) firms.<sup>15</sup> Note that to control industry characteristics, industry dummies according to the industry classification shown in Table A.1 in the Appendix are also included in all regression equations.

As discussed in section 2, the reorganization of domestic operations may be different according to the size of the firm. The variable of firm size is included to control such differences if at all. Capital-labor ratio, foreign sales, R&D expenditure, and advertisement expenditure are variables representing firm specific intangible assets. As a firm expanding operations abroad would have superior technology (or more capital-intensive technology), the coefficient for tangible assets per worker is expected to be positive. A firm's relatively large foreign sales would indicate that the firm is exposed to the global market and internationally competitive and may be significantly involved in production sharing activities. Therefore, the coefficient for the variable of foreign sales is expected to be positive, particularly for relatively strengthened export/import activities with East Asia. The expenditure to R&D and advertisement activities would imply a firm's intangible assets and technological competitiveness, and thus, the coefficient for these variables is expected to be positive. A variable for foreign capital is included to examine whether any significant difference exists between purely domestic firms and firms with (higher) foreign capital in Japan.

For each of dependent variables mentioned above, logit estimation analysis is conducted when they are binary variables measuring changes in domestic operations, while OLS estimation analysis is conducted when they are growth rates of domestic

<sup>&</sup>lt;sup>15</sup> The foreign capital ratio of a firm is denoted from zero to 1000: 10 times percentage of the ratio of foreign capital to total capital of a firm.

employment or a change in exports to/imports from East Asia as a share of total sales/purchases. In addition, the sample set is divided into manufacturing firms and non-manufacturing firms, considering that their FDI strategies would be different.

Our main analysis focuses on the period from 1998 (base year) to 2004 (targeted year), using the balanced panel dataset.<sup>16</sup> We set a change between 1998 and 2004 as a benchmark. A firm's decision on FDI and domestic reshuffling takes a long time. In order to plan FDI, it typically takes at least 2-3 years from a planning stage to the actual initiation of investment. After starting investment, another 2-3 years are needed to reach full operation. The accompanied adjustment in domestic operations is also likely to proceed gradually during these 4-6 years. Our exercise with 6-year changes should thus primarily be interpreted as a sort of contemporaneous, one-shot regression focusing on the association of changes in domestic operations with the expansion of East Asian operations. Some, however, may want to investigate the time lag structure of adjustments in foreign and domestic operations more in details. In order to check it, regressions with balanced panel datasets with different base years and targeted years are also demonstrated.

# 3.2 Empirical results

Tables 4 to 6 report results of logit regression analyses and OLS regression analyses for (a) manufacturing firms, (b) machinery firms, and (c) non-manufacturing firms. As Table 3 suggests, to control the size of firm must be crucial for our analysis. For manufacturing firms, the coefficient for the size of firm is negative and statistically significant in all equations for domestic operations. It indicates that Japanese manufacturing firms with larger employment size at home are more likely to diminish domestic operations in terms of domestic employment, domestic establishments, and domestic affiliates.

<sup>&</sup>lt;sup>16</sup> See Table A.4 for summary statistics and Table A.5 for correlation matrix of independent variables for two-period balanced data for 1998-2004. Notive that the portion of entry-exit firms is relatively small in Japan. If we could include the information on exit firms, however, our results on the globalizing activities would be even larger than the results presented in this paper since those firms should be included in the category of firms not expanding operations abroad.

== Table 4 == == Table 5 == == Table 6 ==

The coefficient for capita-labor ratio is statistically significant with a positive value in the analysis on domestic employment for manufacturing firms including machinery firms.<sup>17</sup> On the other hand, the corresponding coefficient is negative only in the analysis on domestic affiliates for machinery firms, though it is negative in both analyses on domestic establishments and affiliates for manufacturing firms as a while. These results suggest that Japanese manufacturing firms, in particular non-machinery manufacturing firms, with capital-intensive technology tend to keep or expand domestic employment and strengthen transactions with East Asia, while they tend to reshuffle domestic corporate organizations in terms of both domestic establishments and affiliates. What is interesting here is that machinery firms with capital-intensive technology tend to keep or expand domestic operations in terms of domestic establishments. Machinery firm are active investors in East Asia as well as one of important players in developing international production/distribution networks in the region.

Furthermore, for manufacturing firms including machinery firms, the coefficient for in-house R&D ratio is positive with statistical significance for domestic employment, regardless of whether the binary variable or the growth rate, and export activities with East Asia.<sup>18</sup> It implies that R&D intensive manufacturing firms are more likely to expand domestic operations in terms of employment at home and relatively intensify export activities with East Asia, probably because they succeed in

<sup>&</sup>lt;sup>17</sup> On the contrary, the coefficient for capital-labor ratio is negative with statistical significance for non-manufacturing firms, indicating that capital-intensive non-manufacturing firms tend to reduce domestic employment.

<sup>&</sup>lt;sup>18</sup> In the case of non-manufacturing firms for the analysis of domestic employment, the coefficient is positive and statistically insignificant for R&D expenditure ratio, while positive and significant for advertisement expenditure ratio, in contract with those for manufacturing firms. It suggests that advertisement-intensive non-manufacturing firms tend to keep or increase domestic employment.

reorganize competitive activities and strengthen their competitiveness.

Given the size of firm and other controls, our results provide several interesting insights. First, the expansion of operations in East Asia is positively associated with no decline in domestic employment and their growth rates with statistical significance for manufacturing firms once the size of firm is controlled. Interestingly, the coefficient is even larger for only machinery firms than for manufacturing firms in general when firms that conduct the first FDI in the region are excluded from the category of firms expanding foreign operations.<sup>19</sup> On the other hand, the coefficient is smaller and is not always statistically significant for non-manufacturing firms. These suggest that manufacturing firms expanding operations in East Asia, particularly in machinery sectors, are unlikely to reduce their domestic employment are likely to be higher than those for other manufacturing firms by as much as seven to eight percent during the six years (Tables 4 (2) and 5 (2)).

Since we regress six-year changes in domestic operations on the expansion of activities in East Asia in six years, some may have concern on a timing issue in the econometric analysis. We thus conduct casual robustness checks by employing each year's data. Table 7 reports the results of regression analysis on domestic employment for manufacturing firms, using various time-lag versions with one-year or two-year balanced panel data; the table presents only the results of the variable for the expansion in East Asia. As the table clearly shows, the positive association of domestic employment with the expansion of operations in East Asia is robust though the lag structure may differ across firms as well as sample periods.

#### == Table 7 ==

Although the total domestic employment in manufacturing sectors declines at the aggregate level, globalizing corporate manufacturing activities, particularly by machinery firms, tend to partially offset job destruction and sometimes even contribute to net job creation in the domestic market at the firm level. As discussed in the

<sup>&</sup>lt;sup>19</sup> The results do not change even when a variable for the expansion of manufacturing operations abroad is used.

introduction with Figure 2, a rise in domestic employment by Japanese manufacturing firms, in particular machinery firms, expanding operations in East Asia would partially reflect a need to expand domestic production of key parts and components to be exported to East Asia, to strengthen R&D activities for new products, or to intensify a specialization in headquarter services at home, as a result of active and effective fragmentation of production and specialization. The fragmentation with successful cost reduction would allow firms to expand employment engaged in production or services of these PBs though it may indeed decrease in employment at home in other PBs, which results in an expansion of employment at home in total. Another possible explanation for a relative rise in domestic employment by globalizing manufacturing (machinery) firms would be that they succeed in differentiating products to be produced in the domestic market from those to be produced in East Asia.

Second, for manufacturing firms, there is a negative though statistically insignificant relationship between the expansion of manufacturing operations in East Asia and no decline in the number of domestic establishments as well as domestic affiliates when a wider definition for expanding operation in East Asia is applied (Table 4 (3a) and 4 (4a)). The coefficients, however, become negative and statistically significant when a narrower definition is applied (Table 4 (3b) and 4 (4b)). On the other hand, when only machinery firms are focused on, the negative relationship with statistical significance cannot be observed except the case of domestic establishment with a narrower definition for expanding operations (Table 5 (3a), 5 (4a), 5 (3b), and 5 (4b)). These results suggest that the expansion of operations in East Asia is effectively utilized as an opportunity to reshuffle domestic corporate structure, particularly by non-machinery manufacturing firms expanding operations in East Asia (excluding those with the first FDI in the region during the sample period). They also suggest that machinery firms expanding operations in East Asia, in particularly, do not necessarily shrink domestic corporate operations and rather keep or even expand domestic employment when they expand operations in the region.

Third, export/import activities with East Asia are relatively intensified by globalizing firms in East Asia, and such a tendency is stronger for machinery firms (Tables 4(5), 4(6), 5(5), and 5(6)). The relationship between the expansion of manufacturing operations in East Asia and the relative intensification of transactions with East Asia is positively associated with statistical significance, with a larger

coefficient for machinery firms in most cases than for manufacturing firms in general. It suggests that firms expanding operations in East Asia intensify their transactions with East Asia compared to other manufacturing firms, which is particularly true in the case of machinery firms. This is another supporting evidence for expanding fragmentation of production by Japanese firms mainly in machinery industries and their involvement in further development of production/distribution networks in East Asia where trade and FDI are in a sense complementary.

#### 4. Conclusion

Japanese firms have recently accelerated their investment in East Asia, mainly in manufacturing sectors, and have contributed to the development of international production/distribution networks in machinery sectors as the major players. Our study attempted to investigate patterns of globalizing activities of Japanese firms, with a particular emphasis on firms investing in East Asia, and their domestic impacts by using comprehensive firm-level data including both firms with and without foreign operations. In addition to changes in domestic operations such as domestic (parent) employment, domestic establishments, and domestic affiliates, changes in transactions with East Asia are also examined.

Our descriptive analysis shows that most of the Japanese firms developing their foreign operations for the period 1998-2004 expand their activities in East Asia, particularly in the manufacturing sector. Moreover, our logit/OLS estimation analyses with a distinction among manufacturing, machinery, and non-manufacturing firms demonstrates that given the size of firm and other controls, globalizing manufacturing firms are unlikely to reduce their domestic employment and rather tend to increase in the number by seven to eight percent during the six years, compared with other manufacturing firms. Such a tendency is salient for machinery firms who are one of active players in international production/distribution networks mainly in machinery sectors in East Asia. Furthermore, globalizing manufacturing firms, particularly globalizing machinery firms, in East Asia intensify export/import activities with East Asia while sometimes restructuring domestic activities in terms of the number of domestic establishment and domestic affiliates, compared with other firms. Their expanding manufacturing operations in East Asia particularly by machinery firms seem to be complements, rather than substitutes, of domestic operations, and contribute to the further development of production/distribution networks in the region where trade and FDI are in a sense complementary.

Our dataset does not unfortunately allow us to directly analyze changes in the skill structure of employed labor. However, we at least clearly observe that Japanese firms intensifying operations in Eat Asia tend to somehow retain domestic operations more successfully than other firms. Particularly in the case of SMEs globalizing their activities, domestic operations are even expanded. Further investigation on the Japanese case would provide a crucial key to fight against the unwarranted anti-globalism sentiment.

#### References

- Arndt, W. Sven, and Henryk Kierzkowski. (2001). Fragmentation: New Production Patterns in the World Economy. Oxford: Oxford University Press.
- Ando, Mitsuyo (2006) "Fragmentation and Vertical Intra-industry Trade in East Asia," North American Journal of Economics and Finance, 17 (3), 257-281.
- Ando, Mitsuyo and Fukunari Kimura (2006) "Fragmentation in East Asia: Further Evidence," KUMQRP Discussion Paper No. 2006-23.
- Becker, Sascha. Karoline Ekholm, Robert Jäckle, and Marc-Andreas Muendler (2005)
   "Location Choice and Employment Decisions: A Comparison of German and Swedish Multinationals," *Weltwirtschaftliches Archiv*, 141(4), 693-731.
- Blinder, Alan S. (2006) "Offshoring: The Next Industrial Revoluvation? Foreign Affairs, 85 (2), 113-128.
- Blomstrom, Magnus, Gunnar Fors, and Robert E. Lispsey (1997) "Foreign Direct Investment and Employment: Home Country Experience in the United States and Sweden," *Economic Journal*, 107 (445), 1787-1797.
- Brown, Sharon and James Spletzer (2005) "Labor Market Dynamics Associated with Movement of Works Overseas," Presented at the November 2005 OECD conference 'The Globalisation of Production'.
- Ebenstein Avraham, Ann Harrison, Margaret McMillan, and Shannon Phillips (2009)"Estimating the Impact of Trade and Offshoring on American Workers using the Current Population Surveys" NBER Working Paper Series

No.15107.

- Ekholm, Karolina and Katariina Hakkala (2006) "The Effect of Offshoring on Labor Demand: Evidence from Sweden," *CEPR Working Paper* No. 5648.
- Federico Stefano and Gaetano Alfredo Minerva (2008)"Outward FDI and Local Employment Growth in Italy"Review of World Economics Vol.144 (2).
- Fukao, Kyoji and Tomofumi Amano (2004) Inward Direct Investment in Japan and the Japanese Economy (Tainichi Chokusetsu Toshi to Nihon Keizai). Nihon Keizai Shinbunsha. In Japanese
- Head, Keith and John Ries (2002) "Offshore Production and Skill Upgrading by Japanese Manufacturing Firms," *Journal of International Economics*, 58 (1), 81-105.
- Hijzen, Alexander, Holger Gorg, and Robert C. Hine (2005) "International Outsourcing and the Skill Structure of Labor Demand in the United Kingdom," *Economic Journal*, 115 (506), 860-878.
- Hijzen, Alexander, Tomohiko Inui, and Yasuyuki Todo (2007) "The Effects of Multinational Production on Domestic Performance: Evidence from Japanese Firms" RIETI Discussion Paper Series No,07-E-0006.
- Ito, Keiko and Kyoji Fukao (2005) "Physical and Human Capital Deepening and New Trade Patters in Japan" In Takatoshi Ito and Andrew Rose eds., International Trade (NBER-East Asia Seminar on Economics, Volume 14), Chicago: The University of Chicago Press.
- Jones, W. Ronald and Henryk Kierzkowski. (1990) "The Role of Services in Production and International Trade: A Theoretical Framework." In Ronald W. Jones and Anne O. Krueger, eds., *The Political Economy of International Trade: Essays* in Honor of Robert E. Baldwin, Oxford, Basil Blackwell.
- Kimura, Fukunari (2006) "International Production and Distribution Networks in East Asia: Eighteen Facts, Machanics, and Policy Implications," Asian Economic Policy Review, 1 (2), 326-344.
- Kimura, Fukunari and Mitsuyo Ando (2005) "Two-dimensional Fragmentation in East Asia: Conceptual Framework and Empirics," *International Review of Economics and Finance* 14 (4), Special Issue 'Outsourcing and Fragmentation: Blessing or Threat?', 317-348.
- Matsuura, Toshiyuki and Yosuke Nagata (2005) "Activities of Japanese affiliates

abroad and their effects on domestic employment – analysis based on the constructed FDI database – (Nikkei Kaigai Genchi Houjin no Keizai Katsudou to Kokunai Koyou heno Eikyo – Kaigai Chokusetsu Toushi Detabesu no Sakusei niyoru Bunseki -) *Keizai Toukei Kenkyu* 33 (4), 39-57. In Japanese.

Samuelson, Paul (2004) "Where Richard and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization," *Journal of Economic Perspectives*, 18 (3) (Summer), 135-146.



Data source: authors' calculation, based on balance of payments statistics available from the website of the Bank of Japan.

Figure 2 Complementary operations with fragmentation: an illustration



			Number	r of affi	liates by th	ne indus	try of pare	nt firms			Number	r of affi	iliates by tl	ie indus	try of pare	nt firm
	Number				Share by	y the inc	lustry of a	ffiliate	Number				Share by	y the inc	lustry of a	ffiliate
Industry of	of parent firms: all				Manufac	cturing	No manufac	n- cturing	of parent firms:				Manufa	cturing	No: manufac	n- cturing
	sized	(%)		(%)	(mae	chinery)	(who	olesales)	SMEs	(%)		(%)	(ma	chinery)	(who	olesales)
					(a-1) Ea	ıst Asia							(a-2) Ea	ıst Asia		
Manufacuturing	2,610	68%	10,070	70%	73%	(38%)	27%	(18%)	1,280	66%	1,962	62%	84%	(39%)	16%	(12%)
-Machinery	1,200	31%	5,387	37%	69%	(65%)	31%	(20%)	534	27%	916	29%	82%	(76%)	18%	(14%)
Non-manufacturing	1,237	32%	4,412	30%	33%	(8%)	67%	(42%)	668	34%	1,202	38%	35%	(9%)	65%	(55%)
-Wholesales	812	21%	1% 3,645 25% 36% (9%) 1% 14.482 100% 61% (29%)				64%	(50%)	528	27%	1,094	35%	36%	(9%)	64%	(60%)
Total	3,847	100%	14,482	100%	61%	(29%)	39%	(25%)	1,948	100%	3,164	100%	65%	(28%)	35%	(28%)
			14,482 100% 61% (29%) (b-1) North Ameri				erica						(b-2) N	orth Am	erica	
Manufacuturing	1,250	68%	3,123	69%	49%	(29%)	51%	(24%)	367	60%	386	61%	55%	(29%)	45%	(33%)
-Machinery	660	36%	1,955	43%	44%	(41%)	56%	(25%)	195	32%	222	35%	50%	(47%)	50%	(40%)
Non-manufacturing	592	32%	1,392	31%	16%	(4%)	84%	(40%)	249	40%	246	39%	11%	(6%)	89%	(66%)
-Wholesales	353	19%	1,034	23%	20%	(4%)	80%	(51%)	176	29%	197	31%	13%	(7%)	87%	(78%)
Total	1,842	100%	4,515	100%	39%	(21%)	61%	(29%)	616	100%	632	100%	38%	(20%)	62%	(46%)
					(c-1) Eu	irope							(c-2) Ei	ırope		
Manufacuturing	717	70%	3,003	73%	42%	(24%)	58%	(37%)	128	56%	158	56%	48%	(17%)	52%	(43%)
-Machinery	389	38%	2,008	49%	34%	(33%)	66%	(42%)	64	28%	88	31%	34%	(31%)	66%	(56%)
Non-manufacturing	306	30%	1,137	27%	13%	(4%)	87%	(43%)	101	44%	125	44%	18%	(14%)	82%	(63%)
-Wholesales	193	19%	945	23%	15%	(5%)	85%	(50%)	81	35%	114	40%	20%	(16%)	80%	(68%)
Total	1,023	100%	4,140	100%	34%	(19%)	66%	(39%)	229	100%	283	100%	35%	(16%)	65%	(52%)

Table 1 Sectoral patterns of Japanese parent firms and their affiliates in East Asia, North America, and Europe for 2004

Data source: authors' calculation, based on METI database.

Notes: The figures for (a-1, b-1, c-1) are those of all sized parent firms and figures for (a-2, b-2, c-2) are of parent SMEs. The figures for "share" for manufacuring, machinery, non-manufacturing, and wholesales expresse the shares of manufacturing affiliates, machinery affiliates, non-manufacturing affiliates, and wholesales affiliates of all sized/SMEs firms in each sectoral category.

The type of firms	Foreign (incl. East Asia)	East Asia	North America	Europe	Foreign (incl. East Asia)	East Asia	North America	Europe
	(a) All fir	ms			(b) Manut	facturing	g firms	
No entry in	79%	82%	86%	92%	74%	78%	84%	91%
Expansion in (i+ii)	12%	11%	7%	4%	15%	14%	9%	6%
- (i) Expansion in	6%	5%	0%	0%	8%	7%	1%	0%
- (ii) Expansion in (with 1st FDI in the region)	5%	5%	6%	4%	7%	7%	8%	5%
Steady in	5%	4%	1%	0%	7%	6%	1%	0%
Shrinkage in	2%	1%	0%	0%	3%	1%	1%	0%
Shrinkage in (withdrawal from the region)	2%	2%	6%	3%	2%	2%	6%	3%
Total	100%	100%	100%	100%	100%	100%	100%	100%

# Table 2 Globalizing patterns from 1998 to 2004: share by the type of firms

	(c) SMEs				(d) Manu	facturing	SMEs	
No entry in	86%	89%	92%	96%	84%	87%	91%	96%
Expansion in East Asia (i+ii)	7%	7%	3%	1%	9%	8%	3%	1%
- (i) Expansion in	2%	2%	0%	0%	3%	2%	0%	0%
- (ii) Expansion in (with 1st FDI in the region)	5%	5%	3%	1%	6%	6%	3%	1%
Steady in	4%	3%	0%	0%	5%	4%	0%	0%
Shrinkage in	1%	0%	0%	0%	1%	0%	0%	0%
Shrinkage in (withdrawal from the region)	2%	1%	5%	3%	2%	1%	5%	3%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Table A.3 in the Appendix.

#### Table 3 Changes in domestic operations from 1998 to 2004 by the type of firms

	Dome	stic emplo	yment	Domestic	establishments	Domestic a	affiliates
The type of firms	Share of firms with reduction	Average growth rates at the firm level	Aggregate change	Share of firms with reduction	Aggregate change	Share of firms with reduction	Aggregate change
(a) All firms							
No entry in East Asia	59%	0.049	215,001	30%	21,788	18%	-1,003
Expansion in East Asia (i+ii)	59%	0.030	-146,750	42%	2,303	31%	817
- (i) Expansion in East Asia	64%	-0.041	-182,215	51%	-674	40%	189
- (ii) Expansion in East Asia (with 1st FDI in the region)	54%	0.096	35,465	34%	2,977	23%	628
Steady in East Asia	70%	-0.054	-60,318	38%	1,760	34%	-577
Shrinkage in East Asia	71%	-0.080	-9,819	52%	-587	57%	-2,458
Shrinkage in East Asia (withdrawal from the region)	69%	-0.073	-1,623	41%	358	48%	-747
Total	60%	0.038	-3,509	32%	25,622	21%	-3,968
(b) Manufacturing firms							
No entry in East Asia	63%	-0.021	-111.204	26%	1.860	15%	-571
Expansion in East Asia (i+ii)	61%	0.000	-181,593	40%	-627	31%	437
- (i) Expansion in East Asia	66%	-0.057	-171,659	50%	-775	41%	-143
- (ii) Expansion in East Asia (with 1st FDI in the region)	55%	0.057	-9,934	31%	148	22%	580
Steady in East Asia	69%	-0.076	-46.325	37%	119	34%	-442
Shrinkage in East Asia	74%	-0.085	-64.814	51%	-330	56%	-974
Shrinkage in East Asia (withdrawal from the region)	75%	-0.163	-28,045	41%	-97	47%	-343
Total	63%	-0.025	-431,981	29%	925	20%	-1,893
(c) SMEs							
No entry in East Asia	58%	0.051	59,710	27%	7.390	15%	-586
Expansion in East Asia (i+ii)	50%	0.096	10,771	30%	219	21%	94
- (i) Expansion in East Asia	50%	0.048	1.457	35%	-10	23%	-11
- (ii) Expansion in East Asia (with 1st FDI in the region)	50%	0.115	9,314	28%	229	20%	105
Steady in East Asia	65%	-0.039	-3,805	30%	-40	24%	-81
Shrinkage in East Asia	63%	0.039	181	31%	22	26%	-8
Shrinkage in East Asia (withdrawal from the region)	64%	-0.073	-2,496	31%	24	36%	-55
Total	58%	0.049	64,361	27%	7,615	16%	-636
(d) Manufacturing SMFs							
No entry in East Asia	61%	-0.007	-23,291	23%	527	14%	-394
Expansion in East Asia (i+ii)	51%	0.087	6 906	26%	129	20%	65
- (i) Expansion in East Asia	56%	0.031	696	34%	-26	23%	-14
- (ii) Expansion in East Asia (with 1st FDI in the region)	49%	0.108	6.210	23%	155	18%	79
Steady in East Asia	62%	-0.037	-2.588	29%	-45	24%	-53
Shrinkage in East Asia	67%	0.070	2,500 199	33%	8	30%	-6
Shrinkage in East Asia (withdrawal from the region)	69%	-0 103	-1 813	35%	_17	34%	-30 -30
Total	<u>60%</u>	-0.002	-20,587	<u>24</u> %	602	<u>15%</u>	7
Courses outboard coloulation haved on METI database							

Source: authors' calculation, based on METI database.

Notes: The two-period balanced panel data is used. Industry classification and firm size are based on data for 1998.

			Dependent vari	able		
	(1)	(2)	(3)	(4)	(5)	(6)
	demployment	d. employment	d. establishmen	t d. affiliates	exports to	imports from
					E.Asia	E.Asia
Independent variables	[logit]	[OLS]	[logit]	[logit]	[OLS]	[OLS]
a) Wider definition for exp	anding operation	s				
Constant	1.351 ***	0.315 ***	3.369 ***	4.709 ***	0.003	0.017 **
	(0.196)	(0.035)	(0.198)	(0.228)	(0.005)	(0.008)
Expansion in East Asia	0.415 ***	0.084 ***	-0.088	-0.090	0.028 ***	0.032 ***
(incl. new entry)	(0.067)	(0.012)	(0.069)	(0.075)	(0.002)	(0.003)
Firm size	-0.421 ***	-0.069 ***	-0.497 ***	-0.543 ***	0.000	-0.002 *
	(0.026)	(0.004)	(0.026)	(0.028)	(0.001)	(0.001)
Capital-labor ratio	0.085 ***	0.015 ***	-0.053 **	-0.213 ***	-0.0001	0.000
	(0.023)	(0.004)	(0.024)	(0.030)	(0.001)	(0.001)
Foreign sales ratio	0.246	-0.063	-0.503 **	-0.635 **	0.027 ***	0.041 ***
	(0.242)	(0.044)	(0.245)	(0.264)	(0.006)	(0.011)
In-house R&D ratio	3.341 ***	0.546 ***	-0.867	-0.863	0.095 ***	0.011
	(1.093)	(0.189)	(1.149)	(1.297)	(0.028)	(0.049)
Advertisement ratio	-1.101	0.352	-4.147 ***	-4.690 ***	-0.040	-0.049
	(1.430)	(0.252)	(1.379)	(1.471)	(0.035)	(0.059)
Foreign capital ratio	0.00041 *	0.00007 *	0.00011	0.00153 ***	0.00001	0.00356
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.062)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-6495		-5832	-4700		
Adj R2		0.034			0.056	0.027
Number of observations	10218	10218	10218	10218	10218	10036
b) Narrower definition for	expanding operat	ions				
Constant	1 278 ***	0 206 ***	3 317 ***	4 658 ***	0.002 ***	0.016 *
Constant	(0.197)	(0.035)	(0.200)	(0.231)	(0.002)	(0,009)
Expansion in East Asia	0.273 ***	0.043 **	-0.221 **	-0.196 **	0.027 ***	0.029 ***
Expansion in East Asia	(0.096)	(0.017)	(0.093)	(0.098)	(0.02)	(0.02)
Firm size	-0.401 ***	-0.064 ***	-0.487 ***	-0 535 ***	0.001	-0.001
	(0.026)	(0.004)	(0.026)	(0.029)	(0.001)	(0.001)
Capital-labor ratio	0.091 ***	0.016 ***	-0.052 **	_0 212 ***	0.000	0.001
Cupital labor failo	(0.023)	(0.004)	(0.024)	(0.030)	(0.001)	(0.001)
Foreign sales ratio	0.302	-0.046	-0.440 *	-0.582 **	0.027 ***	0.042 ***
Toreign sales failo	(0.243)	(0.044)	(0.248)	(0.267)	(0.02)	(0.011)
In-house R&D ratio	3 554 ***	0.678 ***	-0 779	-0.782	0 103 ***	0.021
In nouse ReeD fund	(1.091)	(0.201)	(1,152)	(1.301)	(0.028)	(0.021)
Advertisement ratio	-1 158	0 334 *	_4 195 ***	-4 730 ***	-0.041	0.002
/ dvertisement futo	(1.426)	(0.253)	(1.378)	(1.471)	(0.036)	(0.062)
Foreign capital ratio	0.00038	0.00007	0.00010	0.00153 ***	0.00000	0.00001
i oreign capital fatto	(0,000)	(0,000)	(0,000)	(0.000)	(0,000)	(0,000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-6510		-5830	-4698		
Adj R2		0.030			0.044	0.020
Number of observations	10218	10218	10218	10218	10218	10036

Table 4 Production networking in East Asia and domestic operations in 1998-2004: manufacturing firms

Data source: Authors' calculation, based on METI database.

Notes: figures in parenthesis are standard deviation. \*\*\* indicates that the results are statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level. Regressions are as follows:

(1) dependent variable: 1 if a firm does not reduce the number of domestic employments and 0 otherwise

(2) dependent variable: growth rate of the number of domestic employment

(3) dependent variable: 1 if a firm does not reduce the number of domestic establishments and 0 otherwise

(4) dependent variable: 1 if a firm does not reduce the number of domestic affiliates and 0 otherwise

(5) dependent variable: a change in the ratio of expoprts to East Asia in total sales

(6) dependent variable: a change in the ratio of imports from East Asia in total purchases

			Dependent vari	able		
	(1)	(2)	(3)	(4)	(5)	(6)
	demployment	d. employment	d. establishmen	nt d. affiliates	exports to	imports from
					E.Asia	E.Asia
Independent variables	[logit]	[OLS]	[logit]	[logit]	[OLS]	[OLS]
a) Wider definition for exp	oanding operation	s				
Constant	1.744 ***	0.327 ***	3.325 ***	4.994 ***	0.004	0.020 *
	(0.234)	(0.041)	(0.244)	(0.287)	(0.008)	(0.012)
Expansion in East Asia	0.409 ***	0.069 ***	-0.094	-0.007	0.033 ***	0.030 ***
(incl. new entry)	(0.094)	(0.017)	(0.097)	(0.110)	(0.003)	(0.005)
Firm size	-0.419 ***	-0.065 ***	-0.372 ***	-0.551 ***	0.002	0.001
	(0.040)	(0.007)	(0.039)	(0.045)	(0.001)	(0.002)
Capital-labor ratio	0.091 **	0.013 *	-0.052	-0.136 ***	0.0009	0.002
	(0.038)	(0.007)	(0.042)	(0.052)	(0.001)	(0.002)
Foreign sales ratio	0.183	-0.087 *	-0.595 **	-0.739 **	0.030 ***	0.057 ***
	(0.288)	(0.053)	(0.287)	(0.313)	(0.010)	(0.015)
In-house R&D ratio	2.583 *	0.632 **	-2.334	-1.571	0.086 *	-0.102
	(1.418)	(0.264)	(1.451)	(1.684)	(0.050)	(0.076)
Advertisement ratio	-0.945	-0.432	-14.694 **	-19.346 ***	-0.091	0.250
	(6.108)	(1.135)	(6.231)	(6.784)	(0.214)	(0.327)
Foreign capital ratio	0.00048	0.00007	0.00019	0.00129 **	0.00001	0.00002
0 1	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-2487		-2228	-1745		
Adi R2		0.035			0.048	0.024
Number of observations	s 3903	3903	3903	3903	3903	3846
h) Normorrow definition for	avpanding aparet	tions				
Constant	1 702 ***	0.215 ***	2 7/7 ***	1 007 ***	0.002	0.021 *
Constant	(0.237)	(0.042)	(0.248)	(0.201)	(0.002)	(0.021)
Expansion in East Asia	0.237)	(0.042)	0.248)	(0.291)	0.008)	(0.012)
Expansion in East Asia	(0.121)	(0.024)	-0.230	-0.170	(0.029	(0.007)
Firm size	0.131)	(0.024)	(0.126)	(0.139)	(0.003)	(0.007)
Filmi size	-0.407	-0.002 · · ·	-0.337	-0.332	(0.003 · ·	(0.002)
Capital Jahar ratio	(0.041)	(0.007)	(0.040)	(0.040)	(0.001)	(0.002)
Capital-labor latio	(0.028)	(0.007)	-0.031	-0.153	(0.001)	(0.002)
Esseise seles estis	(0.058)	(0.007)	(0.041)	(0.052)	(0.001)	(0.002)
Foreign sales ratio	0.190	-0.080	-0.324 *	$-0.000^{-0.00}$	(0.010)	0.034
La haves D&D anti-	(0.290)	(0.033)	(0.290)	(0.517)	(0.010)	(0.013)
In-nouse K&D ratio	2.085 *	0.034	-2.272	-1.409	0.093 *	-0.098
۸	(1.417)	(0.204)	(1.433)	(1.090)	(0.030)	(0.070)
Advertisement ratio	0.068	-0.237	-14.941	-19.391	-0.008	0.520
E''	(0.003)	(1.130)	(0.234)	(0.782)	(0.216)	(0.327)
Foreign capital ratio	0.00046	0.00007	0.00018	(0.00127 ***	(0.000)	0.00002
Industry dummies	(0.000) Yes	(0.000) Yes	(0.000) Yes	(0.001) Yes	(0.000) Yes	(0.000) Yes
Log likelihood	-2493		-2227	-1744		
Adi R2		0.032	;	27.11	0.034	0.021
Number of observations	s 3903	3903	3903	3903	3903	3846

Table 5 Production networking in East Asia and domestic operations in 1998-2004: machinery firms

Data source: Authors' calculation, based on METI database.

Notes: figures in parenthesis are standard deviation. \*\*\* indicates that the results are statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level. Regressions are as follows:

(1) dependent variable: 1 if a firm does not reduce the number of domestic employments and 0 otherwise

(2) dependent variable: growth rate of the number of domestic employment

(3) dependent variable: 1 if a firm does not reduce the number of domestic establishments and 0 otherwise

(4) dependent variable: 1 if a firm does not reduce the number of domestic affiliates and 0 otherwise

(5) dependent variable: a change in the ratio of expoprts to East Asia in total sales

(6) dependent variable: a change in the ratio of imports from East Asia in total purchases

			Dependent vari	able		
	(1)	(2)	(3)	(4)	(5)	(6)
	demployment	d. employment	d. establishmen	t d. affiliates	exports to	imports from
					E.Asia	E.Asia
Independent variables	[logit]	[OLS]	[logit]	[logit]	[OLS]	[OLS]
a) Wider definition for exp	anding operation	s				
Constant	0.540 ***	0.353 ***	2.246 ***	4.411 ***	0.000	0.002
	(0.148)	(0.063)	(0.153)	(0.184)	(0.002)	(0.005)
Expansion in East Asia	0.324 ***	0.073 *	-0.245 **	-0.058	0.025 ***	0.026 ***
(incl. new entry)	(0.096)	(0.042)	(0.097)	(0.109)	(0.001)	(0.003)
Firm size	-0.139 ***	-0.030	-0.300 ***	-0.467 ***	-0.0002 **	0.0003
	(0.025)	(0.011)	(0.025)	(0.029)	(0.000)	(0.001)
Capital-labor ratio	-0.080 ***	-0.022 ***	-0.043 **	-0.240 ***	-0.0002	-0.0005
	(0.017)	(0.007)	(0.018)	(0.024)	(0.000)	(0.001)
Foreign sales ratio	-0.059	-0.326 *	0.233	-0.298	0.016 ***	-0.0041
	(0.403)	(0.173)	(0.421)	(0.464)	(0.005)	(0.014)
In-house R&D ratio	0.604	-0.177	0.798	-2.107	0.011	0.060
	(1.153)	(0.465)	(1.479)	(1.291)	(0.014)	(0.037)
Advertisement ratio	9.368 ***	3.739 ***	2.873 *	2.399	-0.019	0.028
	(1.691)	(0.592)	(1.571)	(1.971)	(0.018)	(0.046)
Foreign capital ratio	0.00036 *	0.00004	-0.00014	0.00071 *	0.00000	-0.00002 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-5412		-5105	-3991		
Adj R2		0.014			0.060	0.011
Number of observations	7994	7994	7994	7994	7994	7955
b) Narrower definition for	expanding operat	ions				
Constant	0 514 ***	0 333 ***	2 229 ***	4 411 ***	0.001	0.001
Combann	(0.148)	(0.064)	(0.154)	(0.185)	(0.002)	(0.005)
Expansion in East Asia	0.247 *	-0.016	-0.375 ***	-0.063	0.034 ***	0.021 ***
Estpanoion in East Fisha	(0.142)	(0.061)	(0.142)	(0.152)	(0.002)	(0.005)
Firm size	-0 133 ***	-0.026 **	-0 298 ***	-0.467 ***	-0.0003	0.0008
T IIIII SIZE	(0.025)	(0.011)	(0.025)	(0.029)	(0.000)	(0.001)
Capital-labor ratio	-0.080 ***	-0.021 ***	-0.043 **	-0.239 ***	-0.0002	-0.0005
oupitui tuoor rutto	(0.017)	(0.007)	(0.018)	(0.024)	(0,000)	(0.001)
Foreign sales ratio	0.059	-0 249	0.286	-0.303	0.014 ***	0.005
r orongin suites rutto	(0.405)	(0.175)	(0.427)	(0.468)	(0.005)	(0.014)
In-house R&D ratio	0.617	-0.155	0.869	-2 103	0.007	0.061 *
In nouse need fund	(1.158)	(0.465)	(1.520)	(1.290)	(0.014)	(0.037)
Advertisement ratio	9 368 ***	3 753 ***	2 909 *	2 400	-0.021	0.028
Auvertisement fatto	(1.691)	(0.592)	(1.572)	(1.971)	(0.018)	(0.046)
Foreign capital ratio	0.00035 *	0.00003	-0.00014	0.00071 *	0.00000	-0 00002 ***
i oreigii capitai fatto	(0,000)	(0,000)	-0.00014	(0,000)	(0,000)	(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-5416		-5104	-3992		
Adj R2		0.014			0.056	0.006
Number of observations	7994	7994	7994	7994	7994	7955

Table 6 Production networking in East Asia and domestic operations in 1998-2004: non-manufacturing firms

Data source: Authors' calculation, based on METI database.

Notes: figures in parenthesis are standard deviation. \*\*\* indicates that the results are statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level. Regressions are as follows:

(1) dependent variable: 1 if a firm does not reduce the number of domestic employments and 0 otherwise

(2) dependent variable: growth rate of the number of domestic employment

(3) dependent variable: 1 if a firm does not reduce the number of domestic establishments and 0 otherwise

(4) dependent variable: 1 if a firm does not reduce the number of domestic affiliates and 0 otherwise

(5) dependent variable: a change in the ratio of expoprts to East Asia in total sales

(6) dependent variable: a change in the ratio of imports from East Asia in total purchases

1 ye	ear			Expansion in East	st Asia (incl. new e	entry)	
v		2003-2004	2002-2003	2001-2002	2000-2001	1999-2000	1998-1999
e	2003-2004	0.438 ***	0.178 **				
[ab]		(0.103)	(0.089)				
vari	2002-2003		0.210 **	0.209 **			
ŗ			(0.087)	(0.100)			
ina	2001-2002		· · · ·	0.044	-0.033		
t: b				(0.098)	(0.110)		
len	2000-2001				0.093	-0.001	
yn					(0.111)	(0.115)	
plc	1999-2000				× /	0.106	0.004
en						(0.104)	(0.124)
D.	1998-1999					( )	0.085
							(0.121)
		4					-
2 ye	ears	2002 2004	2001 2002	Expansion in Eas	st Asia (incl. new e	entry)	-
ble		2002-2004	2001-2003	2000-2002	1999-2001	1998-2000	=
ria	2002-2004	0.419 ***	0.275 ***	0.211 **			
v va		(0.074)	(0.081)	(0.088)	0.050		
ary	2001-2003		0.250 ***	0.014	-0.072		
bin			(0.079)	(0.090)	(0.090)		
nt:	2000-2002			-0.034	-0.137	0.031	
me				(0.091)	(0.097)	(0.104)	
loy	1999-2001				0.196 **	0.013	
du					(0.087)	(0.102)	
.е	1998-2000					0.196 **	
						(0.094)	_
1 ye	ear			Expansion in East	st Asia (incl. new e	entry)	
1 ye	ear	2003-2004	2002-2003	Expansion in East 2001-2002	st Asia (incl. new e 2000-2001	entry) 1999-2000	1998-1999
1 ye	ear 2003-2004	2003-2004	2002-2003	Expansion in East 2001-2002	st Asia (incl. new e 2000-2001	entry) 1999-2000	1998-1999
1 ye	ear 2003-2004	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006)	Expansion in Eas 2001-2002	st Asia (incl. new e 2000-2001	entry) 1999-2000	1998-1999
1 ye	2003-2004 2002-2003	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 ***	Expansion in Ea: 2001-2002 -0.003	st Asia (incl. new e 2000-2001	entry) 1999-2000	1998-1999
f ye	2003-2004 2002-2003	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009)	st Asia (incl. new c 2000-2001	entry) 1999-2000	1998-1999
nt: growth	2003-2004 2002-2003 2001-2002	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003	st Asia (incl. new e 2000-2001 -0.006	entry) 1999-2000	1998-1999
ment: growth	2003-2004 2002-2003 2001-2002	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	st Asia (incl. new c 2000-2001 -0.006 (0.008)	entry) 1999-2000	1998-1999
loyment: growth	2003-2004 2002-2003 2001-2002 2000-2001	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 ***	entry) 1999-2000 0.005	1998-1999
mployment: growth	2003-2004 2002-2003 2001-2002 2000-2001	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008)	1998-1999
). employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008) 0.013	0.001
D. employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008) 0.013 (0.009)	0.001 (0.010)
D. employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008) 0.013 (0.009)	0.001 (0.010) 0.020 *
D. employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 *** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008)	-0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008) 0.013 (0.009)	0.001 (0.010) 0.020 * (0.012)
D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999	2003-2004 0.019 (0.014)	2002-2003 0.007 (0.006) 0.037 **** (0.008)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea:	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007)	0.005 (0.008) 0.013 (0.009)	0.001 (0.010) 0.020 * (0.012)
D. employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999	2003-2004 0.019 (0.014) 2002-2004	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000	0.001 (0.010) 0.020 * (0.012)
D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004	2003-2004 0.019 (0.014) 2002-2004 0.039 ***	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 **	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000	0.001 (0.010) 0.020 * (0.012)
wth D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004	2003-2004 0.019 (0.014) 2002-2004 2002-2004	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009)	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000	0.001 (0.010) 0.020 * (0.012)
growth D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2002-2004	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009) 0.022 **	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000	0.001 (0.010) 0.020 * (0.012)
1: growth D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2001-2003	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009)	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010)	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000	0.001 (0.010) 0.020 * (0.012)
nent: growth D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2001-2003 2000-2002	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009) 0.020 **	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010) -0.001	entry) 1999-2000 0.005 (0.008) 0.013 (0.009) entry) 1998-2000 0.001	1998-1999 0.001 (0.010) 0.020 * (0.012)
oyment: growth D. employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2001-2003 2000-2002	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009) 0.002 ** (0.008)	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010) -0.001 (0.009)	0.005 (0.008) 0.013 (0.009) entry) 1998-2000	1998-1999 0.001 (0.010) 0.020 * (0.012)
nployment: growth <b>b. 6 D</b> . employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2001-2003 2000-2002 1999-2001	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 *** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009) 0.002 (** (0.008)	st Asia (incl. new e 2000-2001 -0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010) -0.001 (0.009) 0.030 ***	0.005 (0.008) 0.013 (0.009) entry) 1998-2000 0.001 (0.010) 0.003	0.001 (0.010) 0.020 * (0.012)
. employment: growth <b>b i b</b> . employment: growth	ear 2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 ears 2002-2004 2001-2003 2000-2002 1999-2001	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 **** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009) 0.002 (0.009) 0.020 ** (0.008)	-0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010) -0.001 (0.009) 0.030 *** (0.009)	0.005 (0.008) 0.013 (0.009) entry) 1998-2000 0.001 (0.010) 0.003 (0.011)	0.001 (0.010) 0.020 * (0.012)
D. employment: growth D. employment: growth	2003-2004 2002-2003 2001-2002 2000-2001 1999-2000 1998-1999 2002-2004 2001-2003 2000-2002 1999-2001 1999-2001	2003-2004 0.019 (0.014) 2002-2004 0.039 *** (0.009)	2002-2003 0.007 (0.006) 0.037 **** (0.008) 2001-2003 0.023 ** (0.009) 0.022 ** (0.009)	Expansion in Ea: 2001-2002 -0.003 (0.009) 0.003 (0.008) Expansion in Ea: 2000-2002 0.010 (0.009) 0.002 (0.009) 0.002 (0.009) 0.020 ** (0.008)	-0.006 (0.008) 0.024 *** (0.007) st Asia (incl. new e 1999-2001 -0.005 (0.010) -0.001 (0.009) 0.030 *** (0.009)	0.005 (0.008) 0.013 (0.009) entry) 1998-2000 0.001 (0.010) 0.003 (0.011) 0.027 **	0.001 (0.010) 0.020 * (0.012)

Table 7 Robustness check for time lag structure: domestic employment for manufacturing firms

Data source: Authors' calculation, based on METI database. Note: Although the table presents only the results of a variable for expansion in East Asia, all the regressions above include other control variables and are conducted by using corresponding balanced panel dataset.

# Table A.1 Industry classification

Manufacturin	g sector	Non-manufacturi	ng sector
090	Food processing	490	Wholesale trade
100	Beverages, tobacco, and animal feed	550	Retail trade
110	Textiles	Other	Mining, services, and other
120	Apparel		
130	Wood and wood products		
140	Furniture and fixtures		
150	Pulp, paper, and paper products		
160	Publishing and printing		
170	Chemicals		
180	Petroleum and coal products		
190	Plastic products		
200	Rubber products		
210	Leather and leather products		
220	Ceramics, clay, and stone products		
230	Iron and steel		
240	Nonferrous metal		
250	Metal products		
260	General machinery		
270	Electric machinery		
280	Telecommunications machinery		
290	Electronic parts and device		
300	Transport equipment		
310	Precision machinery		
320	Other manufacturing		

260-310 Machinery

Table A.2 Sector switching and non-sector switching Japanese affiliates aborad for 2004 (a-1) The number of affiliates in East Asia with all sized parent firms

												11	luusu	y 01 ai	mate	8												
		090	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	490	550 (	Other
	090	233	5		1			2	1	10		1			1				3							35	2	44
	100	7	42							2									1						2	19	3	22
	110			82	15			1		2		4						1		1		1	8			29		4
	120			4	70			2				3		1					1			3				12		4
	130					21																				1		1
	140						18											2	1			1				5	3	
	150			5				68	2	2		1	4			1		1	1			1			2	7		5
	160			1					106			2			1						9	5		18				7
	170	8	4	29	13				3	777	2	41	4		7		12	11	12	1		20	2	5	7	247	10	82
ms	180										5															8	3	22
fin	190			11	1		1	1		20		291			1	2		14	5	3	1	15	3	2	10	71		9
nt	200			1			1			4	1	4	143	1				4	2			2	3	2	7	42	6	7
are	210													10												1		
fp	220	1		2						22		3	1		206			7	4	2	13	40		4	3	38	9	27
0	230									2						63	3	20	6	1	2	4	2		2	4	1	20
Ę,	240									2		2	10		5		239	24	2	4	12	47	46	1	1	59		33
Πp	250					1			1			3	1		4	2	1	236	9	4	5	10	11	5	4	39	2	12
In	260	2	1			2			1		1	2	1		1	8	1	17	580	19	36	4	41	4	16	338	10	112
	270			1		1	1			9					8	1	27	7	14	485	4	44	7	17	6	218	28	66
	280								1			4						6	26	68	246	72	12	5	1	171	3	143
	290	2			2				1	11					1		3	5	13	12	8	466	4	8	2	160	2	38
	300			1	1					3		25	13		1	13	4	11	34	25	2	16	991	11	2	105	45	98
	310						1			4		4	3		3			1	10	10		24	3	160	3	93	10	20
	320				1			2	1			8		1				9	2		2	2	3	8	186	64	4	18
	490	99	3	74	171	9	19	14	6	170	5	108	29	4	35	60	35	62	60	48	20	125	44	28	101	1824	68	424
	550	3	1	4	9		2					2	1			1	1	2			5			5	16	23	107	29
	Other	6			3	2		1	3			1			3			4	16	9	2		4	4	7	25	11	455

(b-1) The number of affiliates in North America with all sized parent firms

												In	dustry	/ of af	filiates													
	-	090	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	490	550	Other
	090	46								2																14	1	14
	100	1	7																						2	18	2	11
	110			4	1																		2			5		3
	120											1										1				1		4
	130					4																						1
	140						2																			1	1	1
	150			1				10		1																4		1
	160								20						1						3	7		6			2	7
	170	1	3	2						151		2			2		1	2	2			6	3	2	2	107	2	74
us	180																									2		5
,H	190	1								4		40							1	1		1	4		4	16	1	10
nt f	200											2	24					2	1						3	13	6	22
n.ei	210																											
p	220									3		1			33				1		9	14				14		10
of	230															9	1	1	1							5		7
Ę	240									1			5		2		41	10			3		20			13	1	24
Ins	250																	56	1		1	1	6	1		19	1	4
In	260						1			1		1				1		1	130	6	4		13	2	3	171	6	76
	270									4							15	1	2	58		9	4		1	68	18	23
	280																		6	8	80	4	1	1		71		289
	290									3		1			1		1		1	2	2	49		1	2	60	1	21
	300											2	4			3		4	12	2		1	380	3	2	72	18	117
	310									1		2			2				1	3		2	2	22		46	6	24
	320			2								5				1	1	1	1			1			35	36	2	26
	490	25	2	4	8	5		4		31	1	16	8		2	12	7	10	12	4	2	8	12	7	28	531	26	269
	550	1											1												3	16	23	20
	Other	1				2				1					1			1	1	1	2					16	35	233

(c-1) The number of affiliates in Europe with all sized parent firms

												In	idustry	of af	filiates	3												
	_	090	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	490	550	Other
	090	13								6															1	17		12
	100		3																						11	7	2	9
	110			1															1							2		1
	120											1														4		
	130					1																						
	140						1																			1		
	150			1		1		4																		7		1
	160								16												1			13	1			5
	170			3					1	130	1	5					3		1			2	2	5	3	116	2	43
m	180									_		~ .													_	2		4
fir	190									2		34	• •					1							5	18	1	2
ent	200						1					1	20					2								25	25	3
Jar	210														107			1			16	10				10	1	
fl	220									4		1			107	2		1		0	16	10				10	1	4
ň	230									1			2			3	16	2					10			2	1	4
ıst	240									1			2				10	52				1	19			07	1	0
ıpu	250		1													1		22	102	7	2	1	15			226	5	54
-	200		1						1	2					2	1	7	2	102	81	1	0	15			162	36	26
	280								1	2					2		'		26	0	105	3	3			133	50	178
	290									3					3				20	2	10	40	5			49		5
	300									5		2	1		1				14	-	10	1	189	1	4	89	59	79
	310											2	1		1				2	2		2	105	20		88	7	28
	320											2							-	-		-	•	20	39	52	2	- 5
	490	6	1	1	9	3	1			27	1	8				7	1		7	2		13	16	5	36	475	31	295
	550	0	•	•		5	•					1	1				•			-		10		2	20		30	- 6
	Other				1											1			2	1					1	7	2	131
																							-					

#### (Continue)

												ш	luusu	y or ar	mates	5												
		090	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	490	550 C	Other
	090	52			1					3					1				1							2		6
	100		2																1							1		
	110			40	5					1													4			9		
	120			2	36			2						1												7		2
	130					14																				1		1
	140						10											1	1			1				4		
	150							21	1				4			1		1							2	2		
	160			1					14						1									1				2
	170	2							1	139		6	1		1		2	6	4						2	22		10
ms	180										5															4		1
fir	190									7		114				2		10	4	3				2	4	12		2
nt	200			1			1			4		1	34													4		
are	210													10												1		
fp	220			1											29				1						3	12	9	1
y o	230															22		2	4	1	_						1	2
str	240																48	2		2	2	4	1			6		
np	250					1			1			1				1		112	3	3		9	6	1	2	11		4
- 1	260		1						1			1			1			8	193	6		3	8	1	10	37	1	9
	270			1											1			2	3	110		3	1	1	5	37	1	11
	280											3						5	5		33	110		1		13	1	2
	290	1							1	2			1					4		6	2	119	4	~	1	31	1	3
	300			1	1					2			1			1		3	4	/	1	6	114	2	2	3	1	2
	310				1			1				1		1	1				1	9		3	1	4/	21	2	1	3
	520	40	1	17	1	2	0	1	Ę	07		12	10	1	17	2	14	25	20	14	0	2	12	15	- 31	6	10	1
	490	40	1	1/	22	3	8	5	5	27		42	12	1	17	3	14	25	20	14	8	26	12	15	28	036	18	22
	Other	1		1	1							1					1	1	4	2			4		1	5	4	5
	Oulei				1													1	- 4				4		1	5	3	07

(a-2) The number of affiliates in East Asia with parent SMEs

(b-2) The number of affiliates in North America with parent SMEs



(c-2) The number of affiliates in Europe with parent SMEs



Data source: Authors' calculation, based on METI database.

Table A.3	Globalizing patte	rns from 1998	to 2004 in East	Asia and othe	r regions: the	number of firms
					<i>a</i>	

	Matrix between patterns of operations in East Asia and those in other regions																			
					Expan			Shrin			Expa			kage			Expan			Shrin
	NY 1	Share		Б	sion	G. 1	G1 ·	kage	Ŋ	F	nsion	G. 1	<b>01</b> ·	(with	N	F	sion	G. 1	C1 ·	kage
	Number	1n total	No	Expan	(1st	Stead	Shrin (	(withd	No	Expa	(1st	Stead	Shrin	draw	No	Expan	(1st	Stead	Shrin	(withd
	of mins	totai	entry	in forei	TDI)	y ntries (i	rage	rawar)	entry	lisioli	in Not	y th ∆me	rica	ai)	enuy	SIOII	in Eur	y me	каде	lawal)
(a) All firms				III IOICI	gii coui			(314)			minoi	ui / tiik	lica					-pc		
No entry in Fast Asia	14 986	82%	14 381	54	175	198	37	141	13 896	4	276	32	24	754	14 461	0	97	7	3	418
Expansion in East Asia	033	5%	14,501	8/7	175	37	19	0	31/	10	153	36	29	52	/71	24	371	, 0	16	410
Expansion in East Asia (with 1st FDI)	983	5%		130	808	37	8	0	659	7	161	16	10	130	809	24	86	6	5	75
Steady in Fast Asia	816	4%		89		642	85	0	511	5	174	21	14	91	640	3	99	3	7	64
Shrinkage in Fast Asia	215	1%		15	_	12	188	0	86	6	90	0	3	21	126	1	69	0	3	16
Shrinkage in East Asia (withdrawal from the region	304	2%		12		15	34	2/3	236	0	26	1	0	38	271	0	9	0	1	23
Total	18 237	100%	1/ 381	1 1/17	083	9/1	401	38/	15 702	71	1180	118	80	1086	16 778	30	731	25	35	638
Share in total for other regions	100%	100 //	70%	6%	5%	5%	2%	2%	86%	0%	6%	1%	0%	6%	02%	0%	4%	0%	0%	3%
share in total for other regions	100 /0		1210	070	570	570	2 10	2 /0	00 //	070	070	1 /0	070	070	12 10	070	770	070	070	570
(b) Manufacturing firms																				
No entry in East Asia	7,939	78%	7,547	34	123	143	23	69	7,344	3	183	27	18	364	7,655	0	64	6	3	211
Expansion in East Asia	691	7%	-	632	-	28	31	0	223	38	351	23	21	35	337	20	288	5	11	30
Expansion in East Asia (entry)	697	7%	-	95	572	27	3	0	457	7	124	11	6	92	576	2	62	4	2	51
Steady in East Asia	597	6%	-	61	-	474	62	0	372	3	126	15	11	70	469	2	75	2	6	43
Shrinkage in East Asia	134	1%	-	10	-	8	116	0	54	4	55	6	2	13	76	1	46	0	1	10
Shrinkage in East Asia (exit)	176	2%	-	8	-	6	25	137	135	0	20	1	0	20	159	0	6	0	1	10
Total	10,234	100%	7,547	840	695	686	260	206	8,585	55	859	83	58	594	9,272	25	541	17	24	355
Share in total for other regions	100%		74%	8%	7%	7%	3%	2%	84%	1%	8%	1%	1%	6%	91%	0%	5%	0%	0%	3%
(c) SMEs																				
No entry in Fast Asia	11 749	89%	11 416	23	103	115	11	81	11.065	3	158	13	13	497	11 423	0	44	3	1	278
Expansion in East Asia	243	2%		229	-	11	3	0	155	2	55	7	4	20	192	1	31	1	4	14
Expansion in East Asia (entry)	618	2% 5%	_	41	556	18	3	Ő	454	0	71	2	3	88	538	0	31	1	1	47
Steady in East Asia	430	3%	_	24		379	27	Ő	321	2	43	10	2	52	362	Ő	25	2	2	39
Shrinkage in Fast Asia	54	0%	_	2	_	3	49	Ő	33	0	11	4	1	5	44	0	4	0	0	6
Shrinkage in East Asia (exit)	143	1%	-	3	_	10	10	120	119	0	7	1	0	16	130	0	3	0	0	10
Total	13 237	100%	11 416	322	659	536	103	201	12 147	7	345	37	23	678	12 689	1	138	7	8	394
Share in total for other regions	10,207	100.0	86%	2%	5%	4%	1%	2%	92%	0%	3%	0%	0%	5%	96%	0%	1%	0%	0%	3%
(d) Manufacturing SMEs	6 151	070	6 0 2 0	15	74	00	(	15	6.075	2	105	11	11	240	6 200	0	20	2	1	1.4.1
No entry in East Asia	0,434	81%	0,232	15	/4	82	0	45	0,075	3	105	11	11	249	0,280	1	3U 10	2	1	141
Expansion in East Asia	101	2%	-	155	200	15	1	0	215	1	34 49	2	3	14	129	1	10	1	3	20
Expansion in East Asia (entry)	429	0%	-	25	388	270	1	0	212	1	48	1	1	04	250	0	10	1	1	32
Steauy In East Asia	301	4%	-	14	-	270	1/	0	253	1	26	2	2	34	259	0	1/	1	1	23
Shrinkage in East Asia	30	10%	-	0	-	2	28	0	19	0	6	2	1	2	26	0	1	0	0	3
Shrinkage in East Asia (exit)	80	1%	6.000	1	-	200		08	69	0	2024	0	10	200	/4	0	2	0	0	4
101al Shano in total for other regions	1,455	100%	0,232	208	462 507	580	6U 407	113	0,818	) 107	224	21 407	18	309 107	/,149	107	84 107	207	5	212
snare in ioiai jor oiner regions	100%		80%	0%	5%	5%	4%	0%	91%	1%	2%	4%	1%	1%	93%	1%	1%	2%	1%	1%

Source: authors' calculation, based on METI database.

Note: figures are based on the two-period balanced panel dataset.

	Observations	Mean	SD	Min	Max
(a) All firms					
Expansion in East Asia	18212	0.105	0.307	0	1
Firm size (number of regular workers)	18212	457	1866	50	71237
Capital-labor ratio (tangible assets per reg. workers, millions JPY)	18212	10	16	0.001	905
Foreign sales ratio (in total sales)	18212	0.022	0.082	0	1
In-house R&D expenditure-sales ratio	18212	0.006	0.022	0	1.646
Advertisement expenditure-sales ratio	18212	0.006	0.017	0	0.363
Foreign capital ratio	18212	16	103	0	1000
(b) Manufacturing firms					
Expansion in East Asia	10218	0.136	0.343	0	1
Firm size (number of regular workers)	10218	469	1944	50	67900
Capital-labor ratio (tangible assets per reg. workers, millions JPY)	10218	11	15	0.004	870
Foreign sales ratio (in total sales)	10218	0.030	0.096	0	1
In-house R&D expenditure-sales ratio	10218	0.010	0.022	0	0.355
Advertisement expenditure-sales ratio	10218	0.005	0.016	0	0.287
Foreign capital ratio	10218	15	92	0	1000
(c) Non-manufacturing firms					
Expansion in East Asia	7994	0.066	0.248	0	1
Firm size (number of regular workers)	7994	443	1761	50	71237
Capital-labor ratio (tangible assets per reg. workers, millions JPY)	7994	9	17	0.001	905
Foreign sales ratio (in total sales)	7994	0.011	0.059	0	0.967
In-house R&D expenditure-sales ratio	7994	0.002	0.021	0	1.646
Advertisement expenditure-sales ratio	7994	0.008	0.017	0	0.363
Foreign capital ratio	7994	17	115	0	1000

Table A.4 Summary statistics for firms in 1998 in the two-period panel dataset, 1998-2004

Table A.5 Correlation matrix for the two-period panel dataset, 1998-2004

	Expansion in	Firm size (log)	Capital-labor	Foreign sales	In-house R&D	Advertisement	Foreign capital
	East Asia	Thin bille (log)	ratio (log)	ratio	ratio	ratio	ratio
(a) All firms (obs=18212)	1						
Expansion in East Asia	1						
Firm size (log)	0.263	1					
Capital-labor ratio (log)	0.100	0.092	1				
Foreign sales ratio	0.241	0.169	0.075	1			
In-house R&D ratio	0.162	0.180	0.085	0.209	1		
Advertisement ratio	-0.011	0.132	0.003	-0.010	0.034	1	
Foreign capital ratio	0.027	0.092	0.006	0.123	0.104	0.103	1
(b) Manufacturing firms (	obs=18212)						
Expansion in East Asia	1						
Firm size (log)	0.338	1					
Capital-labor ratio (log)	0.121	0.150	1				
Foreign sales ratio	0.228	0.245	0.083	1			
In-house R&D ratio	0.202	0.303	0.094	0.257	1		
Advertisement ratio	0.009	0.121	0.046	0.017	0.083	1	
Foreign capital ratio	0.040	0.129	0.059	0.142	0.113	0.076	1
(c) Non-manufacturing fin	rms (obs=7994)						
Expansion in East Asia	1						
Firm size (log)	0.141	1					
Capital-labor ratio (log)	0.045	0.039	1				
Foreign sales ratio	0.242	0.027	0.029	1			
In-house R&D ratio	0.042	0.025	0.021	0.066	1		
Advertisement ratio	-0.019	0.147	-0.012	-0.036	0.010	1	
Foreign capital ratio	0.015	0.055	-0.033	0.116	0.105	0.127	1