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Abstract

We investigate whether previous findings of only limited effects of investing abroad on the performance of parent firms can be explained by the aggregation of heterogeneous effects depending on the motive for foreign direct investment (FDI), sector, and location. Our results suggest, in line with previous work, that on average outward Japanese FDI has limited effects (either positive or negative) on the activity of internationalizing firms at home in the initial years after investment. However, our empirical findings confirm previous insights that the effect of moving abroad is heterogeneous depending on the affiliate sector (manufacturing versus non-manufacturing) and region of location (in USA or Europe versus in Asia). For FDI in the non-manufacturing sector located in USA or Europe, we find a positive impact on parent firm productivity. Further, we find a negative impact on parent firm employment from FDI in Asia.

Keywords: FDI, multinationals, offshoring, and propensity score matching.
JEL classification: F14; F21; F23

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1-Introduction

The claims for a link between expansion abroad and redundancies which are often advanced in the public debate contrast sharply with emerging empirical evidence suggesting only limited effects of investing abroad on domestic employment and the performance of parent firms (Barba Navaretti and Castellani, 2004; Kleinert and Toubal, 2008; Debaere, Lee and Lee, 2010 Hijzen, Jean and Mayer, 2011). In the context of Japan, somewhat more optimistic findings have been obtained suggesting that outward manufacturing foreign direct investment (FDI) tends to strengthen the domestic economic activities of internationalizing firms in terms of both output and employment (Hijzen, Inui and Todo, 2007; Ando and Kimura, 2007). This finding is in line with the prevalent view in the literature that FDI and exports are complementary. As far as an effect on productivity is concerned, Hijzen, Inui and Todo (2007) do not find any significant effect in manufacturing. However, productivity gains seem to occur in services (Ito, 2007) suggesting a heterogeneous impact of moving abroad across industries.

This paper investigates whether findings of non-significant effects (either positive or negative) of locating production abroad can be partly explained by a failure of estimation techniques to take this heterogeneity into account. More precisely, findings of a limited average impact of moving production abroad may coexist with the fact that the results of moving abroad vary considerably across sectors and depend on a variety of conditions related to the sector, the location of the affiliates and the motives for FDI. Preliminary evidence that the effects of outward investment differ depending on the investment strategy is given by Debaere, Lee and Lee (2010) for Korea, and by Hijzen, Jean and Mayer (2011) for France. This paper therefore aims to study how the effects of moving abroad on domestic employment and the performance (productivity and trade) of internationalizing Japanese firms depend on conditions related to their motives for FDI and on the sector of their affiliates.

We rely on a dataset on internationalizing Japanese firms that contains certain information on the characteristics of the foreign subsidiaries. These data allow an investigation into the heterogeneity of the effect of moving abroad on domestic firm performance across sectors and depending on the country of location of the affiliate. While much is known about parent firm characteristics (Greenaway and Kneller, 2007), little is reported about the characteristics of

subsidiaries in the international economics literature. One paper that sheds some light on the activity of foreign affiliates and their relation with the parents is the work by Matsuura, Motohashi and Hayakawa (2008). However, their analysis is limited to the effects of the Japanese electrical manufacturing sector FDI in East Asia on their parents' firms. Our data set gives us a new interesting insight into the characteristics of affiliates and their relationship with their parent firms that helps us to discriminate between the various investment strategies of Japanese firms and to study the specific impact at home of these investments.

One of the contributions of our paper is that it exploits information on the regional location of the foreign affiliate and its industry affiliation to distinguish between the two main motives for establishing an affiliate abroad that have been broadly discussed in the literature on FDI: market-seeking (horizontal) FDI or factor-seeking (vertical) FDI. It might be anticipated that the production factor displacement effect of vertical FDI is likely to be more pronounced than that of horizontal FDI. Pure horizontal FDI may however be expected to lead to the relocation of the part of production that was previously exported, resulting in a decline in exports.

In order to evaluate the potential effects of the role of outward FDI on the economic performance of firms in Japan, we would ideally like to compare the performance of firms that go global with the counterfactual performance these firms would have shown if they had not decided to become multinationals. Since this counterfactual outcome is by definition unobservable, we use propensity score matching techniques to construct a valid control group of domestic Japanese firms. Matching the firms involves re-constructing ex post the missing information on how multinationals would have performed had they not decided to internationalize when a randomised control group is not available. A comparison between the performances of firms that have turned into multinationals with the domestic firms identified by the matching procedure as having similar characteristics (as synthesized by the propensity score) allows us to extract the pure effect of going multinational. We combine propensity score matching with difference in differences estimation to compare the performance of the two types of firms. This method was first applied to the estimation of the effect of investing abroad by Barba Navaretti and Castellani (2004).[1] We follow Kleinert and Toubal (2008),

[1] These authors apply this method to a data set of Italian firms for the years 1994 to 1998. They find that foreign investments improve the growth of total factor productivity and output, but not of employment.

who, in their analysis of the growth in output, employment and productivity of German firms, refine this technique. Our matching technique thus ensures that the performance of a firm initiating production abroad in a given year is compared with the performance of firms in the same sector in the same year. The control group is thus defined to be sector- and year-specific, a restriction not adopted in previous papers on Japan (Hijzen, Inui and Todo, 2007; Ito, 2007).

Results suggest, in line with previous work, that on average outward Japanese FDI has limited effects (whether positive or negative) on the activity of internationalizing firms up to three years after overseas investment. However, our empirical findings confirm previous insights that the effect of moving abroad is heterogeneous depending on the affiliate's sector (manufacturing versus non-manufacturing) and its region of location. We find a positive impact on parent firm productivity from non-manufacturing FDI in the US or Europe and a negative impact on parent firm employment from the FDI in Asia three years after the establishment of the foreign affiliate.

The remainder of the paper is structured as follows. Section 2 provides some background on the link between the motivation for and the expected impact of FDI on activity at home. In Section 3 we provide a detailed discussion of the methodology, present the data used for the study and analyse the determinants of becoming a multinational in order to construct an appropriate counterfactual. Section 4 presents our results on the effects of investing abroad. Finally, Section 5 concludes.

2-Heterogeneity of motives for FDI and its impact at home

One of the contributions of our paper is an investigation into the potential heterogeneity of the effect of FDI on the parent firm according to the type of FDI the firm undertakes. Our dataset contains information on the affiliate's activity and its overseas location. This allows us to distinguish between the two main motives for establishing an affiliate abroad that have been identified in the literature on FDI. The first is market-seeking or horizontal FDI. In this case, the parent firm typically chooses to produce in a foreign country in order to serve the foreign local market. This type of investment usually saves high transport costs that would apply if the firm would export to this market and thus allows a firm to reach markets at lower cost than directly exporting from the parent's location. It is thus supposed to lead to the replication of identical activities in different locations.

The second motive of investing abroad is factor-seeking or vertical FDI. Here, a firm decides to localize all or some of its production processes abroad because prices for factors or intermediate goods are cheaper in the host economy than in the home country. Recently, evidence has emerged of a so-called complex FDI strategy, whereby investing abroad responds to a combination of both vertical and horizontal motives.

The consequences of investing abroad on the parent's activity are likely to depend on the underlying FDI strategy. As far as employment at home is concerned, both horizontal and vertical investment strategies may result in job losses when domestic production for either export or local consumption is relocated to the foreign affiliate. However, one might expect that the displacement effect of vertical FDI is likely to be more pronounced than that of horizontal FDI. In the former (vertical) case, the relocation could concern all activities that can be carried out more cheaply under the host country's factor prices, while in the latter (horizontal) case it would be limited to the part of production that was previously exported to the host market. In any case, becoming a multinational does not necessarily result in job losses at home. Jobs might even be created when the establishment of foreign plants represents an expansionary investment or involves scale effects due to productivity improvements, or when there are important production complementarities.

Another consequence of the relocation of domestic production to a foreign country concerns productivity. On the one hand, investing abroad could reduce efficiency at home through a decreasing plant-level scale effect (Barba Navaretti and Venables, 2004). This effect would derive from the loss of a production stage or from a decrease in exports, which would also result in lower production capacities. A negative impact is thus more likely for horizontal than for vertical FDI. On the other hand, investment abroad could produce learning by doing and the sharing of sunk costs (for example R&D) and information across affiliates, resulting in productivity gains at home. A priori, more significant productivity gains are expected from vertical FDI, as the less productive assembling activities are sent abroad allowing the parent firm to specialise in those production activities in which it is most efficient.

As a result, even after distinguishing between horizontal and vertical FDI, it is not clear whether FDI has a negative or a positive effect on domestic firm productivity. Therefore, whether a positive or a negative effect from FDI on domestic firm productivity becomes dominant will be examined empirically in Section 4.

Concerning export activities, horizontal FDI is expected to reduce exports at home since production abroad to serve the local market would substitute previous exports from the parent location. In contrast, vertical FDI could trigger an increase in exports as intermediate inputs (made at home) are shipped to foreign affiliates for processing.

3- Econometric Methodology

3-1 The Matching procedure

In order to evaluate the impact of investing abroad on the economic outcome of Japanese firms, we adopt a propensity score matching technique in combination with a difference in differences (DID) estimator. This allows us to construct via a non-parametric method the missing counterfactual observation of the outcome of a switching firm if it had not decided to engage in outward FDI. This approach classifies firms into two categories: those that have invested abroad in our sample period, called the treated group, and those that did not invest abroad. Observations of this untreated group are used to construct the counterfactual of the outcome of a switching firm.

An important feature for the accurate construction of the counterfactual is the selection of a valid control group which has comparable observable characteristics to the treated group. The purpose of matching in this context is to pair each firm moving abroad with a firm that is similar in all aspects except that of investing abroad. By 'matching' firms from the group of untreated firms (those who did not invest abroad) that are very similar in their pre-treatment observable characteristics with the treated (those who invested abroad), we can infer the mean difference in outcomes resulting from the treatment (the investment abroad).

Once matched, the only observable difference between treated and untreated firms is their treatment status. Using our matched control group, we analyze the average effect of the treatment on the treated (ATT):

$$\hat{\alpha}_{ATT} = E(y^1 - y^0 \mid D = 1) = E(y^1 \mid D = 1) - E(y^0 \mid D = 1)$$

where y^1 and y^0 are the treated and non-treated outcomes respectively and D is a dummy variable, which equals 1 when a firm is treated and 0 otherwise. Matching is thus a non-

parametric method that focuses on the mean difference in outcomes between the treated and the untreated over the common support, appropriately weighted by the distribution of participants. The performance of this technique requires appropriately determining along which dimensions to match the firms and what type of weighting scheme to use.

The matching method relies on two assumptions: the conditional mean independence assumption (CIA) and the common support assumption (CS). The common support assumption requires that all treated firms have a counterpart in the untreated population and all firms have a positive probability of investing abroad. The CIA is a strong assumption that requires that, conditional on observables, the non-treated outcomes are independent of treatment status. Since firms normally self-select into the group of multinational firms as a result of various firm characteristics such as size, age or productivity, this assumption is expected to be violated. A solution to the challenge of finding an appropriate counterfactual when firms differ along several dimensions is the use of propensity score matching. This method matches firms according to their probability of switching into a multinational, which is conditional on their pre-switching characteristics. This reduces the dimensionality problem since matching is then performed on the basis of a single index that captures all the information from the (observable) characteristics of the firm before investing abroad. Rosenbaum and Rubin (1983) show that the CIA remains valid once propensity score-matching is done appropriately. Hahn (1998) suggests that a propensity score may also improve the efficiency of the evaluation.

The propensity score is defined as the propensity to establish an affiliate abroad as a function of observable characteristics X:

$$E(D \mid y, X) = E(D = 1 \mid X)$$

It will be estimated in Section 3.3 via a logit model.

The literature proposes various matching methods. Since we can draw from a large control group, we use the five nearest neighbours matching method. Following Kleinert and Toubal (2006), our matching technique ensures that the performance of a firm initiating production abroad in a given year is compared with the performance in the same year of firms in the similar sector. We divide the manufacturing sector into three sub sectors (heavy and chemical industry, light industry and other manufactures, and machineries). The control group is thus

defined to be sector- and year-specific, a restriction not adopted in previous papers on Japan (Hijzen, Inui and Todo, 2007; Ito, 2007).

Following Heckman et al. (1997) and Blundell et al. (2004) we combine propensity score matching with the difference in differences estimator. This method allows us to mitigate the risk of violation of the CIA due to unobservable characteristics unaccounted for in the matching procedure. As presented above, the propensity score is conditional on only the limited number of observable characteristics X. If a firm bases its investment decisions for example on future expected profits, which are unobserved by the econometrician, then the CIA assumption would still be violated. By comparing growth rates instead of levels before and after the year of the switch, we control to some extent for selection on unobservable characteristics that could influence firm performance but which have not been captured by the matching procedure. We thus compare differences in growth rates after the year of the switch, taking into account potential differences in growth rates that already existed before switching.

3-2-Data and variables

3-2-1-Identification of switchers

In this paper, we focus on firms that switch from being purely domestic to being multinationals. Our strategy for identifying switching firms, i.e. Japanese firms investing abroad for the first time between 1995 and 2005, relies on information from the basic survey of Japanese Business Structure and Activities (BSJBSA). The strength of the BSJBSA survey is its sample coverage and the reliability of its data, as the survey is compulsory for manufacturing and non-manufacturing firms with more than 50 employees and with capital of more than 30 million yen. We access data for the period of consecutive years 1994-2006 allowing us to compute the yearly change in performance resulting from becoming a multinational firm between 1995 and 2005.

An initial selection of parents initiating FDI projects[2] abroad for the first time in the period 1995-2005 is obtained after cleaning to keep only affiliates providing consistent information over time (notably on the region of location, the date of entry and the sector of operation). We

[2] These include 930 investments in the wholesale and retail sector, 255 in other services, 7 in the primary sector and 2006 in the manufacturing sector.

use information on loans and investments in related firms abroad reported in 1991 and yearly since 1994 to identify switching firms as those which report positive loans and investments in a related firm abroad for the first time after 1994 (and not before). We consequently exclude from our switching group those firms that report a positive investment in a related firm abroad in 1991 or 1994 or that never report positive investment in the BSBSA. Lastly, we exclude firms if more than 33% of their capital is held by a foreign company.

Further details concerning the data used in the estimations can be found in the Tables 1 and 2 showing the number of Japanese switching firms by year and industry, and number of Japanese manufacturing firms by sector and region, respectively. A number of important features are immediately apparent: the concentration of Japanese affiliates in manufacturing sector and in Asia. Summary statistics for, and the distribution of, observations used in our regressions are shown in Table 3.

Table 1

Table 2

Table 3

3-2-2-Determinants of switching and outcome variables

As a first step, we estimate a logit model that evaluates the probability of a domestic firm becoming a multinational. This gives us the propensity score for each firm that is used for the matching. The logit model is estimated on different subsamples, according to the characteristics of the foreign affiliates. This is done in order to take into account the possible difference in determinants of overseas investment by motivation. In section 3.3, we explain this estimation procedure in detail.

Section 4 presents our DID estimations that investigate the impact of investing abroad on several indicators of the parent firm's performance: total factor productivity (TFP), labour productivity (value-added over total employment), total number of employees, number of employees at headquarter, average wage, capital to labour ratio, exports and imports. For all these variables, we calculate the yearly growth rates. In the DID estimations we then compare the differences between the growth rate of the switching firms and that of their matched

domestic firms before and after the switch. We estimated the effect of going global on these indicators one, two and three years after the opening of the first affiliate abroad.
Another very popular indicator is total output of the firm. However, since the sales variable also includes the sales of imported goods, we cannot clearly define the output of a firm in a given year. We thus do not study the effect of switching on this variable.

3-2-3-Estimation of Total Factor Productivity Index

We estimate the total factor productivity (TFP) index, following Caves et al. (1982), Caves et al. (1983), and Good et al. (1983). The TFP index is calculated as follows:

$$\ln TFP_{it} = \left(\ln Q_{it} - \ln \overline{Q}_t\right) - \sum_{j=1}^{J} \frac{1}{2}\left(s_{ijt} + \overline{s}_{jt}\right)\left(\ln X_{ijt} + \ln \overline{X}_{jt}\right)$$
$$+ \sum_{s=1}^{t}\left(\ln \overline{Q}_s - \ln \overline{Q}_{s-t}\right) - \sum_{s=1}^{t}\sum_{j=1}^{J} \frac{1}{2}\left(\overline{s}_{js} + \overline{s}_{js-1}\right)\left(\ln \overline{X}_{js} - \ln \overline{X}_{js-1}\right)$$

where Q_{it}, s_{ijt} and X_{ijt} denote the gross output of plant i in year t, the cost share of input j for plant i in year t and plant i's input of factor j in year t, respectively. Variables with an upper bar denote the industry average of that variable.

We define a hypothetical (representative) plant for each year by industry. Plant input and output are calculated as geometric means of those for all plants in a certain industry. The first two terms on the right hand side of the equation denote the cross-sectional TFP index based on the Tornqvist-Theil specification for each plant, in each year, relative to the hypothetical plants. Since this cross-sectional TFP index is not comparable between t and t-1, we adjust the cross sectional TFP index with the growth rate of TFP for hypothetical plants as in the third and the forth term in the equation.

3-3-Propensity score matching

To obtain the propensity score for each firm, both treated and untreated, we estimate a logit model in which we estimate the probability of switching. Since we are interested in the probability of switching from a purely domestic to a multinational firm, we limit our sample to firms that never switch and stay domestic all the time and firms that switch from being domestic to multinational within the time span of our sample period 1994 to 2005. Our logit model takes the following form:

$$FDI\_start_{it} = \alpha + \beta TFP_{it-1} + \chi L_{it-1} + \delta \frac{K_{it-1}}{L_{it-1}} + \phi age_{it-1} + \gamma VA_{it-1} + \eta WAGE_{t-1} + \lambda_i + \mu_t + \varepsilon_{it}$$

The dependent variable takes the value 0 if firm *i* is not involved in FDI in year *t*, 1 if the firm starts FDI during that year, and any observation after the entry is not coded. We assume the decision to invest abroad in the last year before investment takes place and take one year lag for independent variables. Our logit specification follows the literature on the determinants of FDI and we include TFP, the size of the firm *L* (as measured by the number of employees), the capital-labour ratio (*K/L*), firm age (*AGE*), value added (*VA*), and the average wage level (*WAGE*) (as has been done also by Kleinert and Toubal, 2006 and Hijzen et al., 2011). All variables are expressed in logarithm except TFP, which is already computed based on logarithms. We also include industry and year dummy effects to control for common demand and supply shocks.

We estimate the above logit model first on the total sample and then once on four different sub-samples: 1) switching manufacturing firms with affiliates in the manufacturing sector plus all manufacturing firms that never go global, 2) switching manufacturing firms with affiliates in the non-manufacturing sector plus all manufacturing firms that never go global, 3) switching manufacturing firms with affiliates located in USA or Europe plus all manufacturing firms that never go global, and 4) switching manufacturing firms with affiliates located in Asia (other than Japan) plus all manufacturing firms that never go global[3].
We later split our sample in the DID estimations into these sub-samples and use then the propensity score obtained by the corresponding logit estimation.

In order to compare the propensity scores of firms that have similar characteristics, we classify our firms into 3 manufacturing sector and allow matching only between observations from the same year and sector pair (as proposed by Kleinert and Toubal; 2006). We thus obtain 33 sector-year pairs. Firms are matched separately for each year and each sub-sector in the manufacturing industry.

[3] In our analysis, we exclude switching manufacturing firms which internationalize trough opening simultaneously affiliates in two different regions. In our sample, this concerns mainly firms that open in the same year an affiliate in the USA or Europe and an affiliate in Asia.

Table 4, in which we display a poled logit estimation for the total sample and the four sub-samples, shows that almost all explanatory variables have the expected signs and the coefficients are all significant. The propensity of domestic firms to establish a presence abroad depends positively on the level of TFP, the size of the firm (proxied by the log of employment), log of the capital to labour ratio, and negatively on the log of average wage. We interpret average wage as a measure of skill intensity of firm as in Hijen, et al. (2011), and negative coefficient implies firm with higher skill intensity has a lower propensity to move abroad. These results are very much in line with the model presented in Helpman, Melitz and Yeaple (2004), which suggests that more productive and larger firms self-select into multinationals.

Table 4

The regression coefficients obtained are then used to predict the probability of a firm becoming a multinational in each year. This predicted probability is called the propensity score and will be the matching criterion. Each treated firm is then matched according to its propensity score to its five nearest neighbours within its sector-year sub-sample[4]. Note that we ensure that a switcher is only allowed to match with a purely national firm and not with a firm that will switch later during our sample period.

Table 5 displays the balancing test for the five nearest neighbours matching method. It reports the means of a range of variables. The two groups of firms vary substantially in the characteristics reported: the average employment and capital over employment ratios are significantly different for the treated and the control observations in the unmatched sample. After matching, the differences are significantly reduced. The correcting impact of matching is reflected in the bias reduction, which reaches 90% for almost all variables. This evolution indicates that the balancing condition is satisfied in our matched sample.

Table 5

[4] Using five instead of only one nearest neighbour has the advantage that it reduces the impact of outliers in the control group sample.

4-Difference in Difference estimations results

In this section, we present the difference in differences estimations on the propensity scores obtained from matching the two groups of firms. We estimate the impact of FDI on our different outcome variables: growth in productivity (total factor productivity and labour productivity), employment (total and headquarter), average wage and capital to labour ratio. We also examine the effects on the parent firm's exports. The main focus here is to show how effects vary across different types of affiliates.

Since we estimate the propensity score in a first step, we display significance levels based on bootstrapped standard errors in all tables to control for this two-step procedure.

4.1 Analysis of the effects on manufacturing parent firm performance by affiliate sector (manufacturing and non-manufacturing)

In Table 6, we split our sample according to the sector of activity of the affiliates and test whether the effects of opening a manufacturing affiliate differ from the effects of the opening of a non-manufacturing affiliate. Firms with manufacturing affiliates may have horizontal or vertical purpose or both. Thus, it is not clear whether the effects on the various indicators of parent firm performance should be positive or negative. However, in the case of firms investing in non-manufacturing affiliates, there is no relocation of production. The firms can expect an increase in production through the overseas affiliate research or marketing activities. Hence in this case, we expect some positive impact on the parent firm's performance. In line with these arguments, we find no significant results in the case of opening affiliates in the manufacturing sector, but a positive effect on productivity (TFP and labour productivity) in the case of investing in affiliates in the non-manufacturing sector three years after the initial foreign investment.

Table 6

4.2 Analysis of the effects on manufacturing parent firm performance by affiliate location (USA or Europe, and Asia other than Japan)

We further investigate our contrasting results by the investment purpose. In particular, we assess the extent to which they reflect heterogeneous motives for moving abroad. We consider that FDI in USA or Europe is of horizontal nature since the main purpose for Japanese firms to open affiliates in these regions is considered to increase access to the respective foreign market. In contrast, FDI in Asia (especially in China and Southeast Asia) are considered to be more vertical oriented, since labour and other input costs are substantially lower in these countries than in Japan. In fact, according to the survey data on the affiliates, in 2009 Japanese overseas manufacturing affiliates located in Asia exported 18.5% of their total sales to Japan. For affiliates located in North America and in Europe this share is only 2.4% and 2.5%, respectively[5].

Results from splitting the sample into firms investing in Europe and North America and firms investing in Asia are reported in Table 7. We do not find any significant impact on both TFP and labour productivity growth rate in the first and second year after investment, irrespective the location of the foreign affiliate. However, we found positive and significant effects from investment in USA or Europe on our two productivity measures in the third year after the initial investment. This result is consistent with Hijzen et al. (2007). This positive impact on productivity presumably reflects learning by doing and technological spillovers shared between the parent and the affiliate.

We further found some negative impact on the growth of the capital labour ratio in the second and third year after investment in the case of overseas affiliates in USA or Europe. This could be explained by a decrease in capital investment, since the firm has undertaken an important investment in abroad, limiting thus its investment capacities at home.

We also found a negative employment impact and a positive impact on wages associated with FDI in Asia. This is partly inconsistent with the previous finding (Hijzen et al. 2007), but consistent with expected results and with findings on the internationalization of Korean firms (Debaere et al., 2010).

[5] However, our assumption can be misleading. Alford and Chariton (2009) finds that there is a large share of Vertical FDI between US and other rich countries.

Table 7

4.3 Analysis of the effects on manufacturing parent firm export growths

In a last step, we want to look at the impact of investing abroad on the export activity of the parent firm. The BSJBSA database contains data on the firms' direct exports and imports. However, firms can also export and import products through wholesalers. These trade activities are not recorded in the data base and the export and import measures here are thus underestimating the actual foreign trade activity of the firm. We cannot exactly tell the change in export or import growth of the firm whether it is due to firm's own change in export and import or the firm's direct trade activity outsourced to outside trade companies or wholesalers. Overall, the number of firms which report direct exports or imports for a subsequent number of years is quite low. Because of this, we show results on exports separately from the other indicators in Table 8. We do not report results on imports since theory has no clear prediction on the effect of investing abroad on the import activity of a firm.

Our estimation results show no significant impact on the total exports of the parent firms. This result implies that on average outward FDI does not substitute exports from the home country. However, for the case of FDI in Europe or the US we see the expected negative sign. One possible explanation for the absence of any significant negative effect on exports is the small number of observations here. Another possibility is that these firms replaced the export of final goods with the export of intermediate goods to their foreign affiliate.

Table 8

5-Conclusion

In this paper, we have investigated whether findings of limited effects of investing abroad on firm performance can be explained by the aggregation of heterogeneous effects. We have

analyzed how the effect of moving abroad on domestic employment and performance (productivity and export) of internationalizing Japanese firms depends on conditions related to motives for FDI and characteristics of their affiliates. Our results based on a combination of the difference in differences technique and propensity score matching confirm previous findings that on average outward Japanese FDI has limited effects (whether positive or negative) on the activity of internationalizing in the initial yeas after investments. We find on the one hand a positive effect on the parent's productivity of FDI in USA and Europe in the third year after the initial foreign investment. This may be due to acquired foreign knowledge from their foreign subsidiaries. On the other hand, we find no significant effect from FDI in Asia. The positive effect on productivity from firm level economies of scale is likely to be cancelled out by the negative effect on plant level economies of scale due to the contraction of home activities. In contrast with the previous study on the impact of FDI on the home activity of Japanese firms (Hijzen et al., 2007), we cannot find any positive impacts on employment growth. In addition, we do not find any export substitution effect from overseas affiliate activities in case of Japanese firms.

Furthermore, we find that FDI in the non-manufacturing sector is associated with faster productivity growth, presumably reflecting operational complementarities between the affiliate and the parent. Fears of "hollowing out" effects seem to be more justified in the case of the vertical FDI (investment in Asia), for which a contraction in employment, is observed. We find that positive productivity gains essentially derive from horizontal FDI (investment in the US or Europe), presumably reflecting learning by doing and technological spill-over effects shared between the parent and the affiliate.

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Table 1: Number of switching Japanese firms by year of establishment of first affiliate and by parent firm sector

year		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	total
by industry	primary	1	0	0	0	1	1	2	1	1	0	0	7
	construction	12	4	1	1	2	0	2	5	4	1	6	38
	light manufacturing	92	67	62	40	19	41	38	45	48	65	56	573
	heavy and chemical	54	62	39	19	23	35	36	37	36	41	37	419
	machinery, electronics and vehicle	152	117	83	58	62	56	60	106	90	103	87	974
	other manufacturing	6	5	4	5	3	2	1	2	4	6	2	40
	service	13	15	5	10	8	11	24	32	39	52	46	255
	wholesale	118	96	76	55	29	51	49	53	64	89	61	741
	retail	33	12	17	23	13	10	9	13	19	20	20	189
total		481	378	287	211	160	207	221	294	305	377	315	3236

Table 2: Sectoral and regional allocation of the sample of the switching firms

parents	all	manufacturing	non manufacturing	manufacturing	manufacturing	manufacturing	manufacturing	manufacturing	manufacturing	manufacturing
affiliates	all	all	all	manufacturing	non manufacturing	sector n.a	manufacturing	manufacturing	manufacturing	manufacturing
country	all	all	all	all	all	all	in Europe and USA	in Asia	in Other Contry	country n.a
switching firms	3236	2006	1230	1138	265	603	119	948	43	28
domestic firms	33976									

Table 3: Summary Statistics

variables	observation	mean	standard deviation	lower quartile	median	upper quartile
ln(TFP)	156381	0.039	0.156	-0.046	0.027	0.108
ln(L)	156381	5.164	0.928	4.454	4.963	5.645
ln(K/L)	156381	8.483	1.046	7.967	8.566	9.110
ln(AGE)	156325	3.580	0.578	3.367	3.738	3.932
ln(VA)	154592	6.970	1.197	6.147	6.767	7.601
ln(WAGE)	156381	1.510	0.385	1.319	1.548	1.754
ln(VA/EMP)	154592	1.807	0.599	1.499	1.814	2.132
ln(Head_EMP)	155991	4.385	1.140	3.912	4.431	5.037
ln(EXPORT)	41504	5.736	2.345	4.153	5.753	7.289

Table 4: Results of Logit estimation

parents affiliates	manufacturer manufacturer	manufacturer non manufacturer	manufacturer in Europe and USA	manufacturer in Asia
ln(TFP)	1.398***	1.727**	2.574**	1.145***
	(0.377)	(0.734)	(1.180)	(0.409)
ln(L)	0.775***	0.781***	0.537	0.817***
	(0.106)	(0.207)	(0.359)	(0.113)
ln(K/L)	0.240***	0.319***	0.112	0.248***
	(0.043)	(0.091)	(0.136)	(0.047)
ln(AGE)	0.206***	0.118	0.066	0.266***
	(0.064)	(0.124)	(0.176)	(0.073)
ln(VA)	-0.1	0.03	0.34	-0.156
	(0.098)	(0.193)	(0.345)	(0.104)
ln(WAGE)	-0.472***	-0.407*	-0.585	-0.475***
	(0.117)	(0.242)	(0.380)	(0.125)
Cons	-10.079***	-12.704***	-13.178***	-10.336***
	(0.499)	(0.995)	(1.488)	(0.556)
Time FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
observation	81723	78683	64537	81438
Pseudo R-squared	0.078	0.085	0.143	0.073

＊: 10% significant, ** : 5% significant, *** : 1% significant

Table 5: Balancing test: 5-nearest neighbour matching

parents affiliates	manufacturing manufacturing					
		Mean			%reduct	t-test
Variable	Sample	Treated	Control	%bias	bias	t
ln(TFP)	Unmatched	0.046	0.003	30.3		29.63
	Matched	0.028	0.031	-2.4	92.1	-0.54
ln(L)	Unmatched	5.360	5.086	33		31.81
	Matched	5.357	5.351	0.8	97.7	0.16
ln(L/K)	Unmatched	8.602	8.025	50.4		41.46
	Matched	8.545	8.560	-1.3	97.4	-0.37
ln(AGE)	Unmatched	3.649	3.492	28.8		26.01
	Matched	3.589	3.585	0.7	97.7	0.14
ln(VA)	Unmatched	7.195	6.814	37		37.06
	Matched	7.129	7.132	-0.3	99.2	-0.06
ln(WAGE)	Unmatched	1.542	1.469	19.3		18.22
	Matched	1.508	1.511	-0.8	96.1	-0.16

parents affiliates	manufacturing no-manufacturing					
		Mean			%reduct	t-test
Variable	Sample	Treated	Control	%bias	bias	t
ln(TFP)	Unmatched	0.063	0.000	42.3		21.37
	Matched	0.056	0.053	1.8	95.7	0.18
ln(L)	Unmatched	5.446	5.049	50		23.3
	Matched	5.419	5.389	3.7	92.6	0.36
ln(L/K)	Unmatched	8.708	7.996	61.3		24.52
	Matched	8.648	8.611	3.1	94.9	0.42
ln(AGE)	Unmatched	3.650	3.479	30.8		13.68
	Matched	3.570	3.561	1.5	95.2	0.15
ln(VA)	Unmatched	7.363	6.770	60.6		29.56
	Matched	7.279	7.236	4.4	92.7	0.42
ln(WAGE)	Unmatched	1.588	1.463	33.6		15.23
	Matched	1.553	1.551	0.4	98.9	0.04

parents affiliates	manufacturing in Europe and USA					
		Mean			%reduct	t-test
Variable	Sample	Treate	d Control	%bias	bias	t
ln(TFP)	Unmatched	0.057	0.004	37.9		16.7
	Matched	0.043	0.036	5.3	86.1	0.52
ln(L)	Unmatched	5.492	5.117	43.9		18.99
	Matched	5.495	5.450	5.2	88.1	0.48
ln(L/K)	Unmatched	8.760	8.035	64		23.63
	Matched	8.644	8.668	-2.1	96.8	-0.26
ln(AGE)	Unmatched	3.639	3.497	25.9		10.76
	Matched	3.545	3.563	-3.2	87.5	-0.3
ln(VA)	Unmatched	7.447	6.852	56.7		25.29
	Matched	7.384	7.322	5.9	89.6	0.55
ln(WAGE)	Unmatched	1.633	1.475	42.4		18.01
	Matched	1.593	1.593	-0.2	99.6	-0.02

parents affiliates	manufacturing in Asia					
		Mean			%reduct	t-test
Variable	Sample	Treated	Control	%bias	bias	t
ln(TFP)	Unmatched	0.035	-0.001	25.5		28.74
	Matched	0.023	0.023	0.1	99.6	0.02
ln(L)	Unmatched	5.376	5.040	39.4		46.38
	Matched	5.376	5.383	-0.8	97.9	-0.19
ln(L/K)	Unmatched	8.352	7.983	29.1		30.13
	Matched	8.228	8.210	1.4	95.4	0.35
ln(AGE)	Unmatched	3.621	3.474	26		27.71
	Matched	3.548	3.541	1.3	95.2	0.31
ln(VA)	Unmatched	7.231	6.759	46.6		55.37
	Matched	7.183	7.186	-0.3	99.5	-0.06
ln(WAGE)	Unmatched	1.548	1.461	22.6		25.09
	Matched	1.524	1.525	-0.2	99	-0.06

Table 6: Difference in differences analysis of performance of parent firms moving abroad between 1995 and 2005: Split by Affiliates in the manufacturing sector versus the non-manufacturing sector

6-1 Foreign affiliate in the manufacturing sector

Time	TFP	VA/EMP	EMP	Head_EMP	WAGE	KL_Ratio	number of treatments	number of controls	total
t-1 VS t+1	0.001	0.019	-0.005	0.023	0.007	-0.011	869	4026	4895
	(0.006)	(0.027)	(0.008)	(0.030)	(0.017)	(0.021)			
t-1 VS t+2	0.001	0.008	-0.004	0.013	0.013	-0.009	753	3475	4228
	(0.006)	(0.026)	(0.009)	(0.025)	(0.015)	(0.017)			
t-1 VS t+3	0.003	0.04	-0.007	0.023	0.025	-0.001	657	3022	3679
	(0.006)	(0.030)	(0.008)	(0.028)	(0.020)	(0.018)			

Bootstrapped standard error in parentheses
* : 10% significant, ** : 5% significant, *** : 1% significant

6-2 Foreign affiliate in the non-manufacturing sector

Time	TFP	VA/EMP	EMP	Head_EMP	WAGE	KL_Ratio	number of treatments	number of controls	total
t-1 VS t+1	0.015	0.064	-0.015	0.002	-0.011	-0.029	201	990	1191
	(0.011)	(0.048)	(0.022)	(0.056)	(0.032)	(0.041)			
t-1 VS t+2	0.006	0.03	-0.014	0.071	-0.013	-0.045	174	857	1031
	(0.011)	(0.052)	(0.015)	(0.053)	(0.027)	(0.041)			
t-1 VS t+3	0.023**	0.097*	-0.017	-0.004	0.05	-0.037	155	760	915
	(0.010)	(0.054)	(0.023)	(0.051)	(0.034)	(0.041)			

Bootstrapped standard error in parentheses
* : 10% significant, ** : 5% significant, *** : 1% significant

Table 7: Difference in differences analysis of performance of parent firms moving abroad between 1995 and 2005: Split by purpose for investment: Horizontal versus Vertical FDI

7-1 Foreign affiliate in US or Europe (Horizontal FDI)

Time	TFP	VA/EMP	EMP	Head_EMP	WAGE	KL_Ratio	number of treatments	number of controls	total
t-1 VS t+1	0.006	0.048	0.002	0.073	-0.035	-0.091	177	852	1029
	(0.014)	(0.054)	(0.017)	(0.063)	(0.031)	(0.060)			
t-1 VS t+2	0.012	0.039	-0.015	0.059	0.003	-0.063*	161	781	942
	(0.009)	(0.050)	(0.017)	(0.057)	(0.035)	(0.035)			
t-1 VS t+3	0.026**	0.131**	-0.008	0.065	0.036	-0.089***	152	735	887
	(0.012)	(0.054)	(0.018)	(0.060)	(0.024)	(0.030)			

Bootstrapped standard error in parentheses
* : 10% significant, ** : 5% significant, *** : 1% significant

7-2 Foreign affiliate in Asia (Vertical FDI)

Time	TFP	VA/EMP	EMP	Head_EMP	WAGE	KL_Ratio	number of treatments	number of controls	total
t-1 VS t+1	0.002	-0.01	-0.013	0.021	0.013	-0.012	716	3317	4033
	(0.007)	(0.027)	(0.010)	(0.033)	(0.018)	(0.023)			
t-1 VS t+2	-0.007	-0.03	-0.007	0.03	-0.011	-0.007	614	2856	3470
	(0.007)	(0.027)	(0.009)	(0.028)	(0.021)	(0.022)			
t-1 VS t+3	0.007	0.042	-0.019*	-0.006	0.043*	0.012	531	2478	3009
	(0.006)	(0.026)	(0.011)	(0.033)	(0.023)	(0.022)			

Bootstrapped standard error in parentheses
* : 10% significant, ** : 5% significant, *** : 1% significant

Table 8: Difference in differences analysis of export of parent firms moving abroad between 1995 and 2005

Time	Affiliate in the manufacturing sector	Affiliate in the non-manufacturing sector	Affiliate in US or Europe	Affiliate in Asia
t-1 VS t+1	-0.061	0.304	0.09	-0.026
	(0.138)	(0.189)	(0.464)	(0.136)
t-1 VS t+2	-0.158	-0.035	-0.432	0.07
	(0.117)	(0.202)	(0.533)	(0.111)
t-1 VS t+3	-0.019	-0.259	-0.439	0.125
	(0.135)	(0.166)	(0.483)	(0.142)
number of treatments t+1	249	96	23	209
number of controls t+1	1055	465	115	902
total t+1	1304	561	138	1111
number of treatments t+2	191	79	19	159
number of controls t+2	814	379	95	683
total t+2	1005	458	114	842
number of treatments t+3	155	70	18	128
number of controls t+3	646	324	89	544
total t+3	801	394	107	672

Bootstrapped standard error in parentheses.
* Significant at 10%. ** Significant at 5%. *** Significant at 1%.