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The Location of Japanese MNCs Affiliates: Agglomeration Spillovers and Firm Heterogeneity

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The location of Japanese MNCs affiliates: agglomeration, spillovers and firm heterogeneity[¥]

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Abstract

This study examines the determinants of location choices of foreign affiliates by manufacturing Japanese firms, using a new data set that matches parents and their affiliates created over the years 1995-2003. The analysis is based on new economic geography theory and thus focuses on the effect of market and supplier access, as well as production and trade costs. Our interest is twofold. First, we investigate the importance of agglomeration and spillover effects on the firms' decision through the use of proxies relating to the presence of Japanese affiliates in the host countries as well as to that of Japanese multinational firms at home. Overall, our results confirm the economic importance of information sharing and network effects both at home and in the host country beside traditional determinants pertaining to production and transaction costs and access and supply access. Second, we explore whether the effects of key determinants of locational choice vary substantially depending on the characteristics of the investing firm and the plant. We find less productive and smaller parents to be more likely to create an affiliate in China rather than in Western Europe or an OECD country. Moreover less productive firms appear to be more sensitive to distance-related costs and low institutional quality while being more responsive to the presence of Japanese firms and JETRO presence in the host country.

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1-Introduction

A buoyant literature has recently emerged on the FDI-productivity nexus (see Greenaway and Kneller (2007) and Helpman (2006) for surveys). The causal effect of internationalization on Japanese firms' business performance has been the focus of recent studies (Murakami (2007), Inui and Todo (2007) and Hijzen, Inui and Todo (2006)). So far, the empirical evidence is somewhat mixed but findings point to the importance of the context. Recent empirical results (Sakakibara and Yamawaki (2007), Kiyota et al. (2007) and Ito and Fujao (2006)) suggest that the profitability of Foreign Direct Investment is conditional on the parents' and host countries' features.

Our study builds on previous literature on the determinants of location choices of foreign affiliates by Japanese firms (Belderbos and Carree, 2002; Head et al., 1995; Fukao et al. 2003; Kimura and Kiyota, 2006). Our analysis based on the new economic geography theory assesses the importance of various determinants of FDI profitability. It focuses on the effect of market and supplier access, as well as production and trade costs and explores whether the effects of key determinants of locational choice vary substantially depending on the characteristics of the investing firm and the plant.

The case of foreign direct investment by Japanese manufacturing firms is interesting since internationalization of Japanese firms has expanded greatly since the mid-1980s. Reflecting this increase, a large body of literature on Japan's outbound foreign direct investment (FDI) has sprung up which provides interesting benchmark for our results. Moreover, detailed datasets have been built to examine the behavior of Japanese multinational enterprises. This study relies on a new data set on Japanese firms that matches affiliates and parents during 1995–2003. We are thus able to determine whether heterogeneous firms respond differently to host countries features (such proximity, wages, institutional quality or access to markets) or to networks and spillovers.

Our analysis in closer in spirit to Belderbos and Carree (2002)[1] who investigate the determinants of location of Japanese Electronics Investments in China while focusing on agglomeration effects and investigating potential heterogeneity in the responses of investors

[1] They use a conditional logit model to analyze the influence of regional characteristics on the establishment decisions of 229 Japanese plants in the broadly defined electronics industry in 29 Chinese regions and provinces during 1990-1995.

to locational determinants, depending on the characteristics of the investing firm and the plant.

Our motivation is two-fold. First, we expect our results to shed light on the controversial productivity-internationalization nexus. It has become something of a stylized fact that ex-ante productivity determines the choice of whether or not to invest abroad (Greenaway and Kneller, 2007). This feature is coherent with Helpman et al. (2004)'s assumption that the decision to establish foreign production facilities is based purely on considerations of market access. In that context, all FDI is horizontally motivated. However new evidence stresses that the productivity distribution between multinationals and non multinationals is not so clear cut. Head and Ries (2003) demonstrate that when there are factor price and market size differentials, firms invest abroad for vertical motives also and the ordering of the productivity distribution between multinationals and non-multinationals can even be reversed. Further investigation of the determinants of location choices is thus required.

Our second motivation relates to the identification of potential informational barriers to internationalization of Japanese firms. We investigate whether Japanese parents of different productivity and size respond differently to host countries' features such as distance, institutional quality or access to markets and to networks and spillovers. Much evidence suggests that Japanese affiliates tend to cluster in the same regions. We consider three forms of relatedness. The first two relate to the host location (1) affiliates in the same industry originating from the same country (Japan) and (2) downstream affiliates originating from the same country. The third form (3) captures proximity at home (in the same Japanese prefecture) to parents having affiliates in the same destination country. Clusters of Japanese affiliates may form regional production networks, selling intermediate inputs to each other, sharing knowledge and thereby lowering production costs. We also investigate whether location choices are influenced by the presence of JETRO.

We interpret findings of greater sensibility to distance or institutional quality for less productive firms as evidence of greater impediments to internationalization when productivity is low. Alternatively, greater responsiveness by low productivity firms to the presence of JETRO or strong Japanese community indicates that networks and spillovers may help to mitigate those impediments. These features would legitimate policies encouraging collaboration between Japanese firms and dissemination of information targeted to small and less productive firms.

Our paper contributes to a better understanding of the determinants of affiliates' location and especially of the importance of agglomeration forces and spillovers. Our empirical estimation of firm location choice relies on a model directly derived from the new economic geography model (Krugman, 1991; Fujita et al. 1999). Our results are based on a comprehensive data set that covers nearly all the affiliates created by Japanese firms across manufacturing sectors in 54 host countries during the period 1995-2003. Using the information on bilateral trade flows, sales of Japanese affiliates by country and the Japanese national input/output table we construct measures of market access and supplier access, which we relate to the location choice of the affiliates each country and year. We also control for a variety of host country characteristics: proxies for trade costs include transportation costs and tariff, and proxies for production costs include country specific wage and risks to international business indicators.

Overall, our results confirm the economic importance of information sharing and network effects both at home and in the host country beside traditional determinants pertaining to production and transaction costs and access and supply access. The effects of key determinants of locational choice vary substantially depending on the characteristics of the investing firm and the plant. We find less productive and smaller parents to be more likely to create an affiliate in China rather than in Western Europe or an OECD country. This result suggests that the choice of investing in further away and more competition intensive markets is positively correlated with the firm's productivity. It is rather coherent with recent advances of the literature explaining FDI decisions by firm-specific features (Helpman et al. 2004). Moreover less productive firms appear to be more sensitive to distance-related costs and low institutional quality while being more responsive to the presence of Japanese firms and JETRO presence in the host country.

The remainder of the paper is organized as follows. The next section outlines the theoretical framework from which the location choice model estimated in the subsequent sections is derived, and presents the how access to markets is apprehended. Section 3 describes the data and how explanatory variables (as well as the dependent variable) are measured. Section 4 investigates the extent to which the location of Japanese MNCs affiliates responds to these measures and how it depends on the parent's and affiliate's specific features. Section 5 concludes.

2-Theoretical framework and empirical implementation

We derive our estimating equation from a new economic geography model (Krugman, 1991; Fujita et al. 1999). Our theoretical framework follows that of Mayer et al. (2007), Head and Mayer (2004) and Amiti and Javorcik (2007) that describe the expected profits of an affiliate in each of the prospective locations and compare them to get insight about the equilibrium number of affiliates in each alternative country (Amiti and Javorcik, 2007) or on the probability for a firm to invest in a given country (Mayer et al. 2007; Head and Mayer, 2004). One of our empirical contributions is to integrate in this framework results by Head and Ries (2003) interacting heterogeneity in firm productivity with heterogeneity of potential host countries.

The underlying model assumes that firms maximize a profit function subject to uncertainty when choosing a location.[2] While the real underlying profit yielded by alternative locations cannot be observed, what is observed is the actual choice of each firm and the characteristics of the alternative locations.[3]

The theoretical framework underlying the empirical analysis is a reduced version of a standard New Economic Geography model of monopolistic competition based on Dixit and Stiglitz (1977), similar to that used by Fujita et al. (1999) and Redding and Venables (2004).

We consider a world with R locations, composed of firms operating under increasing returns to scale and producing differentiated manufactured products. Consumers' utility increases with the number of varieties. The demand for differentiated products is modeled in the usual symmetric constant elasticity of substitution way, with σ ($\sigma > 1$) being the elasticity of substitution between any pair of products.

[2] The deterministic component of the profit function consists of the various attributes of locations that can influence the profitability of building a plant in a particular location. The random component consists of maximization errors, unobserved characteristics of choices or measurement errors.

[3] As emphasized by Mayer and Mucchielli (1998), the economic decision studied in theoretical location models is by nature a discrete choice among several alternatives made by individual firms. Turning to empirical matters, the econometric model should therefore ideally have these features too. For this reason, models with a qualitative endogenous variable and particularly conditional logit models have been widely used in the preceding empirical work on industrial location.

The final demand for goods in location j (destination) is derived from the maximization of the representative consumer's CES utility function.[4] Country j's demand for a variety produced in r (origin) is:

$$demand_{rj} = p_{rj}^{-\sigma} \frac{E_j}{G_j^{1-\sigma}} \tag{1}$$

where E_j is location j's total expenditure on manufactured goods and p_{rj} is the price of varieties from location r sold in j (consisting of the mill price p_r and iceberg transportation costs T_{rj} between the two locations: $p_{rj} = p_r T_{rj}$). G_j is the aggregate price index for manufactured goods, $G_j = \left[\sum_{r=1}^{R} n_r p_{rj}^{1-\sigma}\right]^{1/1-\sigma}$, with n_r being the number of firms in r.

Taking into account that T_{rj} units must be shipped in order for one unit to arrive, we obtain the effective demand x_{rj} faced by a firm in r from location j:

$$x_{rj} = T_{rj} p_{rj}^{-\sigma} G_j^{\sigma-1} E_j = T_{rj}^{1-\sigma} p_r^{-\sigma} G_j^{\sigma-1} E_j \tag{2}$$

As demonstrated by Redding and Venables (2004), the own price elasticity of demand is σ, and the term $G_j^{\sigma-1} E_j$ shows the position of the demand curve faced by each firm in market j. This latter is referred to as the "market capacity" of country j. It corresponds to local expenditure E_j adjusted for the "market crowding" effect G_j, which summarizes the number of competing firms and the prices they charge. Intuitively, a greater number of competitors and thus a lower value of G_j will reduce the attractiveness of j for any firm exporting there.

Equation (2) underlines that trade costs influence demand more when the elasticity of substitution is high. We follow the literature in referring to $\phi_{rj} = T_{rj}^{1-\sigma}$ as the "phi-ness" of trade (see Baldwin et al., 2003). This can take a value between 0 (when trade costs are prohibitive) and 1 (when trade costs are negligible).

[4] See Fujita et al. (1999) for a complete statement of the underlying model.

2.1-The profit equation for foreign affiliates

Each firm sets its mill rice to maximize profits. Following the Dixit-Stiglitz-Krugman model, we obtain the usual marginal revenue equals marginal cost condition, with the resulting mill price for each origin r as a simple mark-up over marginal costs of production, c_r, which is region-specific (Head and Mayer, 2004):

$$p_r = \frac{c_r \sigma}{\sigma - 1} \tag{3}$$

All varieties produced in a given region r are thus valued at the same price (before transport costs). The gross profit earned in each market j for a variety produced in region r is given by $\pi_{rj} = p_r x_{rj} / \sigma$.

Substituting in equation (3), summing up the profits earned in each market and substracting the fixed costs f_r necessary to establish a plant in region r, we obtain the aggregate net profit, Π_r to be earned in each potential location r:

$$\Pi_r = \sum_j p_r x_{rj} / \sigma - f_r = \frac{1}{\sigma} c_r^{1-\sigma} \sum_j \left[\phi_{rj} G_j^{\sigma-1} E_j \right] - f_r \tag{4}$$

Following the literature we write:

$$\sum_j \phi_{rj} G_j^{\sigma-1} E_j = \sum_j \phi_{rj} m_j = MA_r \tag{5}$$

where MA_r is the "market access" of region r. This is simply the sum of the market capacities of all destinations j, m_j, weighted by the measure of bilateral trade costs, ϕ_{rj}, between r and j. This summarizes how well a location is endowed with access to markets for the goods it produces.[5]

[5] As pointed out by Head and Mayer (2006), market access bears a close resemblance to Harris (1954)'s market potential. The difference lies in the fact that Harris' market potential implicitly treats G_r, the price index, as a constant and ϕ_{rj} is approximated by $1/dist_{rj}$. In this sense, the MA_r is real, not nominal, since it incorporates the notion that large markets that are extremely well-served by existing firms might offer considerably less potential for profits than smaller markets with fewer competitors around them.

Let us define the marginal costs of production, c_r, as $c_r = w_r^{\xi} P_{i,r}^{\zeta} z^{\psi}$, where w_r is the wage, $P_{i,r}$ is the intermediate input price index in sector *i* and region r and *z* is the price of other factors of production (including transaction costs, business impediments and pecuniary externalities).

Taking the natural logs of equation (4) and allowing all variables to be time varying, we have:

$$\ln \Pi_r = \alpha_1 \ln MA_r + \alpha_2 \ln w_r + \alpha_3 \ln P_{i,r} + \alpha_4 \ln z_r \qquad (6)$$

Our theoretical framework thus decomposes the operating profits of affiliates into three main components: i) Access to relevant markets in terms of demand, ii) various components of production costs among which the price of intermediates and local wages and iii) transaction costs and agglomeration effects related to networks. We proxy the price of intermediates by supplier access (SA) measures. Theory suggests that a lower input price index has a positive effect on profits. The more input varieties available and the lower the cost of accessing those varieties are, the lower is the price index and the higher is the profitability. Since individual input prices are unavailable, we follow Amiti and Javorcik (2007) and Mayer et al. (2007) to construct an inverse measure of the price index (described below), by measuring the proximity to potential suppliers. We hypothesize that profits are positively related to better access to intermediate inputs ($\alpha_3 > 0$).

In our empirical analysis, we include beside access to market and supply access, wages varying by country. The theory predicts a negative coefficient on wages ($\alpha_2 < 0$), that is other things equal, firms prefer to locate in countries that offer lower wages. As in the model, we assume that new entrants are too small individually to influence the local wage, so they take it as given. The other country specific costs, z_r, could include any other factors of production whose costs vary between countries. We will consider factors affecting costs upward such as transactions costs (proxied by distance to Japan) and impediments to business practices (proxied by the International Country Risk Guide (ICRG) index) as well as factors affecting costs downward such as spillover, agglomeration and network effects.

2.2-Specification of the location choice model

We estimate the parameters of the profit function (6) using a discrete choice model. As we do not observe the potential profitability of each location, we rely upon the assumption that firms choose the country yielding the highest profit. The location choice literature makes extensive use of the conditional logit model (CLM). This model requires error terms that are independent across locations. As it seems likely that the unobserved component of profitability is correlated among countries in the same continent, we use a generalization that permits such a structure of the random term, the nested logit model (NLM) (Train, 2003). This method accounts for the possibility that substitution patterns are not the same across all alternatives. To this aim, it partitions the set of alternatives into several "nests" corresponding to continents and assumes nest-specific substitution patterns across alternatives. In our framework, there are six nests relating to Asia, Western Europe, Rest of Europe, Latin America, North America and Oceania. Under this nested tree structure, the location choice can be decomposed into two steps, the choice of a nest and the choice of a location inside the chosen nest.

For estimation purposes it is useful to decompose the nested model into two logit functions. The profit function can be split into i) a component W that is constant for all alternative within a nest and ii) a component Y that varies over alternatives within the nest:

$\Pi_r = Y_r + W_k + \varepsilon_r$ with *k*(=Asia, WEurope, OEurope, LAmerica, NAmerica and Oceania) an index designating the nest in which location *r* belongs and ε_r^i an error which marginal distribution is univariate extreme value. This random term can be seen as a shock to the marginal cost specific to firm-country pairs. The probability for country *r* to be chosen as a location can be expressed as the product of two probabilities, the probability P_k that an alternative with nest *k* is chosen and the conditional probability $P_{r|k}$ for location *r* to be chosen among the different countries constituting the chosen nest: $P_r = P_{r|k} P_k$

McFadden (1978) shows that with the specified logistic error structure, each of those probabilities can be expressed using the information contained in W_k and Y_r, with nest-specific variables used to explain the choice of a nest and location-specific ones explaining the conditional probability: $P_k = \exp(W_k + \rho_k Z_k - \tilde{Z})$ where $\tilde{Z} = \ln \sum_k \exp\left[W_k + \rho_k IV_k\right]$ and

$P_{r|k} = \exp(\rho_k^{-1} Y_r - Z_k)$ where $Z_k = \ln \sum_k \exp\left[\rho_k^{-1} Y_r\right]$ is termed the inclusive value for state *k*, and parameters ρ_k is the "log-sum coefficient" that reflects the degree of independence among the unobserved portions of expected profits for alternative nest *k*.

For $\rho_k = 0$, countries are perfect substitutes between continents whereas for $\rho_k = 1$ there is full independence and patterns of substitution are the same within and between continents. As a first step, we constraint both log-sum coefficients to equality and estimate it using the variability of Y_r within the nests. As shown by Train (2003), the probability of choosing country *r* is $P_r = \exp(W_k + Y_r - \tilde{Z})$ and can be estimated by maximum likelihood techniques using information entering the profit function. The NLM collapses to the CLM. Then in a second step, we adopt a more rigorous approach and consider differences between investments depending on the continent of destination in a more structural way. The choice of continent is modeled as depending on the continent level of development (average GDP per capita), its dynamics (growth rate of GDP over thee 5 years before the investment) and average time difference with Japan. We will show that results are only marginally affected when estimations rely on the nested logit estimator.

Once a continent is selected, the specific country of location is chosen as to maximize profits. In coherence with the theoretical model, key determinants are market and supply access as well as agglomeration and spillover effects that mitigate transaction costs. Next section details how market access is constructed. In section 3, we describe the data sources and the definition of the various other variables in our model.

2.3-Market Access computation

Summing the effective demand x_{rj} faced by a firm in r from location j over all products produced in r (equation 2), we obtain the "trade equation" (Redding and Venables, 2004). The total value of exports of region r to region j is therefore:

$$n_r p_r x_{rj} = n_r p_r^{1-\sigma} \phi_{rj} G_j^{\sigma-1} E_j \qquad (7)$$

As emphasized by Redding and Venables (2003), this equation for bilateral trade flows provides a basis for the estimation of a gravity trade model. While the last term on the right-

hand side of equation (7) reflects the "market capacity" of region j, $m_j = G_j^{\sigma-1} E_j$, the first term, $n_r p_r^{1-\sigma}$, measures what is referred to as the "supply capacity" of the exporting region, $s_r = n_r p_r^{1-\sigma}$. This corresponds to the product of the number of varieties and their price competitiveness.[6]

As shown in equation (5), for each country r, market access is defined as $MA_r = \sum_j \phi_{rj} G_j^{\sigma-1} E_j$. Since neither market access itself nor its components, market capacity ($G_j^{\sigma-1} E_j$) and freeness of trade (ϕ_{rj}), are directly observable, we rely on the two-step procedure that was pioneered by Redding and Venables (2004). In this approach, the market capacities, m, of international and national trading partners, as well as transport costs, ϕ, can be estimated using a gravity equation.

Taking natural logarithms in equation (7) yields the basic econometric specification used for the trade equation, so the total value of exports to region j from all firms based in region r is given by:

$$\ln(X_{rj} = n_r p_r x_{ij}) = \ln s_r + \ln \phi_{rj} + \ln m_j = FX_r + \ln \phi_{rj} + FM_j \tag{8}$$

The empirical estimation of equation (8) provides us with estimates of the two components of market access, freeness of trade and market capacity. Importer fixed effects correspond to the log of the unobserved market capacity of the importer region j, $FM_j = \ln m_j = \ln(G_j^{\sigma-1} E_j)$, while exporter fixed effects (FX_r) capture the log of the exporter's supply capacity, s_r.

Assuming transport costs, ϕ_{rj}, in our gravity equation depend on bilateral distances[7], and a series of dummy variables indicating whether the two partners r and j share a common language and colonial links, or are contiguous, equation (8) yields the following trade regression:

$$\begin{aligned} \ln X_{rj} &= FX_r + FM_j + \delta \ln dist_{rj} + \varphi \text{ common language}_{rj} \\ &+ \psi \text{ colonial link}_{rj} + \zeta \text{ contiguity}_{rj} + \varsigma_{rj} \end{aligned} \tag{9}$$

Equation (9) is estimated separately for each year, yielding country specific estimates of market capacity and transportation costs to construct country market access. This article

[6] Redding and Venables (2003) discuss the concepts of market and supply capacity in greater depth.
[7] In equation 9, $dist_{rj}$ denotes the great circle distance between r and j.

employs the BACI dataset[8], a cross-country dataset developed in CEPII covering the period 1995-2003. A detailed description of the original sources and procedures to obtain data is in Gaulier et al. (2007). Dyadic information (common language, distance, colonial links and contiguity) come from the CEPII Distances database.

3-Data and variables

3.1-The dependent variable: investments abroad

Our dependent variable consists of investments by Japanese firms. Data on Japanese affiliates abroad are obtained from the basic survey on Overseas Business Activities conducted annually by the Ministry of Economy, Trade and Industry (METI).[9]

More than 15,842 Japanese investments in operation in 2001-2003 are listed in our sample with corresponding data on when operation started, sector, country of location and other details on the nature and the objective of the investment. The initial selection of 6,084 Japanese investments[10] (initiated over the years 1995-2003) was essentially driven by the availability of host country data and the necessity to cover only affiliates providing consistent information over time (notably on the sector of operation, date of entry...). Information on the affiliates' parent (such as the location in Japan, size and productivity) is incorporated as the affiliates dataset is then merged to the Basic survey of Japanese Business Structure and Activity through the Japanese parent identification code. The strength of the survey is its sample coverage and the reliability of its information 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. Its limitation is however that it excludes information on financial matters and institutional arrangements such as keiretsu.[11]. In coherence with the theoretical

[8] BACI aims to provide the international trade database for the largest number of countries (over 200) and years (from 1995), with a special care in the treatment of unit values. Original procedures are developed to reconcile data reported by countries to United Nations COMTRADE. The data is downloadable from http://www.cepii.fr/anglaisgraph/bdd/baci.htm.

[9] We obtain access to the answers for three consecutive years 2001, 2002 and 2003.

[10] They include 1,458 investments in the wholesale and retail sector, 1,281 in other services, 93 in the primary sector and 3,252 in the manufacturing sector.

[11] The results of the Basic Survey of Japanese Business Structure and Activities are prepared annually by the Research and Statistics Department, METI (1994-2003). This survey was first conducted in 1991, then again in 1994, and annually thereafter. The main purpose of the survey is to capture statistically a comprehensive picture of Japanese corporate firms that includes their diversification-, globalization-, R&D- and information technology-related activities. The survey is compulsory for manufacturing and non-manufacturing firms with

model, our empirical estimations will only include affiliates operating in manufacturing activities. Because some affiliates do not report their parent identity or due to different inconsistency issues (change in the parent identity, unavailability[12] or inconsistency in the parent statistics), our final sample covers 3,252 Japanese manufacturing investments of which 3,124 provide both host country and parent specific information. Since the information on parents and affiliates is restricted to the period 2001-2003, our empirical estimations will rely throughout on the average features over that period.[13] Our final dataset covers a universe of possible location choices to 54 countries.

Further details concerning the data used in the estimations can be found in the data appendix (Appendix A) which includes Tables A-1 and A-2 reporting the number of Japanese firms by country and manufacturing sectors[14] respectively.

Map 1 uses this data to plot the accumulated number and total employees of Japanese affiliates as of 2003 in the country where they invested between 1995 and 2003. Several important features of Japanese investment patterns are immediately apparent: the concentration in Asia (especially China), the strong attractiveness of US and UK as well as the quasi absence from the non Asia developing world.

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more than 50 employees and with capital of more than 30 million yen (some non-manufacturing sectors such as finance, insurance and software services are not included). The sample firms account for about one-third of the total national workforce, 99 percent of total exports, and 69 percent of total imports for Japan in 2002 (Kiyota and Uruta, 2007).

[12] One rationale for missing parent is that the affiliates survey has no sample restriction in terms of firm size or in terms of sectors while the Basic survey of Japanese Business Structure and Activity covers firms above 50 employees and excludes some non-manufacturing sectors such as finance, insurance and software services.

[13] One would ideally explain the location decision in a year *t* by information on the parent and on the affiliates for that year. Unfortunately, the unavailability forces us to use the average value between 2001 and 2003 and implicitly assume that the size of parents and affiliates remain constant throughout time. The explanatory variables concerned by this approach are supply access and backward linkages, as they incorporate the sales value of affiliates.

[14] The decomposition into sectors follows a 15-sector nomenclature including Textile, Chemical, Basic Metal, Fabricated metal products, Industry machinery and equipment, Office, service industry and household equipment, Household electric appliances, Electronic data processing machines, Communication equipment, Electronic parts and devices, Miscellaneous electrical machinery, Motor vehicles, parts and accessories, Miscellaneous transportation equipment, Precision instruments and Other Manufacturing.

3.2-The explanatory variables

3.2.1 Supply Access

The supplier access effect comes through the price indices of intermediate inputs. As explicit in the theoretical framework of the NEG, a large number of local suppliers of inputs in a host country reduced the price index of intermediate inputs, and therefore production costs, which makes the country more attractive (Krugman and Venables, 1995). Since individual input prices are unavailable, we follow Amiti and Javorcik (2007) who were the first to approximate this effect relying on information on the relative availability of inputs and its use by downward sectors. Our measure of supply access is therefore inspired from Amiti and Javorcik (2007) but incorporates additional hypotheses as in Mayer et al. (2007) to address the unavailability of sector-specific value of output data. First, we assume that an affiliate abroad uses intermediate inputs in the same proportion as forms of its industry in Japan, consequently the Japanese affiliates' technical coefficients will be proxied by those from the national Japanese IO table. Second, our measure of the relative availability of inputs will only account for the location of Japanese affiliates producers of inputs in the host country. Mayer et al. (2007) argue that this corresponds restricting to the co-location of these foreign affiliates that usually work together and neglecting any belonging of these foreign affiliates to the same MNC. This approach implicitly assumes that Japanese affiliates abroad are more likely to buy intermediate inputs from other Japanese affiliates or that the location patterns of Japanese affiliates abroad are a good representation of the distribution of other firms one can source inputs from.

Our measure of the availability of inputs within a country *r* that are used by industry *i* in year *t* is defined as $SA_{i,t}^{r} = \sum_{s=1}^{S} a_{si} \psi_{s,t}^{r} D_{rr}^{-1}$.

Since industries use more than one intermediate input, these output shares are weighted by a_{si}, the technical coefficients from the Japanese national input/output (I/O) table for 2000[15].

The term $\psi_{s,t}^{r}$ stands for the share of the world output of industry *s* produced (by Japanese affiliates) in country *r*. As a proxy for output shares, we use sales shares: $\psi_{s}^{r} = \frac{sales_{s}^{r}}{sales_{s}^{W}}$, with $sales_{s,t}^{W}$, being the overall sales of industry *s* in country *r* (by Japanese affiliates present in

[15] The Japanese national I/O table has 516 sectors and 108 consolidated sectors, which we concord into the 15 manufacturing sectors covered in our empirical analysis.

year *t*). As argued by Amiti and Javorcik (2007), even though individual prices are unavailable, the effects should still be well represented since the price index is lower the higher the share of intermediate inputs produced in close proximity. This measure is divided by the internal distance of country *r,* D_{rr}, in order to account for the ease of access to suppliers inside *r*. We assume the countries to be circular: as in Leamer (1997), intra national distance is modeled as the average distance between producers and consumers in a stylized representation of regional geography, which gives $D_{rr} = dist_{rr} = \left(\frac{2}{3}\sqrt{area/\pi}\right)$. We lag supplier access by one year, in order to limit endogeneity. When controlling for other production costs, supply access is a proxy for a low price index of intermediates in the considered country, and should therefore enter with a positive sign.

3.2.2 Standard covariates

Our other covariates include the standard determinants of location choice that the theoretical and empirical literature have found relevant.

The key measure of final demand, industry-level market access $MA_r = \sum_j \phi_{rj} G_j^{\sigma-1} E_j$ is computed based on the estimation procedure presented in section (2.3). This variable is calculated for the year of investment.

Host country distance from Japan and risks to international business (proxied by the index from the International Country Risk Guide (ICRG)) are also included in order to capture the extent to which it is easier and cheaper for a Japanese investor to operate its business in a proximate and business-friendly country. We rely on the composite risk rating for which 0 denotes the highest risk and 100 the lowest risk. The composite index is based on 22 variables in three subcategories of risk: political, financial, and economic. Those components measure the level of risk to international business operations present in different countries across the globe. They include among others government stability, socio-economic conditions, internal and external conflict, corruption, "law and order" and ethnic tensions.[16]

[16] More information on this data can be found on http://www.prsgroup.com/ICRG_Methodology.aspx.

Another key proposed explanation for investing abroad relates to production costs. We follow the literature and proxy labour costs w_r by the level of GDP per capita, which is expected to enter negatively once demand MA_r is controlled for.

Other country/year features relating to agglomeration and spillover effects may have an impact on the profitability of an affiliate. Global agglomeration effects relating to the number of producers and suppliers ought to be captured by our MA and SA indicators. They will account for the effect of positive externalities associated with the proximate location of downstream and similar manufacturing activities. Such externalities are associated with greater availability and variety in parts and components (Head and Ries, 1996; Belderbos et al., 2000).

We investigate the possibility that agglomeration benefits are stronger when the proximate manufacturers are Japanese-owned. There is some empirical evidence that a Japanese firm investing in a country where there is already a developed Japanese business "community" firms will benefit from lower costs there, everything else equal (Belderbos and Carree, 2002).

We construct our indicator of ***Japanese agglomeration*** intended to account for the Japanese presence in a given country at a given period as the total number of affiliates established since 1990 by Japanese firms. It is computed without including information from the affiliate under scrutiny.

Findings of positive and significant impact of Japanese agglomeration on location choice benefits may reflect the fact that prospective investors may share useful information on how to operate manufacturing plants in a country with other experienced Japanese firms. Belderbos and Carree (2002) argue these greater benefits of clustering can be attributed to easier information sharing among Japanese firms through joint membership of industry associations, national preferences for amenities such as schools and restaurants, greater advantages of proximity due to the use of just-in-time delivery and inventory control systems (Reid, 1994), and the use of specialized components and intermediates for which the specifications are developed within long-term supplier–assembler relationships in Japan. One should note following Mayer et al. (2007) that the count of Japanese firms variable has an ambiguous effect in theory. While it may capture positive technological spillovers, agglomeration dynamics as well as unobserved attractive features of countries, a high number of firms may also mean a high level of local competition for both sales and inputs, which reduces attractiveness. We anticipate and actually observe that once controlling for country

fixed effects that account for previously omitted factors, the negative competition effect become more powerful, and the coefficient on the variable becomes negative as a consequence.

We also investigate the economic impact of the presence of a **JETRO** (Japan External Trade Organization) agency in the host country[17]. Findings of a positive impact of the presence of a JETRO office in the host country on the location choice would suggest positive spillovers from JETRO services on Japanese investors.

Beside those network effects that are identical for all Japanese investors, there might be some firm-specific information/transaction costs across countries. In particular, the literature has highlighted the economic significance of *keiretsu* networks (Belderdos and Carree, 2002; Head and Ries, 1996; Smith and Florida, 1994; Mayer and Muchielli, 1998; O'Huallachain and Reid, 1997; Head et al., 1999; Head and Mayer, 2004; Blonigen et al., 2005). Unfortunately we have no specific information on whether our affiliates or parents firms belong to the same vertical keiretsu. We nevertheless attempt to account for linkages between Japanese firms[18] through two indicators relating respectively to the host and home location.

First, we anticipate in line with Venables (1996) that vertical linkages can induce clustering of suppliers and assemblers in specific locations. It is often argued that numerous suppliers of Toyota followed the international steps of their downstream partner.

Our strategy to compute a measure of **Backward linkages** adopts the same hypotheses as for the Supply Access. It assumes that Japanese affiliates' technical coefficients can be proxied by those from the national Japanese IO table and that Japanese affiliates abroad are more likely to sales their output to other Japanese affiliates (or that the location patterns of Japanese affiliates abroad are a good representation of the distribution of other firms one can sell outputs to). Our measure of backward linkages within a country *r* that apply to firms in industry *i* in year *t* is defined as:

$$BL_{i,t}^{r} = \sum_{s=1}^{S} b_{si} \psi_{s,t}^{r}$$

[17] The list of JETRO offices around the world was taken from http://www.jetro.org/content/97. JETRO provides successful market intelligence information and support to Japanese companies looking for successful entry and expansion abroad.

[18] Refer to Kiyota et al. (2007) for a study on the determinants of the backward vertical linkages of Japanese foreign affiliates focusing on the local backward linkages, or local procurements in the host country. While the Market Access indicator should capture demand not only coming from consumers but also from downstream firms, findings of statistically significant backward linkages in the regressions suggest additional effects between Japanese upstream and downstream firms.

where b_{si} is the share of output from sector *i* that is used as an input by sector *s* taken from the Japanese national input/output (I/O) table for 2000 and $\psi_{s,t}^{r}$ stands for the share of the world output of industry *s* produced (by Japanese affiliates) in country *r,* defined as in section 3.2.1.

Our second strategy to apprehend firm-specific network effects relates to the presence of ***FDI spillovers*** effects at home in the spirit of what is done in the literature looking at export behaviour (Bernard and Jensen (2004). Direct evidence of the positive impact of proximity to other exporters is provided by several papers such as Aitken, Hanson and Harrison (1997), Greenaway, Sousa and Wakelin (2004), Koenig (2005). Assuming that FDI requires specialized knowledge of foreign markets that can be shared through employees exchanges or imitation, one would expect the probability of FDI to be greater for firms surrounded by other multinationals. We investigate the significance of destination specific FDI spillovers for a parent investing in a country by the number of surrounding (defined at the prefecture level[19]) firms having at least one affiliate in the same host country at the time of entry. The Japanese prefecture-level FDI spillovers are computed without including information from the parent of the affiliate under scrutiny, as such it is specific to the FDI project under investigation. We argue that the FDI spillovers may also help to partially capture spillovers from domestic *kereitsu* agglomeration, since *kereitsu* network firms tend to agglomerate in Japan and thus that knowledge of foreign market might be shared among *kereitsu* firms.

We lag our indicators of Japanese agglomeration, backward linkages by one year, in order to limit endogeneity problems[20].

Table A-3 provides summary statistics on our main explanatory variables while Table A-4 reproduces the matrix of their correlation coefficients.

[19] The prefectures of Japan are the country's 47 sub-national jurisdictions: one "metropolis" (都), Tokyo; one "circuit" (道), Hokkaidō; two urban prefectures (府), Osaka and Kyoto; and 43 other prefectures (県). A map of the Japanese prefectures can be found on http://en.wikipedia.org/wiki/Prefectures_of_Japan.

[20] We investigated the importance of host countries' infrastructure quality based on indicators taken from the World Bank (http://econ.worldbank.org) such as the density of roads, railways or phone. Results (available upon request) suggest that none of the infrastructure indicators entered in the regression significantly. Since the results for the other determinants remained unmodified but the sample size was reduced due to the limited coverage of infrastructure data we choose not to include these indicators in the paper.

4-Empirical estimations

We begin with an investigation of the determinants of the choice of country for locating Japanese affiliates relying on the conventional specification used in the literature: the conditional (fixed-effect) logit. We then turn to a nested logit specification in which we first estimate the choice of country within a given continent and then estimate the choice of continent taking into account the attractiveness of its constituent countries. Our first main empirical contribution relates to the investigation of importance of agglomeration forces and spillovers. Our second contribution corresponds to the analysis of how location determinants depend on the investing firm and the plant's features.

4-1 Benchmark estimations

4-1-a Conditional (fixed effect) logit

The first column of Table 1 reports the results of the very simple model of location choice based on distance to Japan, host country GDP and GDP per capita. Column 2 substitutes market access to GDP to proxy the demand potential in the destination country while column 3 further includes the proxies for supply access and backward linkages. Our proxy of risks to international business is further introduced in Column 4.

Colum 5 adds the proxy for Japanese agglomeration, while column 6 further accounts for FDI spillovers. The coefficients on both variables are positive and significant, also within the same order of magnitude as other findings in the literature. Results highlight the powerful influence of Japanese networks both at home and abroad on location choice. Note that introducing these two indicators simultaneously affects the point estimates of the other motives (possibly common to firms in the networks) downward which is expected (comparing columns 4 and 6) though maintaining their respective significance. Column 7, which is our preferred specification completes the model with a dummy variable aiming at capturing the potential positive impact of JETRO's services in the host country. The dummy for the presence of JETRO in the host country enters with the expected and significant positive sign.

All of the variables have a very significant impact on location choice, explaining 40% of the difference in location choices of Japanese affiliates between countries. Our results confirm that profits are negatively related to production and transactions costs. Our proxy for labour costs (GDP/capita) and the two transaction costs variables (distance and risks to international

business) enter in the expected way, negative for the first two and positive for the latter. Results moreover suggest that location choice is positively related to better access to intermediate inputs, which are reflected in a lower intermediate input price index, proxied by SA_r ; and that firms are also concerned about good market access, MA_r . Market access enters with the expected sign and its magnitude matches usual findings in the literature. Supply access always has a significant and positive effect, which is consistent with results by Amiti and Javorcik (2006) and Mayer et al. (2007): Affiliates tend to be located where it is easier to find suppliers and outlets. This latter feature is highlighted by the positive and significant impact of our proxy of Backward Linkages. Findings of positive and significant coefficients on the three indicators introduced in Columns 5 though 7 provide supportive evidence for the importance of agglomeration as well as economic spillover effects. With variables taken in logs (and a large number of location choices), the coefficient on each variable is very close to elasticities of the probability of choosing a country for the average investor (see Train, 2003). Estimates in column 7 indicate that a 10% increase in market access and supply access increases the probability of attracting Japanese investors by about 2 and 1.3% respectively. The impact of backward linkages, agglomeration and spillover effects is quite similar in magnitude since a 10% increase in these variables raises the probability of location by 3%. The probability of investing in a country with a JETRO office is 28%[21] higher than that for a comparable country without JETRO presence.

In the last two columns, we include country fixed effects in the estimation. This accounts for every characteristic of location countries (some observable, some not) that do not vary over our time frame, 1995-2003. Distance to Japan and the JETRO variables are naturally dropped in that specification, which identifies coefficients in the time dimension only. The proxy for business risks loses its significance possibly due to small time variation of institutions over the limited period under investigation. We observe an increase in the magnitude of most coefficients, with the exception of the spillover indicator. However, this does not change the flavor of our results except concerning the impact of the Japanese agglomeration indicator.[22] As anticipated above, we find that once controlling for country fixed effects that account for previously omitted characteristics that make a country a desirable place to invest for Japanese

[21] It corresponds to exp(0.25)-1.

[22] As an additional robustness check, we introduced a proxy for the exchange misalignment and/or volatility between the potential affiliate's location and Japan. We relied on the relative change of the country's exchange rate with respect to the yen over the 5 years preceding the affiliate creation. It failed to enter significantly in the regressions.

investors, the negative competition effect become more powerful, and the coefficient on the now purged count of Japanese affiliates becomes negative as a consequence.

Comparing the impact of variables should go beyond comparing elasticities (approximated by coefficients here), since our different variables have different variance as displayed in table A-3. We follow Head and Mayer (2004) who propose the following thought experiment: Take a hypothetical country with mean value of explanatory variables and simulate a one standard deviation shock in the variable of interest (market access say). The ratio of new over baseline probabilities of being chosen is $[1+cv(MA)]^{\beta MA}$, with βMA being the estimated coefficient in our benchmark estimation (Column 7), and cv(MA) the coefficient of variation of the variable in question. Carrying this one standard deviation shock exercise gives an increase in the "mean country"'s probability of being chosen of 27% for market access, 20% for supply access, 63% for backward linkages, 50% for Japanese agglomeration and 48% for spillovers at home.

4-1-b Nested logit

We now investigate the problem associated with non-independent errors across nations belonging to the same region. The use of the country dummies in specifications 8 and 9 in Table 1 should help to mitigate the problem but it does not resolve problems associated with cross-industry and inter-temporal differences in the attractiveness of locations. By considering the choice of continent for a given choice of country, we condition on all aspects of the continent that do not vary across its constituent countries from the perspective of a given investor. We consider that the choice of a given region depends on its total size and dynamics as well as its remoteness. Those three dimensions are proxied by the average continent development level (GDP per capita), average GDP growth over the 5 year period prior investment and average time difference with Japan respectively. Results are reported in Table 2. The five columns of the Table 2 reproduce using the nested logit estimator columns 3 though 7 of Table 1. The LR test statistics reported in the last line of the Table reject in all specifications the null hypothesis of equivalence between nested and conditional logit specifications. In most specifications, inclusive values are equal to one for all continents while the reverse is true for the other two nests (Asia and in some cases Other Europe). Nevertheless signs and magnitude of our coefficients are very similar (compare column 7 of Table 1 and

column 5 of Table 2). Overall, our results confirm the economic importance of information sharing and network effects both at home and in the host country beside traditional determinants pertaining to production and transaction costs and access and supply access.

4-2 Exploration of location determinants conditionality

One novel contribution of our paper is to explore the possibility that determinants of location choice are conditional and more specifically depend on the parent's and affiliate' s features. We investigate Helpman et al.'s (2004) argument that FDI decisions depend on firm-specific features. Preliminary evidence in the case of Japanese firms is provided by Belderbos and Carree (2002) who investigate the determinants of location of Japanese Electronics Investments in China and the heterogeneity in the responses of investors to locational determinants, depending on the characteristics of the investing firm and the plant. We rely on a two-fold approach to explore the conditionality of location determinants for our much more complete survey of Japanese overseas business activities.

4-2-a Interactive terms between parent's features and destination

Our first approach is to investigate whether the odds of choosing China, OECD, US or Western Europe as a destination depend on the parent's size (proxied by the number of employees) or TFP. We rely on Hijzen et al (2006) estimates of Japanese firm's Total Factor Productivity growth. Their computation follows the method of Good, Nadiri and Sickles (1997), taking the year 1994 as the base time period. Results displayed in Table 3 suggest that firms choosing to locate their affiliates in China tend to be less productive and of smaller size. The picture is exactly opposite as far as location in Western Europe or OECD countries is concerned. These results suggest that costs associated with Europe and OECD locations are greater, requiring higher TFP and size to afford them. The US market does not seem to require higher than average TFP or size. The probability of Japanese firms to investing in China is much less pronounced when the firm is more productive.

4-2-b Sample decomposition depending on affiliate's and parent's features

Our second approach corresponds to dividing the sample according to the affiliates' local sales ratio and the parent's size and TFP respectively. These latter two indicators are measured similarly to the previous sub-section while the local sales ratio of the affiliates correspond to the average share of sales absorbed in the local market as declared by the affiliates (over the period 2001-2003). Table 4 displays results based on our benchmark specification while splitting the dataset between below and above median for the three affiliate's and parent's features enounced above.[23] Results are reported successively relying on the conditional (fixed effects) and nested logit estimators. While coefficients point estimates are slightly different depending on the estimation method, significant differences emerge between subsamples that are robust across empirical methodologies. The left hand side panel of Table 4 explores heterogeneity between affiliates serving local market with a ratio lower or higher than 92% (the median is rather higher than the mean which is 72%). We find affiliates with higher local sales ratio to be more sensitive to distance, market access, supply access and JETRO presence. Greater responsiveness to these four determinants for affiliates focusing in providing appropriate and cheap products to local customers is quite logical. Conversely, affiliates with a lower interest in the local market appear to be more sensitive to Japanese agglomeration. Possibly their activities are mostly in relation with sourcing from or to other Japanese firms and thus not so dependent on local market (demand and supply) conditions.

As far as parent's characteristics are concerned. Limited heterogeneity is found depending on the size, we nevertheless find below median size parents to respond to a greater extent to the JETRO presence and to be less sensitive to distance. Turning to TFP cut-off, more productive parents appear to be less sensitive to almost all determinants than less productive parents, possibly because their above median productivity mitigates the difficulty pertaining to distance or outlets constraints. Their location choices seem to valorize to a greater extent supply access. These findings may relate to the capacity for productive firms to better exploit competition between suppliers. On the opposite, location decisions by less productive parents seem to be more sensible to locational advantages such as proximity, market access and quality of institutions. Moreover, less productive parents are more responsive to Japanese

[23] Very similar findings are obtained using the mean as the criteria to split the sample. They are available upon request from the authors.

agglomeration as well as the JETRO presence. It is indeed very likely that less productive firms rely heavily on information networks (from JETRO office and from other Japanese firms in the host country) to reduce costs of entering and operating in foreign countries.

Overall, our results are quite logical and point to significant heterogeneity in the responses of investors to locational determinants, depending on the characteristics of the investing firm and the affiliate. Diversity emanates from the parents' different strengths and weaknesses: greater size and TFP appears to mitigate the need for easy outlet (high market access and low distance) and thus the sensitivity to networks (Japanese agglomeration) and spillovers (JETRO advices). Conversely, high productive parents seem to make the best out of intense competition between local suppliers and developed Japanese community.

5-Conclusion

Our study examines the determinants of location choices of foreign affiliates by Japanese firms, using a new data set that matches affiliates and parents during 1995–2003. The analysis is based on new economic geography theory thus integrating the effect of market and supplier access, as well as production and trade costs. We first investigate beside the traditional determinants of location choice, the importance of agglomeration and spillover effects on the firms' decision through the use of proxies relating to the presence of Japanese affiliates in the host countries as well as to that of Japanese multinational firms at home. The robustness of out empirical work is ensured through the use of both conditional logit and nested logit estimations. Our results confirm the economic importance of information sharing and network effects both at home and in the host country.

Our second contribution corresponds to the exploration of variations in the sensitivity to key determinants of locational choice depending on the characteristics of the investing firm and the plant. We find less productive and smaller parents to be more likely to create an affiliate in China rather than in Western Europe or an OECD country. Moreover less productive parents appear to be more sensitive to locational advantages such as proximity, market access and quality of institutions. Also they seem to value more the information networks provided by JETRO presence and other Japanese affiliates abroad. More productive firms on the

opposite tend to be more responsive to supply access. As far as differences pertaining to affiliates are concerned, our results suggest that affiliates with higher local sales ratio tend to be more sensitive to distance and also to factors facilitating the provision of products suited to local customers (market access, supply access and JETRO presence).

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Table 1: Benchmark results: Conditional (fixed-effects) logit

	1	2	3	4	5	6	7	8	9
Ln Distance to Japan	-0.615***	-1.356***	-0.352***	-0.353***	-0.300***	-0.047	-0.258***		
	(0.042)	(0.041)	(0.069)	(0.072)	(0.074)	(0.053)	(0.077)		
Ln GDP per capita	-0.287***	-1.442***	-0.777***	-0.897***	-0.654***	-0.396***	-0.525***	-0.940***	-0.866***
	(0.017)	(0.033)	(0.037)	(0.043)	(0.049)	(0.037)	(0.053)	(0.308)	(0.320)
Ln GDP	0.838***								
	(0.019)								
Ln Market Access		1.329***	0.361***	0.371***	0.244***	0.058*	0.200***	1.215***	1.006***
		(0.031)	(0.041)	(0.043)	(0.044)	(0.031)	(0.046)	(0.136)	(0.143)
Ln Supply Access, t-1			0.434***	0.384***	0.175***	0.219***	0.134**	0.321***	0.327***
			(0.050)	(0.051)	(0.055)	(0.048)	(0.057)	(0.080)	(0.082)
Ln Backward Linkages, t-1			0.441***	0.440***	0.317***	0.308***	0.308***	0.281***	0.285***
			(0.027)	(0.027)	(0.030)	(0.029)	(0.032)	(0.043)	(0.046)
Ln ICRG, t-1				1.814***	1.278***	1.225***	0.942***	-0.088	0.221
				(0.287)	(0.284)	(0.266)	(0.308)	(0.430)	(0.459)
Jap. Agglomeration (Ln nb of Jap. affiliates) t-1					0.406***	0.350***	0.322***		-0.586***
					(0.037)	(0.040)	(0.041)		(0.143)
Spillover Ln nb of surrounding parents having an affiliate country/year						0.311***	0.269***		0.185***
						(0.036)	(0.037)		(0.040)
JETRO presence dummy							0.252**		
							(0.121)		
Continent dummies	yes	yes	yes	yes	yes	yes	yes	n/a	n/a
Country-specific dummies	no	no	no	no	no	no	no	yes	yes
Investment * Country	269 916	269 916	269 916	239 587	239 587	219 964	219 964	239 587	219 964
Investment	3 252	3 252	3 252	3 143	3 141	2 924	2 924	3 143	2 924
Pseudo R2	0.33	0.33	0.39	0.40	0.40	0.40	0.40	0.42	0.41

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: Benchmark results: Nested logit

	1	2	3	4	5
Ln Distance to Japan	-0.303***	-0.300***	-0.275***	-0.189**	-0.202**
	(0.071)	(0.075)	(0.074)	(0.080)	(0.080)
Ln GDP per capita	-0.736***	-0.859***	-0.592***	-0.527***	-0.499***
	(0.037)	(0.048)	(0.047)	(0.048)	(0.050)
Ln Market Access	0.304***	0.323***	0.171***	0.146***	0.153***
	(0.043)	(0.047)	(0.042)	(0.042)	(0.043)
Ln Supply Access, t-1	0.475***	0.431***	0.235***	0.167***	0.173***
	(0.053)	(0.055)	(0.051)	(0.055)	(0.055)
Ln Backward Linkages, t-1	0.444***	0.437***	0.297***	0.304***	0.291***
	(0.027)	(0.027)	(0.029)	(0.032)	(0.032)
Ln ICRG, t-1		1.815***	1.142***	1.329***	1.150***
		(0.344)	(0.257)	(0.224)	(0.241)
Jap. Agglomeration (Ln nb of Jap. affiliates) t-1			0.409***	0.347***	0.351***
			(0.032)	(0.042)	(0.042)
Spillover Ln nb of surrounding parents having an affiliate country/year				0.237***	0.237***
				(0.053)	(0.053)
JETRO presence dummy					0.244**
					(0.120)
Explanatory variable of choice of Nest (continent)					
Continent GDP per capita	0.067	1.021*	1.826**	0.273*	0.249
	(0.811)	(0.580)	(0.749)	(0.152)	(0.157)
Continent GDP growth t-5/t	8.457***	8.388***	4.957***	6.220***	6.192***
	(1.144)	(1.157)	(1.292)	(1.200)	(1.206)
Average time difference	-0.997	0.104	0.112	-0.768	-0.712
	(3.099)	(1.603)	(1.376)	(0.520)	(0.538)
Investment * Country	269 916	239 587	239 587	219 964	219 964
Investment	3 252	3 143	3 143	2 924	2 924
LR test (IV=1)	77.73***	57.47***	69.57***	56.71***	54.28***

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Investigation of destination parent related specific features (Conditional logit)

	1	2	3	4	5	Nested Logit 6
Ln Distance to Japan	-0.361***	-0.015	-0.261***	-0.253***	-0.339***	-0.256***
	(0.081)	(0.089)	(0.078)	(0.077)	(0.081)	(0.081)
Ln GDP per capita	-0.582***	-0.625***	-0.525***	-0.522***	-0.572***	-0.554***
	(0.056)	(0.057)	(0.054)	(0.054)	(0.057)	(0.050)
Ln Market Access	0.184***	0.214***	0.197***	0.196***	0.182***	0.172***
	(0.047)	(0.046)	(0.046)	(0.046)	(0.047)	(0.043)
Ln Supply Access, t-1	0.191***	0.179***	0.136**	0.141**	0.202***	0.193***
	(0.059)	(0.058)	(0.058)	(0.058)	(0.060)	(0.054)
Ln Backward Linkages, t-1	0.266***	0.285***	0.308***	0.306***	0.265***	0.248***
	(0.033)	(0.032)	(0.032)	(0.032)	(0.034)	(0.033)
Jap. Agglomeration (Ln nb of Jap. affiliates) t-1	0.388***	0.355***	0.315***	0.313***	0.378***	0.421***
	(0.046)	(0.042)	(0.041)	(0.041)	(0.046)	(0.045)
Spillover Ln nb of surrounding parents having an affiliate	0.298***	0.270***	0.271***	0.279***	0.305***	0.234***
	(0.039)	(0.038)	(0.038)	(0.038)	(0.039)	(0.044)
Ln ICRG t-1	1.215***	1.382***	0.987***	0.964***	1.160***	1.603***
	(0.319)	(0.321)	(0.312)	(0.310)	(0.319)	(0.261)
JETRO presence	0.234*	0.043	0.256**	0.259**	0.238**	0.306***
	(0.121)	(0.127)	(0.121)	(0.121)	(0.121)	(0.118)
China*Ln(parent's TFP)	-0.647**				-0.303	-0.324
	(0.291)				(0.315)	(0.325)
China*Ln(parent's employment)	-0.045***				-0.045***	-0.029**
	(0.014)				(0.014)	(0.014)
OECD*Ln(parent's TFP)		0.908***				
		(0.287)				
OECD*Ln(parent's employment)		0.064***				
		(0.014)				
US*Ln(parent's TFP)			0.489		0.600	0.526
			(0.373)		(0.403)	(0.343)
US*Ln(parent's employment)			0.001		-0.014	-0.006
			(0.023)		(0.025)	(0.022)
Western Europe*Ln(parent's TFP)				1.464***	1.469***	2.055**
				(0.423)	(0.446)	(0.879)
Western Europe*Ln(parent's Employment)				0.179***	0.164***	0.083
				(0.042)	(0.043)	(0.079)
Fixed effects by continent	yes	yes	yes	yes	yes	yes
Investment * Country	218 381	218 381	218 381	218 381	218 381	218 381
Investment	2 903	2 903	2 903	2 903	2 903	2 903
Pseudo R2	0.40	0.40	0.40	0.40	0.40	
LR test (IV=1)						54.57***

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Results depending on parents and affiliates features: local sales content of affiliates and size and TFP of parent (Conditional & nested logit)

	Affiliates local sale ratio				Parent's size (number of employees)				Parent's Total Factor Productivity			
	Conditional Logit		Nested Logit		Conditional Logit		Nested Logit		Conditional Logit		Nested Logit	
	Higher than median	Lower than median	Higher than median	Lower than median	Higher than median	Lower than median	Higher than median	Lower than median	Higher than median	Lower than median	Higher than median	Lower than median
	1	2	3	4	5	6	7	8	9	10	11	12
Ln distance	**-0.341*** **	-0.161	**-0.271*** **	-0.091	**-0.282*** **	-0.201	**-0.216** **	-0.174	-0.207**	**-0.344*** **	-0.223**	-0.283**
	(0.098)	(0.127)	(0.100)	(0.113)	(0.091)	(0.147)	(0.095)	(0.162)	(0.104)	(0.116)	(0.106)	(0.112)
Ln GDP per capita	-0.555***	-0.498***	-0.520***	-0.577***	-0.550***	-0.467***	-0.503***	-0.476***	-0.509***	-0.547***	-0.488**	-0.543***
	(0.070)	(0.084)	(0.064)	(0.071)	(0.063)	(0.102)	(0.059)	(0.093)	(0.070)	(0.084)	(0.072)	(0.073)
Ln Market Access	**0.274*** **	0.098	**0.219*** **	0.138**	0.207***	0.179**	0.143***	0.158**	0.144**	**0.270*** **	0.121*	**0.243*** **
	(0.060)	(0.070)	(0.056)	(0.059)	(0.054)	(0.086)	(0.050)	(0.079)	(0.061)	(0.070)	(0.062)	(0.063)
Ln Supply Access, t-1	**0.177** **	0.031	**0.214*** **	0.104	0.103	**0.212***	0.142**	0.245**	0.173**	0.074	0.193***	0.183**
	(0.073)	(0.094)	(0.070)	(0.070)	(0.067)	(0.113)	(0.065)	(0.110)	(0.076)	(0.0887)	(0.074)	(0.080)
Jap. Agglo (Ln nb of Jap. aff.) t-1	0.268***	**0.435*** **	0.261***	**0.531*** **	0.330***	0.273***	0.365***	0.292***	0.275***	**0.403*** **	0.330***	**0.394*** **
	(0.051)	(0.069)	(0.051)	(0.052)	(0.048)	(0.077)	(0.052)	(0.074)	(0.052)	(0.066)	(0.063)	(0.057)
Ln Backward Linkages, t-1	0.308***	0.309***	0.304***	0.239***	0.301***	0.333***	0.283***	0.325***	0.334***	0.262***	0.318***	0.240***
	(0.040)	(0.053)	(0.041)	(0.046)	(0.036)	(0.064)	(0.038)	(0.065)	(0.041)	(0.050)	(0.042)	(0.049)
Spillovers Ln nb of aff created by	0.243***	0.286***	**0.262*** **	0.111***	0.282***	0.262***	0.260***	0.203**	0.287***	0.241***	0.194***	0.190***
surrounding firms (country/year)	(0.048)	(0.061)	(0.054)	(0.034)	(0.045)	(0.070)	(0.067)	(0.080)	(0.049)	(0.058)	(0.069)	(0.050)
Ln ICRG t-1	0.925**	1.071**	1.115***	1.584***	**1.035*** **	0.886	1.185***	1.165**	0.591	**1.461*** **	0.478	**1.458*** **
	(0.394)	(0.501)	(0.307)	(0.318)	(0.360)	(0.609)	(0.292)	(0.521)	(0.398)	(0.496)	(0.403)	(0.331)
JETRO presence	**0.326** **	0.099	**0.302** **	0.080	0.148	**0.573** **	0.141	**0.556** **	0.119	**0.419** **	0.131	**0.407** **
	(0.152)	(0.198)	(0.153)	(0.198)	(0.139)	(0.250)	(0.139)	(0.250)	(0.164)	(0.179)	(0.164)	(0.178)
Observations: Investment* Country	136 165	83 799	136165	83799	157 317	61 064	157317	61064	122 7640	95 617	122 7640	95 617
Investment	1811	1113	1811	1113	2091	812	2091	812	1632	1271	1632	1271
Pseudo R2	0.39	0.42			0.40	0.41			0.39	0.41		

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

APPENDIX A

Table A-1 Explanatory variable: creation of affiliates 1995-2003 (by sector)

Sector	Name	Number of projects
1	Textile	124
2	Other Manufacturing	553
3	Chemical	467
4	Basic Metal	166
5	Fabricated metal products	100
6	Industry machinery and equipment	306
7	Office, service industry and household eqt	32
8	Household electric appliances	61
9	Electronic data processing machines,	65
10	Communication equipment	166
11	Electronic parts and devices	271
12	Miscellaneous electrical machinery	194
13	Motor vehicles, parts and accessorise	614
14	Miscellaneous transportation equipment	32
15	Precision instruments	101
	Total	3,252

Map 1: Cumulated number of affiliates created between 1995 and 2003 and number employees (2002)

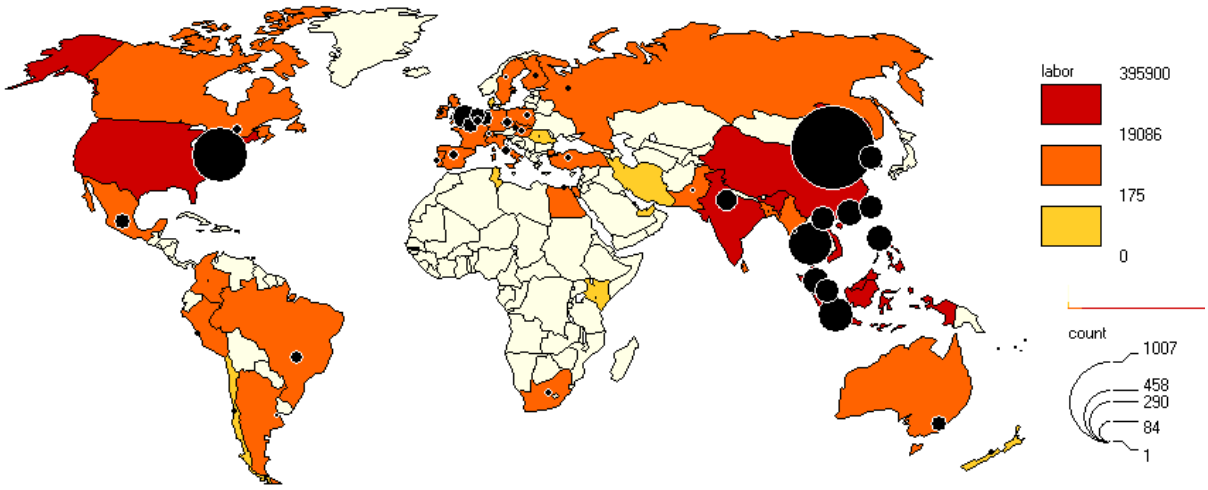

Table A-2 Explained variable: creation of affiliates by Japanese firms 1995-2003 (by country)

Country	Number of projects	Frequency
Argentina	6	0.18
Australia	42	1.29
Austria	1	0.03
Bangladesh	2	0.06
Belgium	17	0.52
Brazil	30	0.92
Burma	6	0.18
Canada	22	0.68
Chile	3	0.09
China	1,007	30.97
Colombia	1	0.03
Czech Republic	18	0.55
Denmark	1	0.03
Egypt	4	0.12
Finland	3	0.09
France	41	1.26
Germany	41	1.26
Greece	1	0.03
Hong Kong	110	3.38
Hungary	11	0.34
India	64	1.97
Indonesia	194	5.97
Iran	1	0.03
Ireland	3	0.09
Israel	1	0.03
Italy	15	0.46
Kenya	1	0.03
Korea	96	2.95
Malaysia	112	3.44
Mexico	36	1.11
Netherlands	37	1.14
New Zealand	3	0.09
Pakistan	5	0.15
Peru	3	0.09
Philippines	114	3.51
Poland	8	0.25
Portugal	7	0.22
Romania	1	0.03
Russian Federation	4	0.12
Singapore	84	2.58
Slovakia	3	0.09
South Africa	13	0.40
Spain	15	0.46
Sri Lanka	2	0.06
Sweden	5	0.15
Switzerland	5	0.15
Taiwan	95	2.92
Thailand	290	8.92
Tunisia	2	0.06
Turkey	9	0.28
United Arab Emirates	1	0.03
United Kingdom	99	3.04
United States of America	458	14.08
Viet Nam	99	3.04
Total	3,252	100

Table A-3: Summary statistics on explanatory variables

Variables	Mean	Standard Error	Minimum	Maximum
Distance to Japan	9 771	3 951	1 157	18 587
GDP per capita	8 678	9 849	212	38 509
Market Access	4.84e+11	1.12e+12	1.63e+09	9.13e+12
Supply Access, t-1	2.29e-06	6.69e-06	0	0.000071
Backward Linkages, t-1	0.013	0.05	0	0.56
Jap. Agglomeration (Ln nb of Jap. affiliates) t-1	79	205	1	2125
Spillover Ln nb of surrounding parents having an affiliate	2.21	7.14	0	91

Table A-4: Correlation Matrix of explanatory variables

	Ln distance	Ln GDP per capita	Ln Market Access	Ln 1+Supply Access, t-1	Jap. Agglo (Ln nb of Jap. aff.) t-1	Backward linkages
Ln distance	1					
Ln GDP per capita	0.6058	1				
Ln Market Access	0.2994	0.8061	1			
Ln 1+Supply Access, t-1	-0.3954	0.0543	0.3952	1		
Jap. Agglo (Ln nb of Jap. aff.) t-1	-0.3898	-0.1174	0.2676	0.8557	1	
Backward linkages t-1	0.0333	0.3289	0.5788	0.8034	0.7410	1
Spillover Ln nb of surrounding parents having an affiliate (country/year)	-0.2541	-0.1412	0.0630	0.4535	0.4646	0.3578