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Location Choice of Multinational Enterprises in China: Comparison between Japan and Taiwan

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***Abstract*:** This paper explores the location choice of MNEs in China, shedding special light on the role of agglomeration of same-nationality firms. In particular, we examine how its role differs according to investors' productivity. Furthermore, we compare the location choice of Japanese and Taiwanese MNEs in China, because Taiwanese MNEs are expected to experience less uncertainty in investing in China than Japanese MNEs, due to Taiwan's linguistic and cultural advantages in China. We find that, less productive Japanese firms prefer to locate close to larger same-nationality agglomerations, there are no differences in location according to firms' productivity in the case of Taiwanese firms.

***Keywords*:** Multinational enterprises; China; Productivity
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1. Introduction

China has attracted a vast volume of foreign direct investment (FDI). Since 1979, the country has attracted foreign firms as part of her export-promotion policy. The increase of inward FDI has been most notable since 1990. Its expansion has been particularly rapid since Xiao-Ping Deng's "Southern Tour Speech" in 1992. Furthermore, the rate of its increase seems to have been steadier since the country joined the WTO. As a result, in 2008, according to FDISTAT (UNCTAD), the inward FDI flow into China was ranked 3rd in the world (the United States was 1st and France 2nd). Its stock is ranked 10th in the world and 1st among developing countries. There is also a wide variety of FDI in terms of industry. Indeed, the amount of inward FDI in services is as large as that in manufacturing (China Statistical Yearbook 2009). As a destination of FDI, China is one of the most important countries in the world.

Taking a closer look at the location of multinational enterprises (MNEs) in China, there seem to be clear differences in the location of MNEs across provinces. For example, Japanese MNEs have mainly invested in the eastern region of China, Taiwanese MNEs in its southern region, and Korean MNEs in its northeastern region. In other words, differences in location with agglomeration of same-nationality firms according to investors' nationality lead to differences in the location of inward FDIs among regions. As confirmed in many previous studies, MNEs tend to invest in regions where same-nationality firms are agglomerated (see, for example, Head,*et al*., 1995; Belderbos and Carree, 2002). In such regions, MNEs can enjoy a greater availability of specialized inputs and labor and less uncertainty in the operating environment. Exploiting those advantages, more MNEs locate their plants in such

regions. As a result, since the same-nationality agglomeration is an evolutionary development, we can seemany clear differences in the location of same-nationality firms among investing countries.

Against this background, the purpose of this paper is to explore the location choice of MNEs in China, shedding special light on the role of same-nationality agglomeration. The difference in the magnitude of FDIs among provinces yields important consequences. Since the existence of MNEs is considered to be a driving force for economic development through the spillover effects of foreign firms' superior technology to indigenous firms, particularly in developing countries, such differences in the amount of inward FDI result in variations in economic growth among regions within the nation. Indeed, as is well known, economic disparity among regions has been of concern in China. Therefore, it is important to understand the detailed mechanism of same-nationality agglomeration creation, because MNEs are likely to invest in regions where agglomeration of same-nationality firms exists. Such behavior on the part of MNEs reinforces existing differences in inward FDI across regions.

Our paper is related to a large number of existing studies on the location choice of MNEs.[1] In this literature, there are two topics; The first topic, to which our paper belongs, examines various kinds of location factors such as the agglomeration of firms belonging to the same firm-group (e.g., Belderbos and Carree, 2002) or investment climate-related elements (free trade zones in the US, Head, *et al*., 1999); special economic zones and opening coastal cities in China, (Belderbos and Carree, 2002);

[1] The recent references are as follows: Head, Ries, and Swenson (1999) for Japanese MNEs in the US; Belderbos and Carree (2002) for Japanese MNEs in China; Head and Mayer (2004) for Japanese MNEs in Europe; Disdier and Mayer (2004) for French MNEs in Europe; for MNEs in Great Britain; Castellani and Zanfei (2004) for large MNEs in the world; Mayer, Mejean, and Nefussi (2007) for French MNEs in the world; Crozet, Mayer, and Mucchielli (2004) for MNEs in France; and Basile, Castellani, and Zanfei (2008) for MNEs in Europe.

Objective 1 structural funds and cohesion funds in Europe, (Basile, *et al*., 2008). The second topic explores the substitution of location by examining inclusive values in the nested-logit model. For instance, using firm-level data on French investments both in France and abroad over the 1992-2002 period, Mayer, *et al*. (2007) investigate the determinants of location choice and assess empirically whether the domestic economy has been a less attractive investment optionover the recent period or not. The estimated coefficient for inclusive value is strongly significant and near unity, indicating that the national economy is no different from the rest of the world in terms of substitution patterns.

To accomplish departure from existing studies, we further investigate the relationship between same-nationality agglomeration and firm characteristics. In this sense, our paper is most closely related to Belderbos and Carree (2002) who categorized Japanese MNEs according to the number of employees and examined the relationship between firms' size (in terms of employment) and location choice in China. As a result, they found significant differences in the role of same-nationality agglomeration in location choice between large MNEs and small MNEs. Specifically, smaller MNEs prefer locations in regions with larger same-nationality agglomeration. This paper, on the other hand, focuses on the relationship with firms' productivity, not their size. Since productivity is a more fundamental attribute of firms than employment, our results will provide a more primary picture of the relationship between location choice and firm characteristics. If we find that less productive firms prefer locations withlarger same-nationality agglomeration, the above-mentioned difference in location among investing countries may not matter from the viewpoint of spillover. That is, since the more productive MNEs, from which spillover effects seem to be larger than

the less productive MNEs, are dispersed across regions, the agglomeration of the less productive MNEs may not contribute to widening the gap in benefits from the existence of MNEs across regions.

Furthermore, unlike Belderbos and Carree (2002), we compare the location choices of Japanese and Taiwanese MNEs in China. It is apparent that Taiwanese MNEs have an advantage with regard to various kinds of knowledge about China because they also speak Mandarin and have a similar cultural background to that of China. Therefore, Taiwanese MNEs experience less uncertainty in investing in China than Japanese MNEs, resulting in lower entry costs. Indeed, it has been revealed that such a Chinese network plays a significant role in international trade (Rauch and Trindade, 2002). Hence, if a significant role of same-nationality agglomeration is to lower the levels of uncertainty about potential host economies, the relationship between the role of same-nationality agglomeration and firms' productivity may be different between Japanese and Taiwanese MNEs. In order to examine such detailed mechanisms on the relationship between productivity and same-nationality agglomeration, we explore how firms' uncertainty related to host economies affects such relationships by comparing the location choices of Japanese and Taiwanese MNEs in China.

The rest of this paper is organized as follows: the next section illustrates how firms' productivity affects the relationship between their location choice and same nationality firm-agglomeration. Section 3 introduces the empirical framework for the location analysis of Japanese and Taiwanese MNEs in China. Section 4 provides a brief overview of their location in China. The estimation results are reported in Section 5. Lastly, Section 6 presents the conclusions of the study.

2. Productivity and Location Choice

This section investigates how firms' productivity affects the relationship between their location choice and same nationality firm-agglomeration. To do this, we examine firms' location choices among regions in a foreign country, shedding light on their productivity. We also explore how this hypothesis changes in the case of firms for which fixed entry costs are trivial, such as Taiwanese firms. The settings in our illustration are rather similar to those familiar in the firm heterogeneity literature, e.g. Helpman, Melitz, and Yeaple (2004). Productivity measures the extent of efficiency in variable inputs and is assumed to have a positive correlation with firms' size. However, unlike Helpman, Melitz, and Yeaple (2004), we need to compare the profit between FDI in a region and that in another region because our model considers the location choices among multiple regions. For the sake of simplicity, some regional characteristics such as wages or market size are assumed to be identical among all regions.

For simplicity, we consider two regions: a large agglomeration region and a small agglomeration region. In the large agglomeration region, firms may be able to obtain the information required for locating their plants from the existing firms. Also, the existence of many same-nationality firms may signify that various kinds of perceived risks in investing there are comparatively low, at least for firms with a common nationality. As a result, fixed costs for investing in regions with a large agglomeration may be much lower than those in regions with a small agglomeration. However, firms in the large agglomeration region may encounter fiercer competition and therefore obtain lower sales per plant because of reduced prices, other things being equal. As a

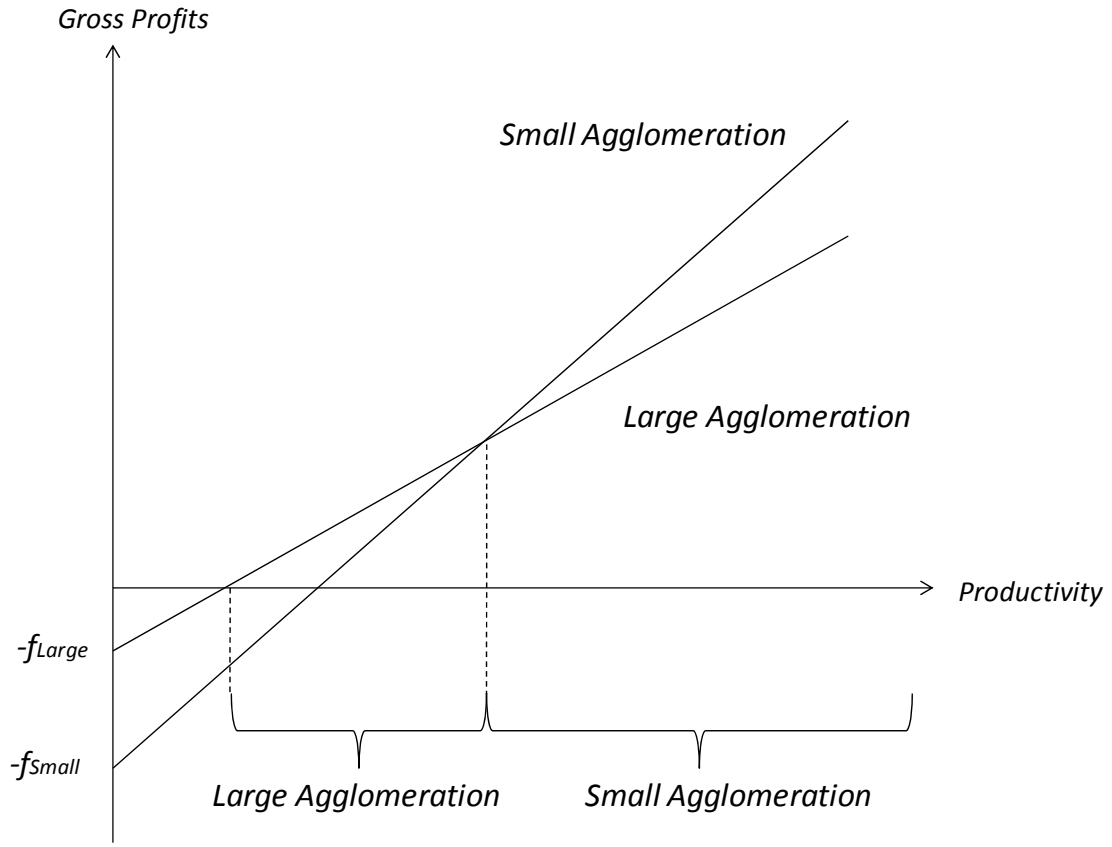
result, operating profits in those firms would be lower. But, there is also a possibility that firms in the large agglomeration area are able to find suppliers more easily, resulting in increased operating profits through the lowering of material costs. Below, we will first focus on the case that the negative impacts of large agglomeration on operating profits are greater than its positive impacts. In short, there is trade-off between lower fixed-entry costs and lower operating profits when firms choose to locate their plants in the larger agglomeration region.

These mechanisms are described in Figure 1, of which the vertical and horizontal axes are firms' gross profit and productivity, respectively. We assume a linear relationship between profit and firms' productivity.[2] The firms in the large agglomeration region have a flatter profit line than those in the small agglomeration region due to the greater impacts of competition on gross profits. From this figure, we can see that less productive firms prefer to locate in the large agglomeration region while more productive firms locate their plants in the small agglomeration region. In other words, as empirically confirmed in Belderbos and Carree (2002), smaller firms locate their plants in the larger agglomeration region. Consequently, more productive firms can obtain larger operating profits through less fierce competition. Since their magnitude is sufficient to cover the higher fixed costs stemming from location in the small agglomeration, the productive firms choose to locate in the small agglomeration region. In contrast, the less productive firms cannot earn much in the way of operating profits even by investing in the small agglomeration region. As a result, they prefer the reduction of fixed costs by investing in the large agglomeration region. These resultsare summarized as follows.

[2] To get such a linear profit line, we may need to include some other elements such as the elasticity of substitution into the productivity measure. See, for example, Helpman *et al*. (2004).

Hypothesis 1. *If negative impacts of competition on operating profits are large enough, the more productive firms locate their plants in the region with a smaller agglomeration of same-nationality firms.*

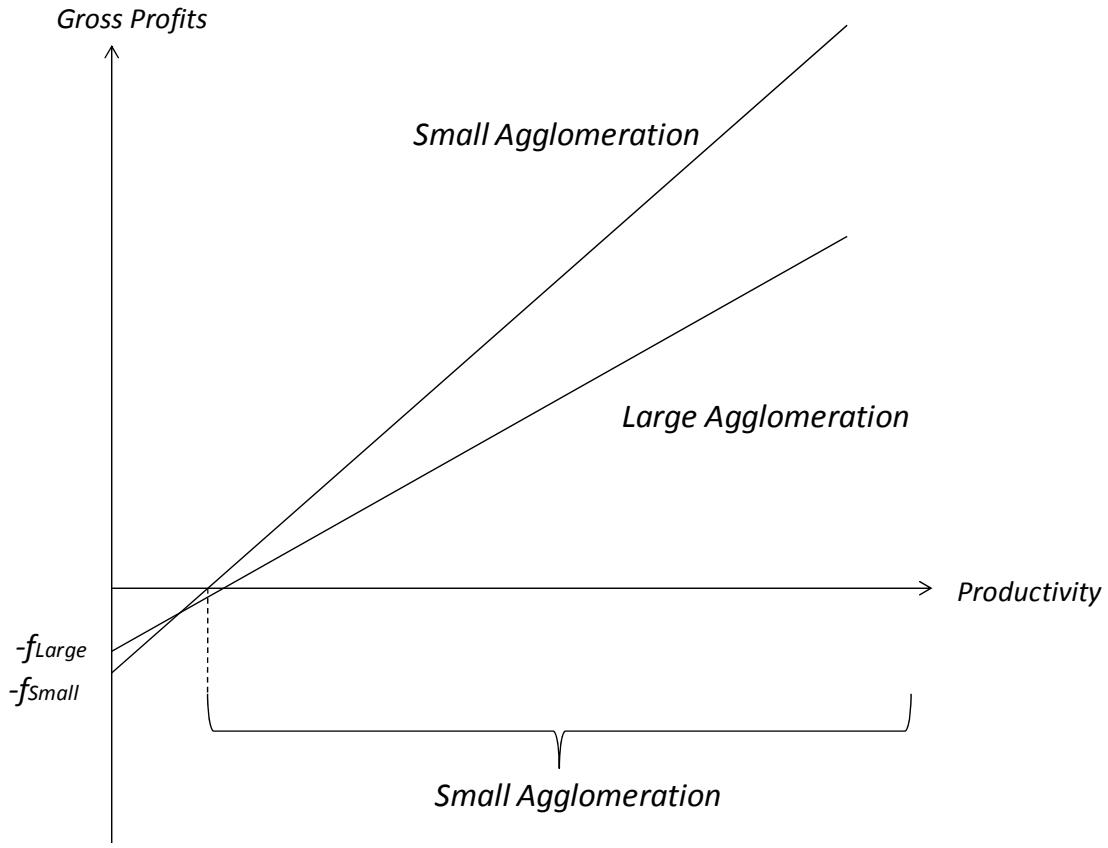
Figure 1. Small Agglomeration versus Large Agglomeration



However, this result might be changed in the case of firms for which fixed entry costs are trivial. For such firms, the difference in fixed entry costs would be negligible regardless of the extent of agglomeration. That is, if firms are already certain about the market in potential locations, they would all face low fixed costs. As a result, as shown in Figure 2, there may be no differences in location according to firms' productivity. Therefore, these firms, no matter their levels of productivity, prefer the small agglomeration region, where the competition is less fierce. These results are summarized as follows.

Hypothesis 2. *If negative impacts of competition on operating profits are large enough, firms with low fixed entry costs choose to locate in the region with a smaller agglomeration, no matter their levels of productivity.*

Figure 2. Small Agglomeration versus Large Agglomeration: Low Fixed Costs



Last, we consider the case that the negativeimpacts of competition are smaller than positive impacts through the availability of good suppliers. Then, firms in the large agglomeration region have a steeper profit line than those in the small agglomeration region. Also, fixed costs are lower in regions with a large agglomeration. Therefore, firms with any level of productivity can obtain the larger gross profit in locating their plants in the large agglomeration. Also in the case of firms for which fixed entry costs are trivial, firms' productivity does not affect the relationship between firms'location

choice and the agglomeration of same-nationality firms. These results are summarized as follows.

Hypothesis 3. *If negative impacts of competition on operating profits are small enough, all firms choose to locate in the region with a larger agglomeration.*

3. Empirical Framework

This paper investigates the location choices of Japanese and Taiwanese MNEs in China between 1996 and 2005, shedding light on the role of their productivity. Specifically, we empirically examine the two hypotheses listed in the previous section. We assume that MNEs choose the locations of their affiliates among provinces. In this section, we first provide our location elements, i.e. explanatory variables. Then, we incorporate the dimensions of firms' productivity and nationality into our model.

3.1. Location Elements

The empirical analysis of the location choice in the previous studies was based on estimates of firms' profit functions, which are often derived from the new economic geography model. Based on any model, the profit function mostly includes market scale, production-factor prices, the prices of intermediate goods, transaction costs with other regions, and fixed costs, which are called "location factors" (see Head *et al*., 1999; Head and Mayer, 2004, for more details). We follow this empirical model and explain proxies for those location factors below.

Harris's (1954) market potential variable is used as the market scale variable

(Market potential). In general, firms in provinces with larger markets can supply their products to a larger number of consumers at lower transport costs and thus obtain higher profit. In addition, the market scale of the surrounding area will also affect firms' location choice because firms need pay only relatively cheap transport costs to supply such an area. In order to take not only the local market, but also the market in the surrounding area into account, the market potential variable of province *r* is calculated as follows:

$$MP_r = \sum_s \frac{Y_s}{d_{rs}}$$

where $d_{rs}$is the distance from provinces *r* to *s*. In this measure, the transaction costs with other regions are taken into account by the geographical distance. Gross regional domestic production (GRDP) of each province is used to calculate its income Y_s.[3]

Proxies for production factor prices and intermediate goods prices are as follows: The wages by industry and province are used as a proxy for production factor prices (Wages). Other things being equal, lower wages lead to lower production costs, cheaper product prices, and a larger supply of products. As a result, since firms in provinces with lower wages obtain higher total profit, they are more likely to choose to locate in provinces with lower wages. As in previous studies, some agglomeration variables are used as proxies for the prices of intermediate goods because firms can procure intermediate goods at cheaper prices in a region with a larger industrial agglomeration. Two kinds of variables are employed in this paper. One is the number of manufacturing plants with the same nationality in a province (Same-industry

[3] Amiti and Javorcik (2008) introduce the more sophisticated measure of market size. But, we simply use the Harris-type market potential index because this is known to work as well as the sophisticated measures taking the price index into account, from an empirical point of view (Head and Mayer, 2004).

agglomeration), and the other is the number of all plants in the same industry in a province (Same-nationality agglomeration). As mentioned in the previous section, these variables would also partly capture the extent of competition within the province. Moreover, the number of same-nationality plants is also closely related to the fixed entry costs.

Two variables are used as proxies for fixed costs. The first is the geographical distance between an MNEs' home country and the province in which its overseas affiliates are located (Distance from home). As mentioned in the previous section, a shorter geographical distance between them results in lower fixed entry costs because of their greater knowledge of, or their decreased uncertainty about the potential host provinces. Also, this variable may work as a proxy for some of the trade costs for material imports between home and the province. Second, GRDP per capita is included in order to control for the level of economic development in a province (GRDP per capita). Like GDP per capita in cross-country analysis, this variable will be closely related to the province's infrastructure and the extent of risks. The development of infrastructure is further captured by the length of highway (Highway).

Other control variables are the following: Openness is a share of trade values (exports plus imports) in GRDP. This variable may indicate the development of soft- and hard-infrastructure to the external market. If Japanese and Taiwanese MNEs are export-oriented, they may be likely to invest in the more open provinces. Patents measures the number of patents filed in the province, and may control for the provinces' intensity of research and development (R&D). Since R&D contributes to the reduction of production costs or to the introduction of new products, and further since such R&D benefits are likely to overflow to other firms (i.e. spillover), MNEs may invest in the

R&D intensive provinces.

MNEs would be expected to choose as a location of their affiliates a province in which they can obtain the highest profit. Defining **X** as a vector of all the above location factor variables and **b** as their coefficient vector, we can formalize the profit function as: $\ln\Pi_r = \mathbf{X}_r\mathbf{b} + u_r$. Subscript r indicates province. The error term u is introduced, which is assumed to be independent and to follow an identical type I extreme value distribution across provinces. Then, as McFadden (1974) demonstrates, the probability that province k is chosen by a representative investor can be shown as:

$$P_k = \frac{e^{\mathbf{X}_k\mathbf{b}}}{\sum_r e^{\mathbf{X}_r\mathbf{b}}}$$

We can estimate the vector of coefficients by maximum likelihood procedures. This model is also called a conditional logit model. The sample years are 1996 and 2005. In order to avoid a possible simultaneous issue between the location choice of affiliates and the location factors, the time point of location factor variables is lagged by one year.

3.2. Productivity and Nationality

We further investigate how the crucial location factors change according to firm characteristics. In particular, as in Belderbos and Carree (2002), the relationship of firm characteristics with the same-nationality agglomeration will be examined. Belderbos and Carree (2002) included the interaction terms of a large enterprise dummy with a variable of the agglomeration. The large enterprise dummy takes unity if the number of employees in a firm is over 500 and zero otherwise. As a result, they find a negative coefficient for such an interaction term. Instead of this dummy variable, we

include the interaction terms of firms' productivity, which is a more fundamental attribute of firms. Thus, we can examine whether or not the results found in Belderbos and Carree (2002) are also valid in the case of productivity. That is, as illustrated in the previous section, we examine if firms with lower productivity have a higher tendency to invest in a location with an agglomeration of same-nationality enterprises (Hypothesis 1)[4].

For a measure of productivity we have used the total factor productivity (TFP) database for East Asian Listed Companies (EALC) which was estimated by Fukao,*et al.* (2009)[5]. Their estimation methodology was as follows: First, they defined the TFP index within each country as the following formula:

$$TFP_{imt} = \left(\ln Q_{imt} - \overline{\ln Q_{mt}}\right) - \sum_{f=1}^{F} \frac{1}{2}\left(s_{ifmt} + \overline{s_{fmt}}\right)\left(\ln X_{ifmt} + \overline{\ln X_{fmt}}\right)$$
$$+ \sum_{s=1}^{t}\left(\overline{\ln Q_{ms}} - \overline{\ln Q_{ms-t}}\right) - \sum_{s=1}^{t}\sum_{f=1}^{F}\left(\overline{s_{fms}} + \overline{s_{fms-1}}\right)\left(\overline{\ln X_{fms}} - \overline{\ln X_{fms-1}}\right),$$

whereQ_{imt}, s_{ifmt} and X_{ifmt} denote the shipments of firm *i* in country *m* in year *t*, the cost share of input *f* for firm *i* in country *m* in year *t*, and input of factor *f* for firm *i* incountry *m* in year *t*, respectively. The inputs are labor, capital, and intermediates. Variables with an upper bar denote the industrial average for that variable. Second, they constructed the relative TFP index for Korea, China, and Taiwan against Japan using the industrial averages of output and input for the benchmark year.

[4] We do not interact TFP with the other variables because of the lack of theoretical prediction and of avoiding multicolinearity among interaction terms.

[5] The data are available at the Japan Center for Economic Research (JCER) web site; http://www.jcer.or.jp/report/asia/detail3735.html#database. Details of the measurement methodology and results are provided in the paper by Fukao, *et al*. (2009).

$$\ln \mu^{m,Japan} = \left(\overline{\ln Q_m} - \overline{\ln Q_{Japan}} - \ln q_Q^{m,Japan}\right) - \sum_{f=1}^{F} \frac{1}{2}\left(\overline{s_{fm}} + \overline{s_{f,Japan}}\right)\left(\overline{\ln X_{fm}} - \overline{\ln X_{f,Japan}} - \ln q_X^{m,Japan}\right).$$

$\ln q_Q^{m,Japan}$ and $\ln q_X^{m,Japan}$ indicate the output and input price in country m relative to those in Japan in each industry in the benchmark year. All variables are converted to Japanese Yen monetary value by using Purchasing Power Parity (PPP). Finally, they define the TFP level of firm *i* in country *m* in year *t* as $TFP_{ijmt} - \mu^{m,\,Japan}$. Using this methodology, firms' TFP is comparable between Japan and Taiwan not only in terms of its growth but also in terms of its level.[6] The use of this TFP measure forces us to restrict sample parent firms only to listed companies in Japan and Taiwan, but such restriction enables us to easily link the parent firms' TFP with Japanese and Taiwanese affiliate data (i.e. the Overseas Japanese Companies Data and the Taiwan Stock Exchange-Market Observation Post System) by employing the identification number of listed companies.[7]

We also examine how this relationship between firms' productivity and location elements differ by firms' nationality. It is apparent that Taiwanese MNEs have an advantage in terms of various kinds of knowledge about China because they also speak Mandarin and have a similar cultural background to that of China. Therefore, Taiwanese MNEs experience less uncertainty when investing in China than Japanese MNEs, resulting in lower entry costs. Hence, as illustrated in the previous section, the above-mentioned relationship will be different between Japanese and Taiwanese MNEs.

[6] It is possible to calculate TFP by estimating production function by Olley - Pakes or Levinshon - Petrin methodologies. However, the estimation of production function forces us to assume that production factor shares are common both for Japan and Taiwan. We believe that this assumption is too strong and unrealistic. Therefore, we used the TFP index proposed by Fukao, *et al*. (2009).

[7] As well as the other explanatory variables, the one-year lagged TFP is introduced.

Particularly in the case of Taiwanese MNEs, firms' productivity would not affect the relationship between their location choice and the agglomeration of same-nationality firms. In order to examine this hypothesis, we further interact the Japanese dummy variable with the interaction term between the agglomeration variable and firms' productivity.

3.3. DataIssues

Our data sources are as follows: The location data of overseas affiliates in China are derived from the "Overseas Japanese Companies Data" (Toyo Keizai Inc.) in the case of Japan and the "China Investment Data Collection Table" (Taiwan Stock Exchange Market Observation Post System) in the case of Taiwan. The details of these two data sources are provided in the next section. GRDP, GRDP per capita, the number of patents and graduates, the length of highway, total exports, and total imports for each province are derived from the "China Statistical Yearbook"; the average wages of each province and industry are obtained from the "China Labour Statistical Yearbook"; the numbers of plants in each province and industry are gleaned from the "China Industrial Economy Statistical Yearbook". To calculate the distance between a home country and a province, the longitudes and latitudes of Japan's and Taiwan's capitals as well as those of the capital city of each province in China are adopted. The longitudes and latitudes of each province's capital city are also used to calculate the distance between two provinces in order to construct the market potential variable.

The Global Reference Solution (GRS) Database, published by Dun and Bradstreet (D&B) is used for the calculation of the number of same-nationality manufacturing plants.GRS is a database that collects information on branch offices of over 100 million

companies from over 200 countries. It includes information about the headquarters, location, industry, number of employees, earnings, and set-up year of each branch office. From the database, the numbers of Japanese and Taiwanese affiliates investing in each province of China each year were obtained. The enterprises in the database are not limited to listed companies, allowing for a broader coverage than the abovementioned "China Investment Data Collection Table" (Taiwan Stock Exchange Market Observation Post System), in which sample firms are restricted only to listed companies.

4. Data for Multinational Enterprises

This section explains the data on the location of MNEs affiliates in China. For the data on MNEs, the samples used in the analysis are limited to Japanese or Taiwanese manufacturing affiliates in China. The industries of parent firms are also restricted only to manufacturing. Lastly, we give a brief overview of their location in China.

4.1. JapaneseMNEs

The data on the location of Japanese affiliates in China are obtained from Toyo Keizai's "Overseas Japanese Companies Data," which has been widely used by many researchers, such as Head and Ries (2002). The data focus on the survey of 6,000 listed and non-listed enterprises, and include their overseas affiliate data on: location, investment year, investment type (new establishment, capital investment, and acquisition), amount of capital, total number of employees, number of employees from Japan, earnings, business content, purpose of investment, and funding relationship.

The sample affiliates included in this database are those in which a Japanese firm has invested capital of 10% or more.

Although the response rate of the questionnaire was only 60%, items that were not responded to were followed up using survey methods such as phone interview, securities reports, and annual reports. As a result, the total number of overseas affiliates included in 2001 was 17,041, of which 2,855 invested in China. This number is larger than that reported in the government statistics: their number is 14,991, of which 2,530 invested in China, in "The Basic Survey of Overseas Business Activities" conducted by the Ministry of Economy, Trade and Industry of Japan in March 2001. In other words, the sample coverage of our dataset is broader than that in "The Basic Survey of Overseas Business Activities". This is probably because the latter does not include the financial services and insurance industries and does not follow up the affiliates which did not respond to the survey.

4.2. TaiwaneseMNEs

The data on the location of Taiwanese affiliates in China are obtained from the "China Investment Data Collection Table" by Taiwan Stock Exchange Market Observation Post System. The total number of affiliates in 2005 was 2,530 in China. The "China Investment Data Collection Table" gathers data from 1996 to the present and provides the data of the listed companies' affiliates in China, including province of location, industry, primary business items, paid-in capital, investment method (e.g., whether or not investment is through a third country), amount of investment, the direct or indirect funding rate of the mother companies, and investment gain or loss. In this dataset, Taiwanese affiliates are ones in which a Taiwanese firm has invested capital of

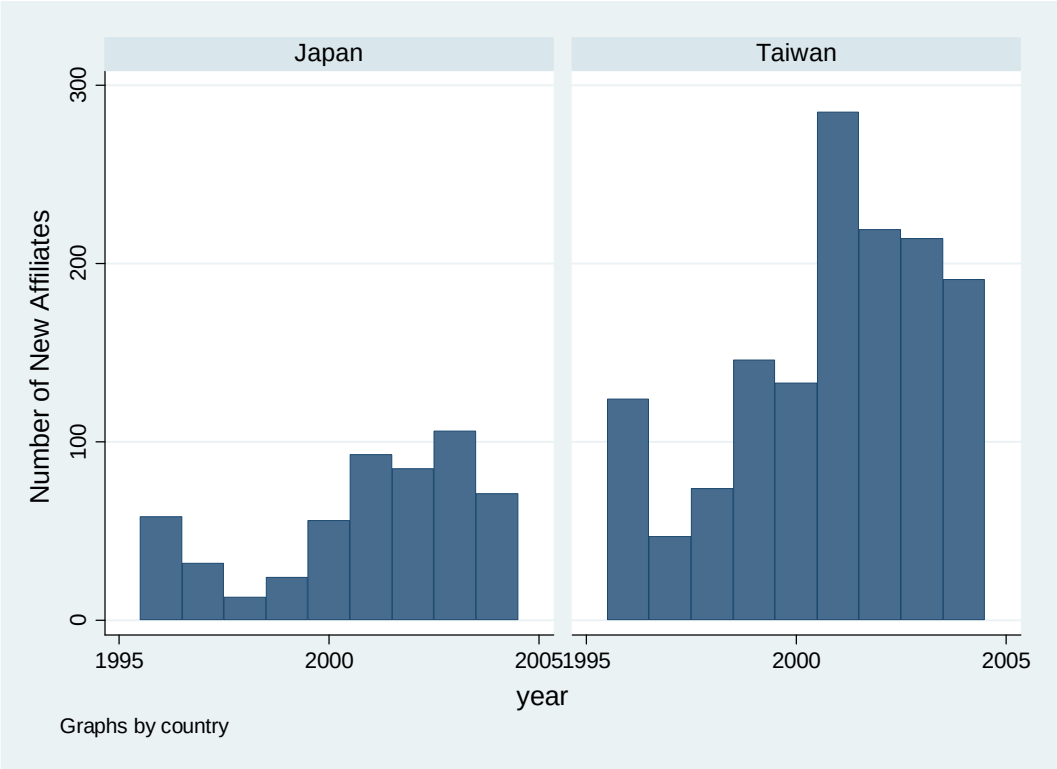
at least 1%.

Besides the “China Investment Data Collection Table”, there are other databases related to overseas direct investment, such as “The Business Operations Survey of Enterprises Investing in China” conducted by the Chung-Hua Institution for Economic Research, which was commissioned by the Investment Commission, Ministry of Economic Affairs. The survey, starting from 2000, covers many items, but the response rates are low. For example, in the 2006 survey, only enterprises investing at least 1 million USD were surveyed and the response rate was a mere 30%. Other databases include the “TEJ Taiwanese Enterprises-in-China Database,” which is based on the “China Investment Data Collection Table” and provides founding years and retail revenues that are not required in this study. Therefore, this study uses the “China Investment Data Collection Table”.

4.3. Overview of the Data

Employing the above-introduced datasets, this subsection gives a brief overview of Japanese and Taiwanese affiliates in China. Figure 3 shows the changes in the number of affiliates in China set up by Japanese and Taiwanese listed enterprises since 1996. Taiwanese enterprises dominate in terms of the number of new investments after 1996, which generally reflects the fact that Japanese listed enterprises had invested in China before 1995 and Taiwanese enterprises did not begin investing until slightly later. In addition, both Japanese and Taiwanese enterprises have increased new investments since China joined the WTO in 2001. The total number of their investments approximately doubled from 2000 to 2001.

Figure 3. Changes in the Number of Affiliates in China



Source: Authors' calculation

Table 1 shows the geographic distribution of Japanese and Taiwanese MNEs in China in 2006.Both are most likely to locate their affiliates in Jiangsu Province (26% of Japanese affiliates and 37% of Taiwanese affiliates). However, the second most popular province is Shanghai for Japan (20%) and Guangdong for Taiwan (26%), respectively, though the numbers of affiliates in Shanghai and Guangdong are not markedly different, particularly among Japanese MNEs. Since Shanghai is closer to Japan than Guangdong, and Guangdong is closer to Taiwan than Shanghai, the table shows that the distance to home country may have a significant influence on an enterprise's decision on where to invest.

Table 1. Geographic Distribution of Japanese and Taiwanese MNEs in China: 2006

	Japanese MNEs		Taiwanese MNEs	
	# of Affiliates	Share (%)	# of Affiliates	Share (%)
Beijing	12	2	47	3
Tianjin	27	5	35	2
Hebei	11	2	0	0
Shanxi	0	0	2	0
Inner Monglia	1	0	0	0
Liaoning	22	4	10	1
Jilin	4	1	5	0
Heilongjiang	1	0	6	0
Shanghai	108	20	179	12
Jiangsu	140	26	533	37
Zhejiang	44	8	84	6
Anhui	3	1	6	0
Fujian	11	2	50	3
Jiangxi	2	0	9	1
Shandong	22	4	35	2
Henan	6	1	6	0
Hubei	10	2	20	1
Hunan	2	0	5	0
Guangdong	96	18	367	26
Guangxi	0	0	2	0
Hainan	0	0	3	0
Sichuan	12	2	17	1
Guizhou	0	0	0	0
Yunnan	1	0	2	0
Shanxi	3	1	7	0
Gansu	0	0	0	0
Qinghai	0	0	1	0
Ningxia	0	0	0	0
Xinjiang	0	0	4	0

Sources: "Overseas Japanese Companies Data" (Toyo Keizai Inc.); "China Investment Data Collection Table" (Taiwan Stock Exchange Market Observation Post System)

Table 2 shows the industrial distribution of parent firms which had affiliates in China in 2006. Most of the investors in China from both countries are in the machinery industry. However, Japanese enterprises, not limited to the electrical machinery industry, also include general machinery and transportation machinery industries, while almost all Taiwanese machinery enterprises are from the electrical machinery industry. Because the production process for electrical machinery can be easily divided geographically, the vertical division of labor for the production process is much easier than is the case for other industries. Therefore, most Taiwanese enterprises in China may not be aiming at supplying products for the Chinese market but rather at an international division of labor.

Table 2. Industrial Distribution of Parents with their Affiliates in China: 2006

	Japanese MNEs		Taiwanese MNEs	
	# of Affiliates	Share (%)	# of Affiliates	Share (%)
Food	27	5	76	5
Fiber	17	3	25	2
Paper and pulp	6	1	30	2
Petroleum products	1	0	1	0
Chemical products	73	14	82	6
Nonferrous metals products	26	5	44	3
Primary metals	39	7	38	3
Metal products	19	4	7	0
General machinery	91	17	5	0
Transport machinery	112	21	51	4
Electronic machinery	107	20	1,076	75
Precision machinery	20	4	0	0

Sources: "Overseas Japanese Companies Data" (Toyo Keizai Inc.); "China Investment Data Collection Table" (Taiwan Stock Exchange Market Observation Post System)

5. Estimation Results

This section reports our estimation results of the location choice model. The basic statistics are shown in Table 3. The baseline result is reported in column (I) of Table 4.

Table 3. Basic Statistics

	# of Obs.	Mean	S.D.	Min	Max
Japanese MNEs					
Wages	14,350	9.16	0.46	7.77	10.92
Same-nationality agglomeration	14,350	1.02	1.28	0	4.56
Same-industry agglomeration	14,350	5.67	1.37	0	8.59
Market potential	14,350	5.01	0.51	3.75	6.19
Distance from home	14,350	7.80	0.27	7.33	8.41
GRDP per capita	14,350	-0.15	0.59	-1.61	1.53
Highway	14,350	11.25	0.88	8.26	13.41
Patents	14,350	8.06	1.29	3.76	11.74
Openness	14,350	0.31	0.36	0.04	1.61
Taiwanese MNEs					
Wages	38,583	9.16	0.46	7.77	10.92
Same-nationality agglomeration	38,583	0.36	0.76	0	3.26
Same-industry agglomeration	38,583	5.64	1.44	0	8.59
Market potential	38,583	5.01	0.51	3.75	6.19
Distance from home	38,583	7.16	0.53	5.52	8.22
GRDP per capita	38,583	-0.16	0.59	-1.61	1.53
Highway	38,583	11.39	0.81	8.26	13.41
Patents	38,583	8.22	1.22	3.76	11.74
Openness	38,583	0.30	0.35	0.04	1.61

Table 4. Estimation Results: Conditional Logit Analysis

	(I)	(II)	(III)
Same-nationality agglomeration	0.814***	0.816***	0.861***
	[0.034]	[0.034]	[0.038]
* TFP		-0.118	0.21
		[0.133]	[0.178]
* TFP * Japan			-0.831***
			[0.303]
Wages	0.802***	0.799***	0.784***
	[0.168]	[0.168]	[0.167]
Distance from home	-0.332***	-0.326***	-0.307***
	[0.080]	[0.080]	[0.082]
Same-industry agglomeration	0.861***	0.863***	0.839***
	[0.062]	[0.062]	[0.062]
Market potential	-0.364***	-0.358***	-0.346***
	[0.100]	[0.100]	[0.100]
GRDP per capita	0.563***	0.566***	0.568***
	[0.210]	[0.210]	[0.210]
Highway	-0.019	-0.02	-0.026
	[0.090]	[0.090]	[0.090]
Patents	-0.118	-0.12	-0.107
	[0.093]	[0.093]	[0.093]
Openness	-0719***	-0.717***	-0.718***
	[0.123]	[0.122]	[0.122]
Observations	52,933	52,933	52,933
Pseudo R-squared	0.3809	0.3809	0.3815
Log-likelihood	-4001	-4001	-3997

Notes: ***, ** and * indicate, respectively, 1%, 5% and 10% levels of statistical significance. Standard errors are in parentheses.

The results are interpreted as follows: First, the agglomeration of the same-nationality firms and the industrial agglomeration have significantly positive coefficients. These results imply that, *on average*, their positive impacts through the

availability of suppliers and/or low fixed costs are larger than their negative impacts through more intensive competition. Second, the coefficient for geographical distance from home is estimated to be significantly negative, indicating that MNEs tend to invest in provinces closer to their home country, where fixed entry costs are lower because of the reduced uncertainty. Third, GRDP per capita has a significantly positive coefficient. This result indicates that the level of economic development is a key factor for enterprises of both countries in regard to their location choices, though Highway has an insignificant result. Last, the coefficient for Patents is insignificant and may indicate that Japanese and Taiwanese firms do not expect significant spillover effects in R&D.

The other noteworthy results are found in Wages, Market potential, and Openness. Although we expected its positive sign, the coefficient for wages is estimated to be significantly positive. This might be because the data on wages include labor quality, thereby affecting the result; since a higher quality of labor leads to higher wages, the negative effect of wages may be offset by their positive effect based on quality. The market potential has a negatively significant coefficient. This result may indicate that Japanese and Taiwanese FDIs are not market-seeking; rather, they are efficiency-seeking (cheap labor-seeking), though negative coefficients cannot be expected even in efficiency-seeking FDI. Last, the coefficient for Openness is negatively estimated, indicating that FDIs are not necessarily export-seeking. In summary, we may conclude that Japanese and Taiwanese FDIs in China are a mix of FDIs based on several motivational factors.

Column (II) shows the estimation results of the equation including the interaction term of same-nationality firm agglomeration with firms' TFP. The results of the

previous variables are unchanged: the coefficients for wages, agglomeration variables, and GRDP per capita are significantly positive, and the coefficients for distance from home, market potential, and openness are negatively significant. Unlike Belderbos and Carree (2002), who examined the interaction terms of firms' employment, our results for the interaction terms of firms' productivity are not significant. In other words, while Belderbos and Carree (2002) show that crucial location factors differ by firms' employment, their location choice does not depend on the productivity level.

One source of the different results from Belderbos and Carree (2002) might be our sample of multi-investing countries. In order to examine whether or not the role of firms' attributes differs by their nationality, we introduce the interaction term of productivity and a Japan dummy with the same-nationality agglomeration. The results are reported in column (III). The results in the previous variables are qualitatively unchanged. In particular, the interaction term of TFP with same-nationality agglomeration is still insignificant. However, its interaction with both TFP and the Japan dummy has a significantly negative coefficient, indicating that the positive influence of same-nationality agglomeration is smaller in the more productive firms in the case of Japanese MNEs, as in Belderbos and Carree (2002). But, there is no such effect of same-nationality agglomeration according to firms' productivity in the case of Taiwanese MNEs.Thus, Taiwanese MNEs prefer the large agglomeration region, no matter their levels of productivity.

These results are consistent with our expectation and could be derived from the differences in fixed entry costs in China between Japanese and Taiwanese firms. In other words, in the case of investment by firms with a low level of uncertainty about host economies (i.e. China), there are no differences in the role of same-nationality

agglomeration according to firms' productivity. Also, these results imply that the negative impacts of competition are strong for Japanese firms and weak for Taiwanese firms. The weak negative impacts in Taiwanese firms may be due to the detailed differentiation of their products'customers, which is based on their better knowledge on local market. In addition, availability of workers might be different between Japanese and Taiwanese firms, though this possibility is not taken into consideration in our theoretical framework. That is, Japanese firms, which have less knowledge on local labor market, are more difficult to find an enough number of workers in regions with the large agglomeration, in which labor market is likely to be tight, and thus may have stronger negative impacts of competition on operating profits.

We have conducted one robustness check on our results. It is well-known that in the conditional logit model, the odds ratio, P_i/P_j, does not depend on the other choices. This property is called "independence from irrelevant alternatives (IIA)". The IIA comes from the assumption that the disturbances are independent and homoscedastic, which may be too restrictive. The model to relax the IIA assumption is the nested-logit model, which might be called the generalized extreme value (GEV) model. In order to assure the justification for our results using the conditional logit model, we also employ the nested-logit model with the same explanatory variables. Then, we partition a set of sample provinces into two subsets, coastal provinces[8] and non-coastal provinces, because the target provinces of the open-door policy have been concentrated in the coastal regions and thus there may be qualitative differences in policy treatment between coastal and non-coastal regions.[9]

[8] The coastal regions include Fujian, Guandong, Guangxi, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin, and Zhejiang.

[9] For simplicity, this paper assumes the common IV parameters among nests.

The results for the nested-logit model are reported in Table 5. In all specifications, inclusive value (IV) parameters are estimated to be nearly unity, and the test statistics for the null hypothesis that those are unity cannot be rejected. Since the nested-model with one-valued IV parameters recovers the conditional logit model, our results from the conditional logit model are qualitatively the same as those from the nested-logit model. Indeed, the estimated results in the location elements are the same as those reported in Table 4. In particular, while less productive Japanese firms prefer locations with a larger same-nationality agglomeration, we cannot find any differences in location according to firms' productivity in the case of Taiwanese firms.

Table 5. Estimation Results: Nested-logit Analysis

	(I)	(II)	(III)
Same-nationality agglomeration	0.815***	0.820***	0.872***
	[0.049]	[0.049]	[0.055]
* TFP		-0.106	0.213
		[0.134]	[0.180]
* TFP * Japan			-0.827***
			[0.312]
Wages	0.786***	0.792***	0.793***
	[0.185]	[0.186]	[0.187]
Distance from home	-0.329***	-0.330***	-0.311***
	[0.080]	[0.081]	[0.083]
Same-industry agglomeration	0.859***	0.860***	0.842***
	[0.067]	[0.067]	[0.068]
Market potential	-0.375***	-0.369***	-0.365***
	[0.106]	[0.106]	[0.107]
GRDP per capita	0.529***	0.546***	0.548***
	[0.210]	[0.211]	[0.214]
Highway	-0.039	-0.031	-0.038
	[0.090]	[0.090]	[0.092]
Patents	-0.102	-0.115	-0.1
	[0.094]	[0.094]	[0.095]
Openness	-0703***	-0.709***	-0.724***
	[0.137]	[0.138]	[0.140]
IV parameter	1.004	1.001	1.102
	[0.053]	[0.053]	[0.054]
Chi-Squared	0.01	0.00	0.05
	0.94	0.981	0.8181
Observations	52,839	52,569	52,569
Log-likelihood	-4002	-3974	-3971

Notes: ***, ** and * indicate, respectively, 1%, 5% and 10% levels of statistical significance. Standard errors are in parentheses. "Chi-squared" indicates the test statistics and their p-values on the null hypothesis that the IV parameter is unity.

6. Concluding Remarks

China has been one of the most important countries in the world as a destination of FDI. This paper has explored the location choices of MNEs in China, shedding special light on the role of same-nationality agglomeration. In particular, we have examined how its role is different according to investors' productivity. Furthermore, we have compared the location choices of Japanese and Taiwanese MNEs in China because Taiwanese MNEs are expected to experience less uncertainty in investing in China than Japanese MNEs, due to Taiwan's linguistic and cultural advantages in China. As a result, our finding is that while less productive Japanese firms prefer to locate to provinces with a larger same-nationality agglomeration, we cannot find any differences in location according to firms' productivity in the case of Taiwanese firms.

Our results have the following implication: Our finding that less productive Japanese firms prefer locations with a larger same-nationality agglomeration implies that the location of productive MNEs is not limited to regions with existing same-nationality agglomeration. In other words, the more productive Japanese MNEs are dispersed across regions and will present a large extent of spillover benefits. As a result, indigenous firms in regions with a small agglomeration of Japanese firms will be able to enjoy sufficient spillover effects from the productive Japanese firms, compared even with those in regions with a large agglomeration of Japanese firms. In this sense, the differences in the location of same-nationality agglomeration may not widen the gap in indigenous firms' productivity among provinces. However, as implied in the results in the case of Taiwanese MNEs, if uncertainty about the Chinese economy decreases from now, the observed differences in the location of same-nationality agglomeration may indicate the expansion of such a gap because then the agglomeration includes not

only less productive firms but also productive firms. In summary, policy makers need to be mindful of the consequences of building agglomeration regions whilst at the same time considering the extent of uncertainty about regional economies for MNEs.

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