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Chapter 8

Location Choice of Japanese Multinationals: Country Characteristics or Region Characteristics?

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Abstract: The purpose of this paper is to investigate the location choice of Japanese multinational enterprises (MNEs) in Thailand, Cambodia, Laos, Myanmar, and Vietnam. By examining region-level location choice with the nested-logit model, I investigate the relative importance of not only country characteristics but also region characteristics. Furthermore, the use of the nested-logit model enables us to examine substitution patterns between country-based and region-based location decisions by MNEs in the concerned countries. I also incorporate MNEs' productivity into the model and examine how productive firms are likely to invest in respective countries.

***Keywords*:** Multinational firm; Firm heterogeneity; Productivity

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1. Introduction

In the present global era in which firms choose the location of their plants beyond national borders, location characteristics are important for attracting multinational enterprises (MNEs). The better access to countries with large market is clearly attractive for MNEs. For example, special treatments on tariffs such as the Generalized System of Preferences (GSP) are beneficial for MNEs whose home country does not have such treatments. Not only such country characteristics but also region characteristics (i.e. province-level or city-level ones) matter, particularly in the case that location characteristics differ widely between a nation's regions. The existence of industrial concentration, that is, agglomeration, is a typical regional characteristic. It is with consideration of these country-level and region-level characteristics that MNEs decide their location abroad.

A large number of academic studies have investigated in what kinds of countries MNEs locate, i.e. location choice analysis. Employing the usual new economic geography model (i.e. constant elasticity of substitution (CES) utility function, Dixit-Stiglitz monopolistic competition, and ice-berg trade costs), the literature derives the profit function, of which coefficients are estimated using maximum likelihood procedures. Recent studies are as follows: Head, Rise, 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; Castellani and Zanfei (2004) for large MNEs worldwide; Mayer, Mejean, and Nefussi (2007) for French MNEs worldwide; Crozet, Mayer, and Mucchielli (2004) for MNEs in France; and Basile, Castellani, and Zanfei (2008) for MNEs in Europe. At the present time, three main topics can be found in this literature.

The first introduces various location elements as independent variables. The above-mentioned new economic geography model usually yields the profit function, which is

a function of market size, productive factor prices, price of intermediate goods, and trade costs. As a proxy for the price of intermediate goods, the measure of agglomeration is often used, particularly the number of manufacturing firms. Some studies employ more disaggregated numbers of manufacturing firms, such as the number of manufacturing firms with the same nationality as the firms choosing the location (e.g., Head et al., 1999; Crozet et al., 2004) or the number of firms belonging to the same firm group (e.g., Belderbos and Carree, 2002). As part of trade costs, some investment climate measures have been examined: free trade zones in the US (Head et al., 1999), special economic zones and opening coastal cities in China (Belderbos and Carree, 2002), and Objective 1 structural funds and cohesion funds in Europe (Basile et al., 2008).

Second, the validity of proxy variables for location elements is further examined. Head and Mayer (2004) examine the validity of market potential on location choice. They propose the use of two measures: the Harris market potential index (Harris, 1954) and the Krugman-type index used in Redding and Venables (2004). The Harris-type index is simply the sum of distance-weighted real GDP. They employ the Krugman-type market potential index, which is directly derived from the new economic geography model, as it takes into account the extent of competition (i.e. price index) and is constructed using estimators of importing country dummy variables in the well-known gravity equation, as in Redding and Venables (2004). They find that "*theory does not pay*", in the sense that the Harris market potential outperforms Krugman's market potential in both the magnitude of its coefficient and the fit of the model to be estimated.

The third topic explores the substitution of location by examining inclusive values in the nested-logit model. For example, 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 losing attractiveness over the recent period or not. The estimated coefficient for inclusive value is strongly significant and near unity, indicating that the national economy is not different from the rest of the world in terms of substitution patterns. Similarly, Disdier and Mayer (2004) investigate whether French MNEs consider Western and Eastern Europe as two distinct groups of potential host countries by examining the coefficient for the inclusive value in nested-logit estimation. They confirm the relevance of an East-West structure in the country location decision and furthermore show that this relevance decreases over time.

The purpose of this paper is to investigate the location choice of Japanese MNEs in Thailand, Cambodia, Laos, Myanmar, and Vietnam, and is closely related to the third topic mentioned above. By examining region-level location choice with the nested-logit model, I investigate the relative importance of not only country characteristics but also region characteristics. Such investigation is invaluable particularly in the case of location choice in those five countries: industrialization remains immature in those countries which have not yet succeeded in attracting enough MNEs, and as a result, it is expected that there are not yet crucial regional variations for MNEs within such a nation, meaning the country characteristics are still relatively important to attract MNEs. To illustrate, in the case of Cambodia and Laos, one of the crucial elements for Japanese MNEs would be that LDC preferential tariff schemes are available for exports from Cambodia and Laos. On the other hand, in the case of Thailand and Vietnam, which have accepted a relatively large number of MNEs and thus raised the extent of regional inequality, regional characteristics such as the existence of agglomeration would become important elements in location choice. Our sample countries seem, therefore, to offer rich variations for analyzing the relative importance between country characteristics and region characteristics.

Our empirical strategy has a further advantage. As in the third topic in the location choice literature, the use of the nested-logit model enables us to examine substitution patterns

between country-based and region-based location decisions by MNEs in the concerned countries. For example, it is possible to investigate empirically whether Japanese multinational firms consider Thailand/Vietnam and the other three countries as two distinct groups of potential host countries, by examining the inclusive value parameters in nested-logit estimation. In particular, our sample countries all experienced dramatic changes in, for example, economic growth or trade costs reduction during the sample period. Thus, we will find the dramatic dynamics of such substitution patterns.

Our rigorous analysis of the relative importance between country characteristics and region characteristics is invaluable from the viewpoint of policy implications. First, while the former characteristics should be improved mainly by central government in each country, there is sometimes room for the improvement of the latter characteristics by even local governments or smaller institutions such as private agencies. Consequently, it becomes important for these smaller institutions to know just how crucial the improvement of region characteristics is for attracting foreign companies. Second, as economies grow, country characteristics become similar among countries. For example, the LCD preferential tariff schemes are available only when a country is less developed. Therefore, it is important particularly for the least developed countries to know what kinds of regional characteristics become important following economic growth; in other words, after their country characteristics become similar to those of the more developed countries.

I also incorporate one important characteristic of MNEs, namely, productivity. The well-known Helpman-Melitz-Yeaple model indicates that only firms with higher productivity can afford overseas entry (Helpman et al., 2004). Beyond this argument, there may be some differences in MNEs' productivity among our sample countries and regions. Such differences are important from the viewpoint of "spillover effects" from MNEs, which are one of the most important results for host countries in accepting their entry. The spillover effects are that

the presence of inward foreign direct investment (FDI) raises domestic firms' productivity through various channels such as imitation.[1] Such positive effects might be larger in areas with more productive MNEs. Therefore, it becomes important for host countries to know how much productive firms are likely to invest in them.

The rest of this paper is organized as follows. Section 2 takes a brief look at the worldwide distribution of Japanese overseas affiliates. Section 3 provides an empirical model to examine their location choice, and lastly, we discuss future works to estimate our model.

2. Overview of Japanese MNEs' Locations

In this section, we look at the locations of Japanese MNEs by employing the *Overseas Japanese Companies Data* provided by Toyo Keizai Inc. This dataset covers almost the same number of Japanese overseas affiliates as the *Survey of Overseas Business Activities*, which is an affiliate-level survey conducted by the Ministry of Economy, Trade and Industry. The advantage of this dataset is that the data are not consolidated and are open to all researchers. The data provide basic information on the overseas affiliates of Japanese firms, such as their location and number of employees. In this paper, we restrict our overseas affiliates to manufacturers.

Figure 1 shows the locations of Japanese MNE worldwide. In this figure, East Asia includes ASEAN countries and the North-East Asian countries of Taiwan, Hong Kong, and Macao. From this figure, we can see that Japanese overseas affiliates have been concentrated in East Asian countries. Although developed countries—particularly the US—succeed in attracting Japanese MNEs to some extent, there is a much larger number of affiliates in East Asia. In particular, Japanese investment to East Asia increased dramatically around 1995, and

[1] Gorg and Greenaway (2004) and Crespo and Fontoura (2007) are important survey studies on this topic.

although it stopped around the time of the Asian currency crisis in 1998, it has increased steadily from around 2000.

=== Figure 1 ===

Taking a closer look at Japanese MNE's location in Cambodia, Laos, Myanmar, and Vietnam (the CLMV countries), we find a dramatic contrast between Vietnam and the other countries (Fig. 2). Each of the other countries attracts only a few Japanese affiliates and their number is almost unchanged during our sample period, whereas in Vietnam, the number of Japanese affiliates shows an explosive increase around 1995. As in the case of East Asia in Fig. 1, the number again starts to increase remarkably after 2002.

=== Figure 2 ===

Last, we compare MNEs' productivity according to their affiliates' location. As for the productivity measure, we use the TFP index, the details of which are provided in Section 3.2. Data on Japanese companies are taken from the *East Asian Listed Companies Database* provided by the Japan Center for Economic Research, and are available for the period 1985-2005. Linking this dataset with that of Toyo Keizai Inc., we can examine firms' productivity and their overseas location. The mean, standard deviation, 25th percentile, and 75th percentile by location are reported in Table 1.

=== Table 1 ===

The results are almost consistent with those of Chen and Moore (2010) who focus on

French FDI and show empirically that productivity differences among MNEs lead to differential effects of host-country attributes and consequently distinct choices of foreign production locations. In short, they found that investment in less favorable countries requires firms to be more productive. Consistent with this finding, Table 1 shows that the investors to developed countries have lower productivity than those to developing countries. In particular, investing in Myanmar requires investors to be highly productive. As a result, we may expect that highly productive firms are investing in CLMV countries.

3. Empirical Issues

This section first provides our nested-logit model to examine the relative importance between country-level and region-level characteristics for Japanese MNEs' location choice among CLMV countries and Thailand. Then, our country-level and region-level variables are introduced.

3.1. Nested-logit Model

We employ the nested-logit model to examine Japanese MNEs' location choice. For the firm n faced with J choices (regions), suppose that a random profit indicator of region j is:

$$\pi_{nj} = V(\boldsymbol{x}_j, \boldsymbol{s}_n) + \epsilon(\boldsymbol{x}_j, \boldsymbol{s}_n),$$

where V is nonstochastic representative profit of the population and ε varies randomly in the firm's attributes with the jth choice set that is characterized by observable vector $\boldsymbol{x}_j$. $\boldsymbol{s}_n$ is a vector of measured attributes of the nth firm. A set of J choices is denoted by G.

The probability P_{ni} that a firm drawn randomly from the population with attributes $\boldsymbol{s}_n$ and facing alternative set $\boldsymbol{B} \equiv \{\boldsymbol{x}_1, \boldsymbol{x}_2, \ldots, \boldsymbol{x}_J\}$ will choose $\boldsymbol{x}_i$ is

$$\begin{aligned} P_{ni} &\equiv P(\boldsymbol{x}_i | \boldsymbol{s}_n, \boldsymbol{B}) \\ &= P(\pi_{ni} > \pi_{nj}, \forall j \neq i) \end{aligned}$$

$$= P\left(\epsilon\left(\boldsymbol{x}_j, \boldsymbol{s}_n\right) < \epsilon(\boldsymbol{x}_i, \boldsymbol{s}_n) + V(\boldsymbol{x}_i, \boldsymbol{s}_n) - V\left(\boldsymbol{x}_j, \boldsymbol{s}_n\right), \forall j \neq i\right).$$

McFadden (1973) has shown that if and only if the J disturbances are independent and identically distributed with type I extreme value distribution, then

$$P_{ni} = \frac{e^{V(x_i, s_n)}}{\sum_{j \in G} e^{V\left(x_j, s_n\right)}}.$$

This is called the conditional logit model.

It is well known that in the conditional logit model (or the multinomial logit model), the odds ratios, P_{ni}/P_{nj}, does not depend on the other choices. This property is called "independence from irrelevant alternatives (IIA)" and can be expressed as:

$$\frac{P_{ni}}{P_{nj}} = \frac{e^{V(x_i, s_n)}}{e^{V\left(x_j, s_n\right)}} = e^{V_i - V_j},$$

where $V_i \equiv V(\boldsymbol{x}_i, \boldsymbol{s}_n)$. 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 a generalized extreme value (GEV) model. Here we consider a two-level nested-logit model. Let the set G be partitioned into some subsets. For GEV, the marginal distribution of each ε follows univariate extreme value function, but all ε with each subset are correlated with each other. The nonstochastic representative profit is decomposed into two parts (a part that is constant for all alternatives within a subset and a part that is not constant within subsets):

$$V_{gm} = \lambda_g V_g + \lambda_m V_{m|g}, \;\; m \in M_g, g \in G.$$

Here n is dropped for brevity. M_g is a set that consists of the choices within the subset g. $V_{m|g}$ is the mean of V_{gm} over all alternatives in subset M_g. V_g is the deviation of V_{gm} from the mean of $V_{m|g}$. λ_g and λ_m are scale parameters.

Similarly, the probability is also decomposed as:

$$P_{gm} = P_g \cdot P_{m|g}.$$

While P_g represents the marginal probability of choosing an alternative in g, $P_{m|g}$ indicates the conditional probability of choosing alternative m given that an alternative in the subset g is

chosen. As a result, the probability can be derived as:

$$P_{gm} = \frac{\exp\left(\lambda_g V_g + \frac{\lambda_g}{\lambda_m} I_g\right)}{\sum_{g' \in G} \exp\left(\lambda_{g'} V_{g'} + \frac{\lambda_{g'}}{\lambda_{m'}} I_{g'}\right)} \cdot \frac{\exp(\lambda_m V_{m|g})}{\sum_{m' \in M_g} \exp(\lambda_{m'} V_{m'|g})},$$

where

$$I_g \equiv \ln \sum_{m' \in M_g} \exp(\lambda_{m'} V_{m'|g}).$$

I_g is called the inclusive value for the gth subset and allows the model to incorporate some degree of heteroscedasticity. Only within each subset does the IIA restriction continue to hold.

There are three noteworthy points. First, the sufficient condition for global consistency with the random utility model (RUM) is that the inclusive value parameter (IV parameter), which is defined as λ_g/λ_m, lies between 0 and 1. The second is the similarity within a subset. We can show that:

$$\operatorname{corr}(V_{m_1|g}, V_{m_2|g}) = 1 - \left(\frac{\lambda_g}{\lambda_m}\right)^2.$$

This relationship implies that, the closer to unity the IV parameter, the lower the correlation in expected profits between choices within a subset. In other words, the IV parameter closer to zero indicates that firms regard alternatives within a subset as more similar than alternatives between different subsets. Third, it is well known that the restriction λ_g/λ_m =1 recovers the above-introduced conditional logit model. Last, for estimation, λ_g is normalized to one.

3.2. Variables

In our two-level nested-logit model, the upper-level consists of country-level variables and the bottom-level consists of region-level ones. The respective variables are as follows.

Our region-level variables are price index for primary production factors, intermediate goods, and market size. For price index for primary factors, we simply use the average wage in each region. Market size is captured by introducing the market potential measure. Specifically, we use the Harris market potential index, that is, the sum of distance weighted-real GDP, rather than the Krugman-type variable used in Head and Mayer (2004) and Redding and Venables (2004). The construction of the latter variable requires inter-regional transaction values, which are unavailable in our sample regions. Specifically, the Harris market potential index is the following:

$$MP_i = \sum_{k \in G} \frac{GRDP_k}{Distance_{ik}},$$

where $Distance_{ik}$ denotes the geographical distance between regions i and k. Following the literature on border effect (see, for example, Head and Mayer, 2000), we use (2/3) times the radius of surface area in the region for the intra-regional distance. $GRDP_k$ represents regional GDP in region k.

As usual, data for the price index for intermediate goods are unavailable. In this paper, we use the variable reflecting the magnitude of agglomeration in a sector as a proxy. Since, from the theoretical standpoint, the price index for intermediate goods is low in those regions with such large agglomeration, this proxy seems to be plausible. Specifically, we use the intra-sectoral agglomeration index (*ISA*) as the agglomeration variable, which is often used in empirical analysis of economic geography (see, for example, Hanson, 1998). *ISA* in sector h in region i is given by:

$$ISA_i^h = \frac{VA_i^h / \sum_k VA_i^k}{\sum_r VA_r^h / \sum_r \sum_k VA_r^k},$$

where VA_i^h denotes value-added in sector h in region i.

On the other hand, country-level variables are as follows. The first is the availability of the LCD preferential tariff schemes. Second, we introduce the credibility index for countries

in order to examine their various kinds of stability, such as political stability. The index is drawn from the *Institutional Investor* and is the aggregate of bankers' evaluations on risk of default. The larger the index, the smaller the country's risk of default. This index embodies, at least partly, the level of investment costs. Third, we introduce trade barriers indices such as the openness index, which can be drawn from the *Global Competitiveness Report*. In short, country-level variables are ones which are determined by each nation's government.

Furthermore, we interact firms' productivity with country-level variables to examine the heterogeneous effects of country-level characteristics among firms. We introduce firms' TFP as the measurement of their productivity. Specifically, we estimate the TFP index following Caves et al. (1982, 1983) and Good et al. (1983). The TFP index is calculated as follows:

$$TFP_{it} = \left(\ln Q_{it} - \overline{\ln Q_t}\right) - \sum_f \frac{1}{2}\left(s_{ift} + \overline{s_{ft}}\right)\left(\ln X_{ift} + \overline{\ln X_{ft}}\right)$$
$$+ \sum_s \left(\overline{\ln Q_s} - \overline{\ln Q_{s-t}}\right) - \sum_s \sum_f \left(\overline{s_{fs}} - \overline{s_{fs-t}}\right)\left(\overline{\ln X_{fs}} - \overline{\ln X_{fs-t}}\right),$$

where Q_{it}, s_{ift} and X_{ift} denote the shipments of firm i in year t, the cost share of input f for firm i in year t, and input of factor f for firm i in year t, respectively. The inputs are labor, capital, and intermediates. Variables with an upper bar denote the industry average for that variable. We define a hypothetical (representative) firm for each year and industry. Its input and output are calculated as the geometric means of the input and output of all establishments in the industry. The first two terms on the right-hand side of the equation denote the cross-sectional TFP index based on the Theil-Tornqvist specification for each firm and year relative to the hypothetical establishment. Since the cross-sectional TFP indexes for t and t-1 are not comparable, we adjust the cross-sectional TFP index with the TFP growth rate of the hypothetical firm, which is represented by the third and fourth terms in the equation.

4. Future Works

As the next stage of this research, we will investigate Japanese MNEs' location choice between CLMV and Thailand. Estimating the model provided in the previous section, we will examine the relative importance between country-level and region-level characteristics. We will also explore the substitution pattern of location between country and region by examining the IV parameters. In particular, they are expected to rise within at least some of the countries: national border does not matter within such countries in terms of MNEs' location choice. Lastly, we will examine the heterogeneous effects of the characteristics according to firms' productivity. For example, investing in Myanmar or Laos is expected to require more highly productive investors than investing in Thailand or Vietnam.

In order to complete such work, a crucial task remains. We need to extend our sample investors at least in Cambodia, Myanmar, and Laos. The dataset provided by Toyo Keizai Inc. reports a few Japanese investors in each country. Such a small number of observations make our estimation difficult. For example, it leads to that most of the sample regions have no samples, resulting in us needing to omit such regions from our analysis. In order to assure enough variation in the different region characteristics, it is necessary to include a sufficient number of regions in our analysis. Thus, we will try to include more investors in the sample by also using data sources other than Toyo Kiezai Inc.

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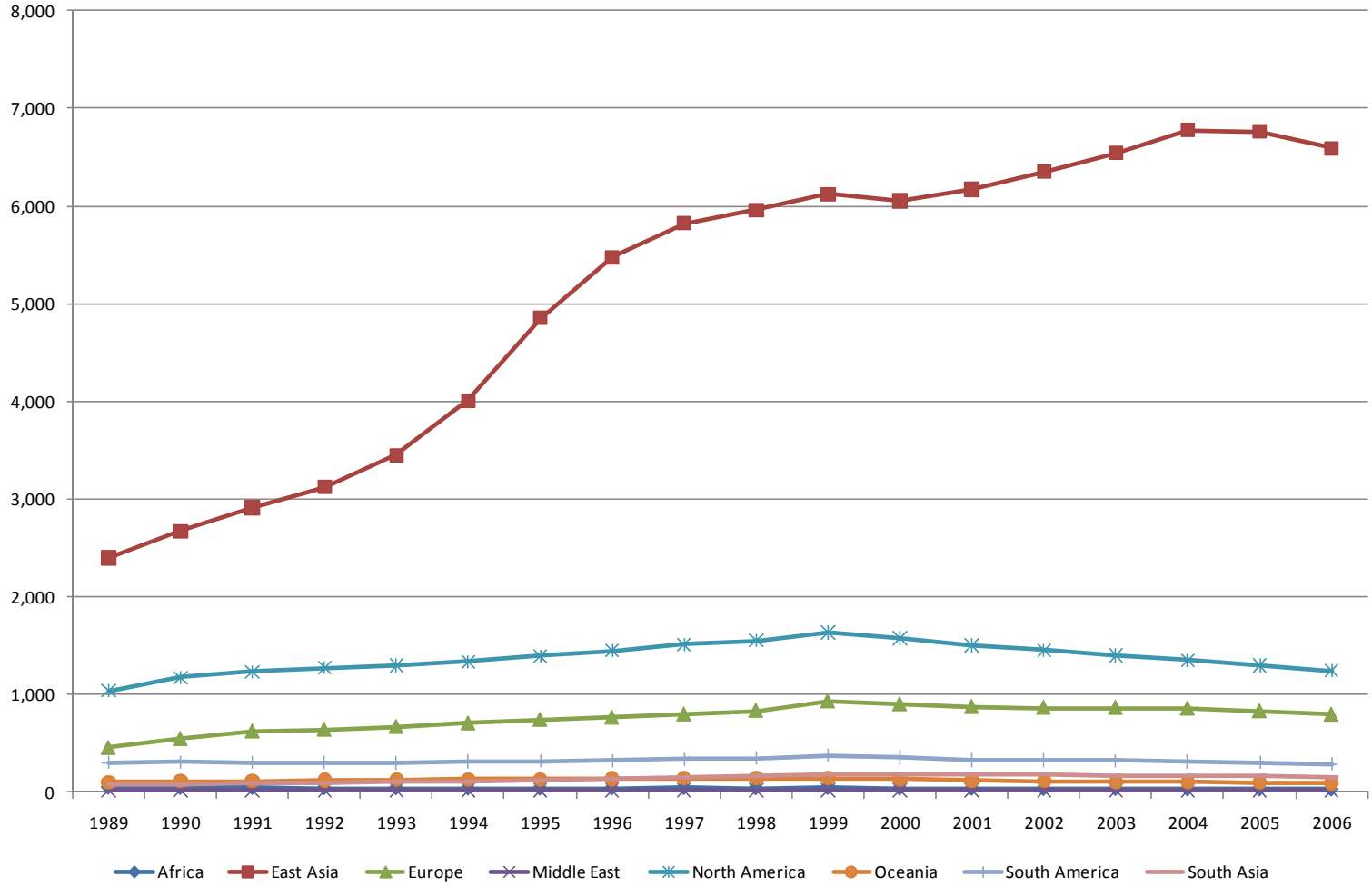
Table 1. MNEs' TFP by their Affiliates' Location

	N	Mean	SD	p25	p75
Africa	357	0.185	0.091	0.136	0.244
Europe	9,463	0.154	0.133	0.073	0.231
Middle East	208	0.097	0.174	0.015	0.194
North America	15,733	0.137	0.134	0.056	0.214
Oceania	1,639	0.128	0.130	0.040	0.208
South America	3,799	0.147	0.124	0.067	0.221
South Asia	1,701	0.173	0.117	0.109	0.240
East Asia	49,834	0.152	0.138	0.071	0.229
ASEAN4	14,875	0.151	0.125	0.073	0.221
NE Asia	25,922	0.154	0.147	0.071	0.233
Thailand	8,067	0.144	0.128	0.064	0.222
Cambodia	19	0.137	0.071	0.081	0.192
Laos	14	0.162	0.024	0.140	0.184
Myanmar	41	0.208	0.135	0.181	0.291
Vietnam	896	0.182	0.147	0.121	0.255

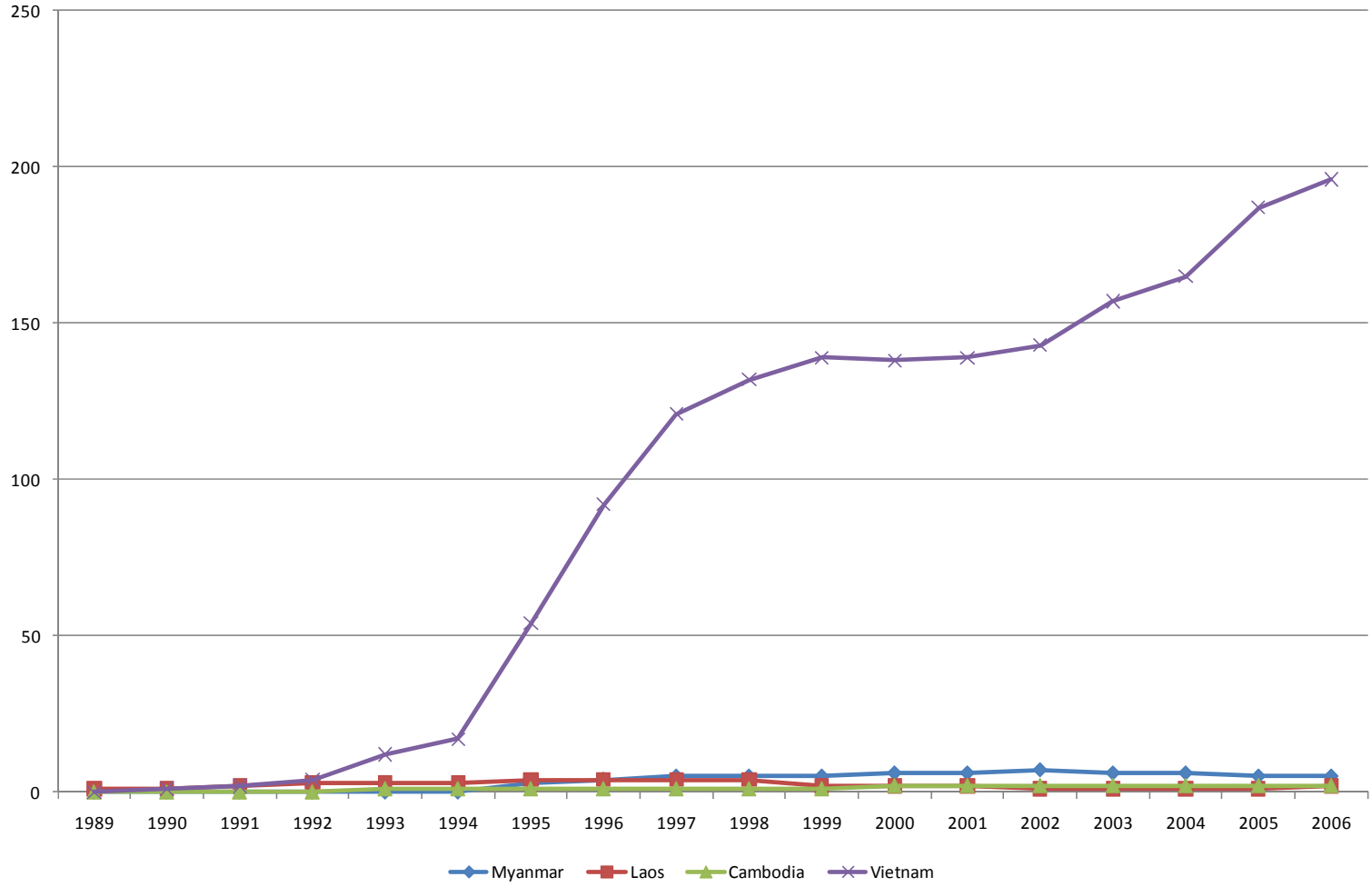
Source: Authors' calculation based on the Overseas Japanese Companies Data (Toyo Keizai Inc.) and the East Asian Listed Companies Database (Japan Center for Economic Research)

Figure 1. Japanese MNEs' Location in the World (Number of Affiliates)



Source: The Overseas Japanese Companies Data (Toyo Keizai Inc.)

Figure 2. Japanese MNEs' Location in CLMV Countries (Number of Affiliates)



Source: The Overseas Japanese Companies Data (Toyo Keizai Inc.)