

Firm Size and Determinants of Foreign Direct Investment

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Abstract

This paper studies the locational determinants of foreign direct investment (FDI) by Japanese manufacturing firms in seven Asian countries by utilizing the 1993 survey data. I show that different size-groups of firms react to different factors in the host country in making the foreign investment decisions.

Low labor cost and sufficient infrastructure encourage small firms to invest in a certain country while, for large firms, market size of the host country and strategic considerations (e.g. whether competitors invested in the country or not) are most important for their locational decisions.

Overall, availability of cheap labor is not necessarily an important factor for Japanese FDI in Asia.

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1. Introduction

This paper studies the locational determinants of foreign direct investment (FDI) for firms of different size and industry groups. Here I show from the evidence of Japanese FDI in Asia that the locational determinants of FDI for large firms are quite different from those for small firms. The investment decisions of large firms are dominated by strategic considerations, market size of the host country, and policy environments while small firms are more likely to undertake investments in a country where there are abundant low-cost labor and sufficient infrastructure.

The past studies of the determinants of FDI fall in one of two streams of literature. One is the industrial organization approach which seeks to pinpoint the characteristics of investing firms and the industries in which many investing firms belong. The consensus is that FDI takes place because firms seek to exploit firm-specific advantages or technological superiority by expanding operations abroad, and they tend to be large firms spending much on R&D and advertising. (Hymer, 1960; Vernon, 1966) Furthermore, those investing firms tend to form oligopolistic industries. (Horst,1972; Caves,1971; Kinoshita and Mody, 1997)

The other approach is to relate the location choice of FDI and various macroeconomic conditions of the host country to see what host country characteristics affect firms' investment decisions. (Kravis and Lipsey,1982; Wheeler and Mody,1992; Sianesi,1995) For example, location-specific advantages for which investing firms may seek in the host country are low costs of production, market, size, and political factors. Although findings from past studies vary, it is generally considered that availability of cheap labor, growth potential of the host country market, and favorable policies toward foreign investment are the main incentives for FDI.

The mechanism through which foreign investment decisions are formed is a complex one because both microeconomic—firm and industry attributes— and macroeconomic conditions—host country characteristics— are dependent on each other. There is only a limited number of studies of foreign investment decisions that incorporate both micro and macro determinants. The study of Taiwanese firms by Chen (1992) is one of the few exceptions. He finds that the characteristics of Taiwanese FDI firms are different under different macroeconomic conditions.

The objective of this study is to identify the locational determinants of FDI conditional on firm- and industry-attributes. The empirical set-up for this study is 173 Japanese manufacturing firms that invested or did not invest in seven Asian countries (China, India, Indonesia, Malaysia, Philippines, Thailand, and Vietnam)

between 1989 and 1993. In contrast to large U.S. multinational firms, Japanese investing firms are typically smaller on average as found in Kojima(1985). This is particularly true for Japanese investments in Asia. The variation in firm size of our samples is quite large compared to the previous studies on the U.S. FDI. By utilizing the data on Japanese FDI, I will be able to reexamine the role of firm size for FDI decisions more thoroughly. The different scope of production reflected on firm size also gives rise to different incentives for choosing a particular location for investment.

In the next section, I discuss the previous empirical works relevant to this study. Then, the empirical model is presented in Section 3. Section 4 describes the characteristics of sample firms. After explaining the data set used for this analysis(Section 5), I discuss the estimation results in Section 6 followed by conclusions.

2. Previous works

2.1. Firm size and FDI

It is generally argued that the very reason for a firm to become multinational is ‘intangible assets’ possessed by the firm. These assets may represent technology, managerial skills, or know-how. Since there is no direct measure for such intangible assets, economists use some proxies. The variables often used as proxies are R&D expenditure, advertising expenditure, degree of product differentiation, and firm size.

Among these variables, the evidence from previous studies indicate that firm size— either measured by total sales or total assets— is probably the most important determinant of foreign direct investment decisions whereas other firm-attributes could be subordinated by firm size.(Horst, 1972; Lall, 1986; Grubaugh, 1987; Chen, 1992)

Firm size is considered to represent some firm-specific advantages because of the following reasons. First, foreign investments incur sunk costs at the initial stage and large firms are considered to have better access to credit than small firms.(Horst,1972) Second, larger scale production implies that the firm is likely to produce goods more efficiently through learning-by-doing. Third, the market for such intangible assets (e.g.; brand name, patent) is often imperfect and this produces an incentive to keep the use of the technology within the firm.

For the following reasons, many previous studies conclude that large firms

are more likely to invest abroad. The pioneering work by Horst(1972) shows in the study of the U.S. FDI to Canada that firm size is the only important explanatory firm-attribute with the positive coefficient in explaining the incidence of investment. Lall(1986) also draws a similar conclusion for Indian firms during 1977 and 1979, although firm size is not the only necessary firm-attribute for FDI; capital-output ratios and dependence on imported raw materials are also important. The role of firm size as defined by Blomstrom and Lipsey (1986) is also significant but only for initial decisions to invest abroad, not for subsequent investment decisions.

In contrast to this evidence which favors large scale firms, Kojima(1985) finds that the size of Japanese multinationals is rather small on average. He argues that this is because Japan had undertaken FDI in an industry becoming comparatively disadvantageous and these investing firms are often not technologically advanced large firms but small and more labor-intensive firms.

If the destinations of investment are extended beyond Asia, however, the effect of firm size on Japanese investment decisions abroad is still found positive and significant. (Trevino and Daniels,1994; Horaguchi, 1992)

If firm size is such an important precondition for FDI, the location-specific attributes of the destination may have different implications for investment decisions. Large firms endowed with technological superiority may be less sensitive to cost factors because they are so powerful and profitable that their strategies for dealing with taxes are more dominant in their investment decisions.(Kravis and Lipsey, 1982)

2.2. Locational determinants of FDI

Another study of the determinants of FDI includes the analysis of the conditions for host countries to attract foreign investments. These conditions are also referred to as locational determinants of FDI. This type of study is particularly relevant to developing countries that are striving for foreign investments in the “locational tournament.”(Wheeler and Mody, 1992) This is because FDI brings in not only foreign capital but also advanced technology.(Haddad and Harrison, 1993)

The locational factors considered to influence foreign investment decisions consist of roughly three elements: demand conditions, cost factors, and political factors. There are other classifications for these factors; however, I will follow Sianesi’s(1995). Demand conditions represent how much demand for FDI exists in the host country and the proxies used are market size of the domestic economy,

growth rate of the domestic market, and the degree of industrialization of the host country. Cost factors represent supply conditions for inputs necessary for overseas production and they include the availability of natural resources, in particular, labor costs and labor quality and sufficient infrastructure. Finally, political factors comprise trade, FDI and macroeconomic policies, and country risks of the host country.

Kravis and Lipsey (1982) present one of the first comprehensive studies on locational determinants of FDI. They refer to the U.S. experience at the industry level and argue that host market size and the extent of ‘openness’ of the host country are the major determinants for location decisions. In their study, however, relative labor costs turn out to be unimportant. Wheeler and Mody (1992) also study the locational decisions of the U.S. multinationals by using country ratings provided by Business International. They emphasize in this study the importance of agglomeration economies for location decisions. The importance of the existing stock of foreign investment and sufficient infrastructure (as proxies for agglomeration factors) indeed supports their view. Among other things, market size and labor cost are also found to be important.

The locational decisions by Japanese firms in three Southeast Asian countries are examined by Sianesi (1995). Her conclusion is that Japanese FDI in the region is driven by the exchange rate variations, particularly the appreciation of the yen since 1985. Market size is conditionally significant.¹

In this study, I will examine some of the representative host country variables which are comparable to past studies. They are market size, labor cost, infrastructure, and policy environments along with microeconomic factors.

3. Model specification

A firm’s decision to invest in the country is observed as a binary choice. If a firm invested in the country in the past five years, then the firm answers “yes,” which is coded as 1. Otherwise, it records 0. Suppose that there is an underlying continuous variable (Y^*) such as the amount of investments, but it is not observable to us. It is expressed as:

$$Y_i^* = \beta' X_i + u_i$$

¹Although this is one of the few attempts to examine the locational determinants of Japanese FDI, as the author admits it, it is severely constrained by the availability of the data.

where X_i is a column vector of explanatory variables, and u_i is an error term. What we can observe is whether or not a firm invested. Let d_i be an indicator function. Then, the relationship between an indicator and the latent variable is described as:

$$\begin{aligned} d_i &= 1 \text{ if } Y_i^* \succ 0 \\ d_i &= 0 \text{ if } Y_i^* \leq 0 \end{aligned}$$

Here I specify the probability distribution as a logistic function. That is, $\text{Prob}(d_i = 1) = \text{Prob}(u_i \succ -\beta'X_i) = \Lambda(\beta'X_i) = \frac{e^{\beta'X_i}}{1+e^{\beta'X_i}}$. This is a binary logit model and our objective is to find β s that maximize the loglikelihood function for observed responses.

Our dependent variable is, thus, the likelihood of investments that is reflected in the “past FDI” variable.

Independent variables (X_i) are a combination of host country characteristics and microeconomic factors. Host country characteristics used in this study are host market size, labor costs, availability of infrastructure, and policy environments. Microeconomic factors are firm-size, rivalry, and industry attributes.

What is notable here is an inclusion of the rival variable. The rival variable is defined as the perceptions of how substantial competitors in the same industry are making investments in the country. This variable reflects strategic rivalry in foreign investment decisions leading to the possibility of cascading effects. Observing its rival’s investment in the country, the firm may deduce that the host country has a favorable investment environments, or it may see potential benefits from following the ‘herd’ of investors (Vernon, 1960; Banerjee, 1992). Kinoshita and Mody (1997) confirm the existence of such herd behavior of Japanese investors in Asia.² For U.S. firms, Knickerbocker (1973) shows that this “follow-the-leader” syndrome is prevalent particularly for foreign investment decisions in oligopolistic industries. I expect this to be positive and significant.

Including the ‘rival’ variable and host country characteristics together in regressions, however, may cause multicollinearity. After all, competitors also observe the same host country characteristics before making investments and high ‘rival’

²Kinoshita and Mody (1997) use the same data set used for the study. Kinoshita and Mody focus on the relative importance of private and public information for foreign direct investment decisions made by Japanese firms while I emphasize the interactions between firm-attributes (firm size) and host country characteristics for firms’ location decisions of investments.

may be induced by the high ratings of other independent variables such as domestic market and labor cost. In this case, the coefficient of the 'rival' variable would be upward-biased. In order to avoid this problem, I regressed the 'rival' variable on all other independent variables ('rival'= $\alpha_0 + \alpha_1$ *domestic market + α_2 *labor cost + α_3 *infrastructure + α_4 *policy environment + error term) and redefined a new 'rival' variable only as an intercept plus the error term. (α_0 + error term)

Turning to other independent variables, the 'labor cost' variable is a firm's perception of how cheap labor is. A surge of Japanese FDI in Asia since the late 1980s is often attributed to the appreciation of the yen followed by the increases in wages and other production costs. A hypothesis to be tested is that Japanese FDI in manufacturing had been driven by the availability of cheap labor force abroad. If this is true, we expect the coefficient of labor cost to be '+'.

The domestic market variable is how favorable the host country market is to a prospective investor. This implies how much potential the host market has. This is also an indicator of economies of scale. (Kravis and Lipsey, 1982) The expected sign of this variable is also positive. Past studies consistently find this variable significant, either measured by GDP or GDP growth.

The infrastructure variable is constructed from an average of three original variables; availability of transportations, telecommunication, and energy. If the country is perceived to have high quality infrastructure, then the value of this variable is rated high. It represents the importance of agglomeration effects for FDI as discussed in Wheeler and Mody(1992) and Coughlin, Terza and Arromdee(1991).

The 'policy environment' variable is also constructed from an average of several variables (macroeconomic policy, trade policy, and FDI policy) because of the low response rate for each of these three variables. Ideally, we should distinguish various policies concerning the activities of foreign subsidiaries in order to draw detailed policy implications as in Hekett and Srinivasan (1993). However, due to lack of information, it is not possible in this study. Favorable policy environments toward foreign capital are expected to induce more FDI inflows. Recently, some developing countries (e.g. Mexico, Morocco, China, and Vietnam) have engaged in activist foreign investment policies and succeeded in increasing FDI inflows.

Other independent variables include firm-size measures such as total sales of a firm, country- and industry-dummies.

4. Sample characteristics

Table 1 shows the average characteristics of firms by size-group. Out of 173 total samples, observations used here are 161 because 12 firms did not report total sales. The average sizes of sample firms vary from 45,00 to 80,53,00 million yen. Thus, our sample firms are quite heterogeneous in size.

As discussed in Section 2, it is believed that the presence of intangible assets is the reason for firms to invest abroad. Many of the variables in Table 1 are considered to reflect directly and indirectly intangible assets or a firm's technology level.

R&D propensity in the fourth row of Table 1 is defined as the ratio of R&D expenditures to total sales indicated by a scale of 1 to 5.³ As the firm size increases, so does R&D propensity in our samples. Naturally, there is a scale economy at work in the presence of such intangible assets.

It is interesting to see that export propensity is least for large firms. Some past studies find that there is a positive relationship between a firm's export performance and the propensity to invest abroad (Kravis and Lipsey, 1982; Chen, 1992). If large firms are more likely to invest abroad, then export propensity should have been highest for large firms. This may be due to industry differences across size groups.

The birth year of the firm indicates that small firms are the oldest on average. This is because Japanese FDI in Asia had been historically concentrated in low-technology and labor intensive industries.

³The scales of R&D expenditures are 1 if there are no R&D expenditures, 2 if R&D expenditures are more than 0 but less than 1% of total sales, 3 if more than 1% but less than 3%, 4 if more than 3% but less than 5%, and 5 if more than 5%.

Table 1: Characteristics of sample firms by size group

	small firms	medium firms	large firms
number of firms	36	63	62
birth year	1885	1939	1920
sales (100 million yens)	45	455	8053
R&D propensity	2.81	3.11	3.70
export propensity	0.09	0.11	0.01

5. Data

The data used for this analysis is based on the survey of Japanese manufacturing firms conducted by MITI (Ministry of International Trade and Industry of Japan) in March 1993. Questionnaires were distributed to a few hundreds firms and 173 firms returned usable answers.

In the questionnaire, a firm is asked whether it invested in each of the seven Asian countries in the past five years. This is used as a dependent variable in the regressions. Also, a firm is asked to rate various host country characteristics from its general perceptions with a scale of 1 through 10. There are 13 characteristics of each host country in the original questionnaire. For regressions, I use four variables that are relevant to this literature—labor cost, domestic market, availability of infrastructure, and favorable policy environment.⁴

In addition to these host country characteristics variables, a firm reports how substantial its competitors' investments were in a host country during the past five years. This 'rival' variable ranges from 1 through 7. Both host country characteristics and the 'rival' variable are independent variables in the regressions.

The sample firms are quite heterogeneous in 2-digit ISIC (International Standard Industrial Codes). The main products they produce vary from food products to electronics and transportation equipment.

The problem for conducting regression analysis is that there is much missing information in the independent variables partly because the ratings of host country characteristics are finely defined in the original questionnaire⁵. Missing values also occur across different countries. For example, many firms left out blank host country characteristics of India, Philippines, and Vietnam because they have less investment experience in these countries.

The solution to this problem is to stack up the data by country and to create a panel. (1211 observations if 173 x 7.) I control for country and firm attributes by including country dummies and firm characteristics variables, respectively.

⁴I also checked the correlation coefficients of 13 variables and dropped some variables to avoid the multicollinearity.

⁵There are originally 13 characteristics of a host country in the questionnaire and I used 4 representative variables for the regression analysis.

6. Estimation results

The regression results of the base model are presented in Table 2. The dependent variable is the binary variable that reflects whether the firm invested in the country or not. This can be also interpreted as the firm's propensity to invest in each country. Among all independent variables, note that the rival variable shown in the table is the one after being corrected for multicollinearity.

Column I contains the results for the pooled samples. Overall, most of the host country characteristic variables—domestic market, infrastructure, and political environment—carry expected signs and statistical significance. In terms of investment, Japanese firms in Asia are attracted to the countries with favorable policy environment. Large market size and sufficient infrastructure are also important but by a lesser degree than political factors.

The only exception is, however, the labor cost variable. The coefficient of labor cost is -0.04 with no statistical significance at the 10% level. This may be due to a difference between a firm's perception about average wages and the labor force needed for its production. In this respect, firms in labor-intensive industries are the only ones that are expected to perceive cheap labor and to use that cheap labor force. Other firms in non labor-intensive industries may require more skilled workers and not invest in areas where such skilled labor force is scarce even if the average wages are low. In order to see if such industry differences are significant, I include industry dummies in Column III but the result remains the same. As an alternative, I estimate different coefficients for different industry groups in Table 5, the results will be discussed later.

The previous findings on labor costs in a host country are mixed. For example, Wheeler and Mody(1992) find evidence that low labor costs in the host country encourage U.S. FDI. At the industry-level, however, Kravis and Lipsey(1982) find no such evidence.⁶ In the study of Japanese FDI, Sianesi(1995) finds empirical support for labor cost consideration due to the yen's appreciation in the analysis of macroeconomic determinants of Japanese FDI in Southeast Asian countries. This study supports the results in Kravis and Lipsey(1982) in this respect.

I also find that the rival variable is as important as the host country characteristics variables and it remains stable throughout regressions. This implies that FDI by one firm will trigger similar investments by other leading firms in the industry to maintain their market shares. This result is consistent with Ki-

⁶Kravis and Lipsey (1982) explain that the reason why the labor cost variable is insignificant is that the labor-intensive textile industry is omitted in industry group regressions.

noshita and Mody's(1997) finding that the rival variable is the most influential determinant of future investment plans.

After including country dummies(Column II), the sizes of all these coefficients become less. Yet, the relative importance of each variable remains unchanged. Policy environment is the most important variable, followed by the rival variable, and two other variables, domestic market and infrastructure, which are equally important. The differences across countries in terms of different intercepts are statistically significant. Industry dummies are, on the other hand, insignificant in explaining the investment decision and rejected by the likelihood ratio test.

In sum, the likelihood of Japanese FDI in these countries is affected mostly by changes in host government policies. Although the current data set used for this study contains no breakdown of policies, there are some descriptive statistics on 'policy disincentives' for overall Japanese FDI. According to the statistics, Japanese firms see requirement on local ownership, quantitative restrictions on imports of raw materials and capital goods, and high tariffs on imports of inputs (trade policies) as serious disincentives for investments. In other words, lifting these restrictions will help increase Japanese investments.⁷

Other traditional variables such as market size and the availability of sufficient infrastructure are also incentives for firms to invest in the country. But the availability of low-cost labor alone did not induce investments. This may be due to different skill levels demanded across industries. Strategic considerations are equally important as location-specific advantages.⁸ Next, we will see if these results still hold after taking into account firm-specific attributes.

⁷Heckett and Srinivasan (1993) find that Japanese FDI in developing countries is very sensitive to local content requirements. Our descriptive statistics on FDI disincentives also evaluate this as one of the impediments.

⁸My finding is different from that of Kinoshita and Mody(1997) in the importance of rivalry relative to other determinants. We find that the rivalry variable (e.g. private information) could subordinate other location-specific advantages (e.g. public information). In this paper, rivalry is found as important as location-specific advantages, but policy environment is more influential.

Table 2. The base model with country and industry dummies

	I	II	III
rival	0.28*** (0.06)	0.26*** (0.06)	0.29*** (0.06)
domestic market	0.23*** (0.05)	0.19*** (0.06)	0.27*** (0.06)
labor cost	-0.04 (0.07)	0.05 (0.08)	-0.06 (0.07)
infrastructure	0.26*** (0.08)	0.18** (0.09)	0.26*** (0.08)
policy environment	0.41*** (0.09)	0.35*** (0.10)	0.41*** (0.10)
country dummies	no	yes	no
industry dummies	no	no	yes
n	491	491	491
loglikelihood	-218.05	-210.20	-212.89

Note:

(1) Dependent variable= past FDI.

(2) *** and ** indicate 1% and 5% significance level, respectively.

In order to control for firm-specific effects, the size factors of firms are added in Table 3. There are also other firm-specific variables (R&D propensity, export propensity, and age) available in the data set. However, none of these variables turns out to be significant. Firm size is measured as total sales and size dummies are three categories (small, medium-size, and large) and the large dummy is dropped as a base.

The same results from Table 2 hold stronger in Column I of Table 3. All but the labor cost variable are significant. Firm size improves loglikelihood significantly. The positive coefficient of firm size implies that foreign investment decisions of Japanese firms are affected by the scale of operations: The larger the firm is, the more likely it invests abroad. Size dummies in Column II, on the other hand, are also included in place of firm size, but rejected by the likelihood ratio test.

The coefficient of firm size is 0.00005 and smaller than those found in the past studies.⁹ The reasons for this are explained first by the methodological difference. The results from the previous studies are obtained by regressing the likelihood of foreign investments only on various firm-attributes. In my study, firm size is examined together with exogenous macroeconomic factors. Therefore, my result implies that the effect of firm size becomes smaller once we condition investment decisions on different host country conditions. Second, we are looking at the determinants of investment decisions only in Asia while other studies seek for those for foreign investment decisions overall. In other words, the small effect of our 'firm size' variable may indicate that the scale of Japanese firms matters less to investments made in Asia. If it were for investments regardless of its destinations, then the effect of firm size would have been larger for Japanese multinationals, too. This point, however, will not be verified unless there are some comparable results from overall investments by Japanese firms.

It seems that firm size influences the choice of investment locations by Japanese firms, but by a lesser degree than in the previous results. If there are interactions between firm size and macroeconomic conditions in the course of investment decisions, then the motives for foreign investments may also vary with firm size. To illustrate this point, I divide the samples by firm-size groups and perform the logit regression on each group in Table 4.

⁹Lall(1986) studies the characteristics of investing Indian firms and finds the coefficient of firm size, which is measured as gross sales, lies in the range of 0.54 and 0.97 in the probit model. Also, Chen (1992) performs similar regressions for Taiwanese firms and finds that the coefficient of sales revenues is 0.0812 with statistical significance.

Table 3: The base model with size attributes

	I	II
rival	0.27*** (0.06)	0.27*** (0.06)
domestic market	0.24*** (0.06)	0.23*** (0.05)
labor cost	-0.02 (0.07)	-0.05 (0.07)
infrastructure	0.29*** (0.09)	0.27*** (0.08)
policy environment	0.43*** (0.10)	0.40*** (0.09)
firm size	0.00005*** (0.0001)	—
size dummies	no	yes
n	491	491
loglikelihood	-202.98	-215.87

Note:

(1) Dependent variable=past FDI.

(2)*** indicates 1% level of statistical significance.

Table 4 shows the results for three firm-size groups. Small, medium-size, and large firm groups are defined as firms with total sales of 2-100 hundred million yen, 100-1000 hundred million yen, and over 1000 hundred million yen, respectively.¹⁰ According to Table 4, the reasons for foreign investments are quite different for each group.

Compared to the results for pooled samples in Table 2 and 3, there are several differences in by-size regressions.

The labor cost variable still remains insignificant for the medium-size and large firms, but for small firms, this becomes positive and significant. It seems that small firms are most sensitive to increasing costs of production in the home market due to the appreciation of the yen. The main reason for small firms to invest in Asia is the comparative disadvantage in terms of labor costs. This ‘Japanese-type FDI’ proposed by Kojima(1985) is more applicable to small Japanese firms.

Small firms are also concerned about the availability of sufficient infrastructure. It is natural for small firms with capital constraints to minimize fixed costs of investments, therefore, to invest in the country with enough infrastructure.

In contrast to small firms, domestic market size and rivals’ movements are major incentives for investments by both medium-size and large firms. First, the significance of market size indicates the existence of economies of scale, thus, the greater profitability of operating in a large host country market.

Second, it is natural that strategic considerations are more important for large firms in oligopolistic industries. As the coefficients of ‘rival’ increases gradually across size groups, it is confirmed that the larger the firm is, the more important strategic considerations become (namely, whether or not other competitors invested) and the more cascading effects are observed.

The general picture of Japanese FDI in Asia is that small firms are induced to invest by low labor costs and sufficient infrastructure. Large and medium-size firms are, in contrast, driven by market size and competitors’ investments. Changes in host country policies toward foreign investments seem to affect only large firms. These two opposing results fit into the hypotheses proposed by Kravis and Lipsey(1982) in the study of the location choice of the U.S. firms: Whether firms choose the location for investment in order to exploit location-specific advantages (market scanning hypothesis), or simply locate where host country tax

¹⁰Threshold levels of sales for three groups are taken from the definitions of size groups for Japanese companies listed in ‘Report on the Survey of Research and Development’ published by Statistics Bureau of Japan.

policies are favorable (market making hypothesis). Among Japanese multinationals, the first hypothesis describes the locational choice of small firms whereas the latter is appropriate for medium-size and large firms.

It is therefore important to consider the size of the investing firms to evaluate host country attributes in attracting FDI since different size firms are motivated by different host country factors.

Table 4: By size-group regressions

	small	medium	large
rival	0.04 (0.34)	0.25* (0.13)	0.43*** (0.12)
domestic market	-0.32 (0.29)	0.56*** (0.17)	0.29*** (0.11)
labor cost	1.52** (0.70)	-0.19 (0.16)	0.11 (0.13)
infrastructure	0.88** (0.42)	0.12 (0.20)	0.12 (0.14)
policy environment	0.61 (0.43)	0.13 (0.23)	0.29* (0.16)
country dummies	yes	yes	yes
industry dummies	yes	yes	yes
n	61	192	238
loglikelihood	-14.37	-55.46	-98.29

Note:

(1)Dependent variable= past FDI.

(2)***, **, and * indicate 1%, 5%, and 10% level of statistical significance, respectively.

Recall our discussion on the insignificance of the labor cost variable for all firms (Table 1 and 2). I argued that this may be due to differences in skills demanded across industries. However, industry dummies fail to bear significance in explaining the likelihood of investments. At two-digit ISIC, each industry group is expected to have different production technology. Generally, the cloth and textile industries are considered to use more labor-intensive technologies than the chemical industry. In order to examine these possibilities, I next estimate different coefficients for labor-intensive industries.

Table 5 presents regressions for the textile and electronics industries. Both are considered relatively more labor-intensive industries. Also, the presence of Japanese-owned firms in Asian countries has been historically the greatest in the electronics industry.

To our disappointment, although the coefficient is positive (4.60), the labor cost variable is not significant in the textile industry at the 10% level. We still see, however, that labor cost is relatively more important for the textile industry than for any other industry since t - statistics of labor cost is 1.614, close to the 10% significance threshold. Overall, Japanese FDI in the textile industry is motivated by favorable host country policies rather than low labor costs. In fact, the textile industry is most sensitive of all industry groups to the policy environment.

For the electronics industry, availability of sufficient infrastructure and firm size are the key determinants of FDI. The electronics industry is generally labor-intensive but the coefficient of the labor cost is not only insignificant but also negative. In contrast to the result in Wheeler and Mody(1992), the electronics industry is not particularly sensitive to different host country characteristics relative to all industries, with an exception of infrastructure.(see also Table 3) On the other hand, it is more sensitive to interfirm differentials. The size of the coefficient of firm size, 0.00007 relative to 0.00005 for all firms (Column I, Table 3) indicates that the tendency that larger firms invest more is greater in the electronics industry.

The determinants of FDI in labor-intensive industries are different from those of all industries. In particular, the rival variable that was significant for all industries seems irrelevant to labor-intensive industries. One explanation for this is that labor-intensive industries are less likely to be oligopolistics than other R&D- or capital-intensive industries. Indeed, chemical, machinery and transportation equipment recover statistical significance of the rival variable.(the results are not reported here.)

Table 5: By industry-group regressions

	textile	electronics
rival	0.40 (0.62)	-0.07 (0.19)
domestic market	1.81 (1.21)	0.13 (0.17)
labor cost	4.60 (2.85)	-0.15 (0.19)
infrastructure	-1.63 (1.61)	0.46* (0.26)
policy environment	9.57* (5.79)	0.34 (0.27)
firm size	-0.001 (0.001)	0.00007*** (0.00002)
country dummies	yes	yes
n	42	114
loglikelihood	-7.34	-37.07

Note:

(1)Dependent variable=past FDI.

(2)*** and * indicate 1% and 10% levels of significance, respectively.

7. Conclusions

In this paper, I study the locational determinants of FDI in the context of Japanese manufacturing FDI in Asia. In addition to classical variables, I also analyze factors endogenous to the investing firms— firm size and industry attributes— as determinants of FDI. The role of these microeconomic factors is not ignorable because the locational determinants are a function of these factors.

Investments by Japanese firms in Asia are generally motivated by large host market size, sufficient infrastructure, favorable policy environment, and intra-industry strategic rivalry . Among these, policy environment is the most important determinant. The availability of low-cost labor does not necessarily help increase the likelihood of their investments. The appreciation of the yen since 1985 is often believed to have put cost pressures on many Japanese manufacturing firms to relocate their production sites to a country where they can utilize cheap labor. Our evidence does not support such hypothesis with the exception of small firms.

I also find that there is a difference across firm size groups. For small firms, low labor cost and availability of sufficient infrastructure are the major determinants of their location choices while medium-size and large firms seek to invest in a country with large market size. Strategic considerations are also an important determinant for medium-size and large investing firms, and particularly in oligopolistic industries.

The policy implications for other developing countries can be discussed now based on this Asian experience. A host developing country can initially affect the volume of inward foreign investments to a certain extent by relaxing various restrictions on the operations of foreign subsidiaries. The next question is whether or not a country can transform that initial surge into a continuous flow of investments. Firms in oligopolistic industries tend to follow the herd of investors even if they have little information about host country conditions. To induce informational cascading, the host country need to have more than favorable policies. For the first comer to remain operating, the host country should have sufficient infrastructure and show some economic growth potential of the economy. Availability of cheap labor has only a limited impact on certain industries, and it is not always sufficient. By retaining the first group of investors, the host country may be able to trigger an outburst of foreign investment inflow.

Appendix 1. Definitions of the variables

variables	definitions
Size	Measured as total sales in Japanese yen
R&D propensity	R&D expenditure to sales ratio. A scale of 1-5. (1if zero, 2 if 0-1%, 3 if 1-3%, 4 if 3-5%, and 5 if greater than 5%)
Export propensity	Exports to sales ratio as a percentage.
Age	Birth year of a firm.
Past FDI	A binary variable. Whether a firm invested in a country in the past five years (=1) or not (=0).
Domestic market	Evaluations on the importance of a size of a host country market as a locational determinant. A scale of 1 (not important) to 10 (very important).
Labor cost	Evaluations on the importance of low labor cost in a host country. A scale of 1 to 10 .
Infrastructure	An average of three infrastructure variables (availability of transportation, telecommunication, and energy). A scale of 1-10.
Policy environment	An average of three policy variables (macro-economic policy, trade policy and FDI policy).
Size dummies	Three firm size dummies. If world sales are 2-100 hundred million yen, then small-size. If world sales are 100-1000 hundred million yen, then medium-size. If greater than 1000 hundred million yen, then large-size. A large-size dummy is dropped as a base.

variables	definitions
Country dummies	Seven country dummies of China, India, Indonesia, Malaysia, Phillipines, Thailand, and Vietnam. Vietnam is dropped as a base.
Industry dummies	Six industry groups (1= food, textile, lumber & pulp; 2=chemical; 3=iron; 4=machinery,electronics; 5=transportation equipment; 6=others) The “others” industry group is dropped as a base.

Appendix 2. Summary statistic of regression variables

	n	mean	std.dev.	min.	max.
rival	946	3.04	2.15	1	7
domestic market	637	5.74	2.46	1	10
labor cost	576	7.22	1.89	1	10
infrastructure	566	4.85	1.79	1	10
policy environment	535	5.27	1.77	1	10
past FDI	1210	0.14	0.35	0	1
firm size	1127	3289	8027	2	74499

Appendix 3. Correlation matrix

	rival	market	labor cost	infra.	policy	firm size
rival	1	0.37***	0.02	0.38***	0.41***	0.15***
market		1	0.16***	0.30***	0.36***	0.07
labor cost			1	-0.06	0.04	-0.01
infrastructure				1	0.64*	0.03
policy environment					1	0.05
firm size						1

Note: *** indicates 1% level of significance.

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