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LOCATION, GOVERNANCE, AND STRATEGIC DETERMINANTS OF JAPANESE MANUFACTURING INVESTMENT IN THE UNITED STATES

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A firm's decision to manufacture abroad depends on location, governance, and strategic factors. Governance factors are firm-specific. In spite of this, most empirical studies of foreign direct investment (FDI) have been conducted at the industry level (making it impossible to look at firm-specific determinants), and only a handful have considered governance, location, and strategic factors simultaneously. This paper is the first large sample study of the determinants of foreign direct investment at the product and firm-level. It examines the impact of location and governance factors, and of four types of strategic interactions, on a Japanese firm's propensity to manufacture in the U.S. The results support the view that foreign direct investment is explained by location, governance, and strategic variables. Economies of scale and trade barriers encourage Japanese FDI in the U.S. The larger a Japanese firm's R&D expenditures, the greater the probability it will manufacture in the U.S., but this is not the case for advertising expenditures. Some strategic factors are also important: Japanese firms with medium domestic market shares have the highest propensity to invest in the U.S. There is evidence of follow-the-leader behavior between firms of rival enterprise groups, but none of 'exchange-of-threat' between American and Japanese firms. Japanese investors are also attracted by concentrated and high-growth U.S. industries.

INTRODUCTION

It stands to reason that a firm's decision to integrate into foreign manufacturing should depend both on its own capabilities and on the behavior of its rivals. Yet empirical studies on foreign direct investment (FDI) have concentrated exclusively on the former or on the latter, but almost never on both. Transaction cost theory focuses only on firm-specific assets in explaining the decision of firms to expand abroad and ignores strategic interactions between firms of the 'follow-the-leader' (Knickerbocker, 1973; Flowers, 1976) or 'exchange-of-threat' types (Graham, 1974, 1978). In other words, it assumes that firms act by themselves, and that they do not react to their competitors. Conversely, strategic interaction theories (Knickerbocker, 1973; Graham, 1974, 1978; Flowers, 1976) do not take into account firm-specific factors which

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may lead firms to invest abroad even in the absence of strategic imperatives.

In this paper we show that internationalization and strategic interaction theories are complementary, and that both sets of factors affect a Japanese firm's decision to manufacture in the United States. Only a few empirical studies before this one (Caves, Porter, and Spence, 1980; Terpstra and Yu, 1988; Yu and Ito, 1988) have considered both sets of variables simultaneously. In contrast to the present work, they neither cover the full range of manufacturing industries nor do they investigate various types of strategic interactions simultaneously. This study is the first to explore the impact of location and governance factors, and of four types of strategic interactions, on a firm's propensity to invest abroad.

Ours is also the first large scale study of the determinants of FDI at the *product and firm-level.* With the exception of Swedenborg (1979) and Grubaugh (1987), previous empirical studies have been at the *industry level* (Caves, 1974: Pugel, 1981; Kim and Lyn, 1987; Kogut and Chang, 1991; Drake and Caves, 1992; Kimura and Pugel, 1992). One strong argument for firm-level studies is that both industrial organization (Hymer, 1976) and transaction cost theories of FDI (e.g., Hennart, 1982) stress that it is *firm-specific* characteristics that lead to FDI. Running tests at the industry level assumes that all firms are homogeneous within an industry (Porter, 1981; Nelson, 1991), an assumption that we now know to be unwarranted (Rumelt, 1991).

In this paper, we focus on the determinants of the decision of Japanese firms to manufacture a given product in the United States. Japanese investment has grown rapidly in the last decade, raising considerable interest and even some alarm. One important element of the debate is the extent to which Japanese FDI possesses unique characteristics that differentiate it from European or American FDI. The results of this paper throw some additional light on this issue.

The next section reviews the theoretical and empirical literature on FDI, and states the main hypotheses. For ease of exposition, the hypotheses will be worded in the context of Japanese investment in the United States. The model is general, however, and applies to investors of any home country investing in any host country. The third section describes data and methodology, and elaborates on the variables. The fourth section reports the results, and the last section presents our conclusions.

THE DETERMINANTS OF FOREIGN DIRECT INVESTMENT

Location and governance factors

Transaction cost theorists (e.g., Buckley and Casson, 1976; Dunning, 1981; Hennart, 1982, 1991a) see FDI as the result of two sequential decisions (see Figure 1). The first decision is whether to manufacture products at home and export them, or whether to manufacture them abroad (the location decision). Given a decision to manufacture abroad, the second decision is whether a firm will rent or sell its own firm-specific advantages to local firms, or whether it will internalize their transfer (the governance decision).[1] Hence, two types of variables simultaneously affect a firm's decision to invest abroad: (a) those that determine the optimum location of production (location factors); (b) those that determine the optimal governance structure to exploit advantages (governance factors).

Location factors

The optimum location of production depends on plant economies of scale, transportation costs, tariff and nontariff barriers, relative production costs, and on the presence of long-standing customers in the foreign market (Hypotheses 1–5).

Scale economies

When the product produced by a firm has a relatively large plant minimum efficient scale (MES), it makes sense to centralize production in a few plants in order to exploit economies of scale and to serve foreign markets through exports from that plant. Conversely, the cost disadvantages of setting up foreign production

[1] Note, however, that as aruged by Casson (1987) and Hennart (1991a), firm-specific advantages are not necessary for a firm to expand abroad. Vertically-integrated firms do not do so to exploit firm-specific advantages, but instead to reduce transaction costs in markets for intermediate inputs. Hence a more general statement of the conditions for FDI is that FDI arises from the internalization of the market for intermediate inputs, including intangibles, such as knowledge and reputation.

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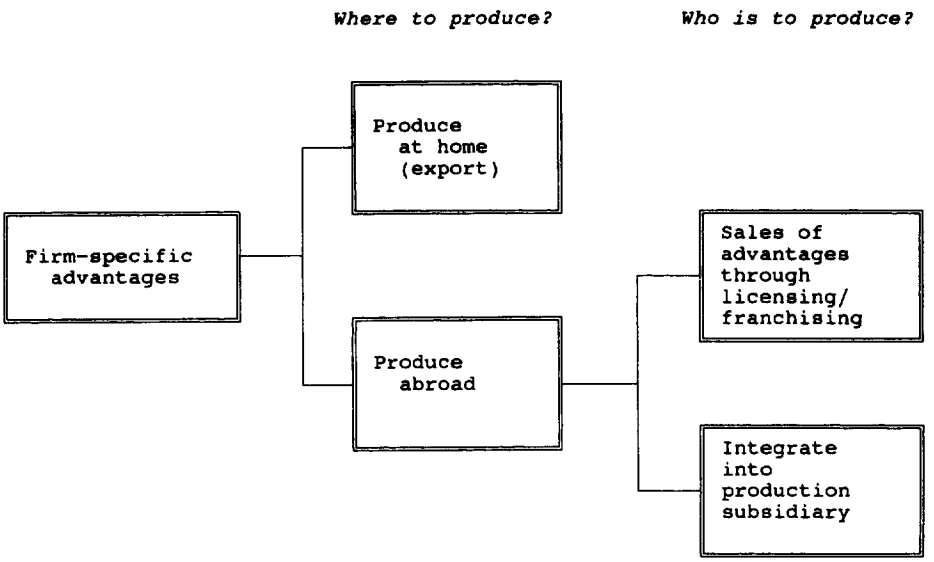

Figure 1. International expansion decision-making process. Source: Hennart, J-F. (1991), 'The transaction cost theory of the multinational enterprise', in C. N. Pitelis and R. Sugden (eds.), *The Nature of the Transnational Firm*, Routledge, London and New York, p. 86

facilities are lower when plant MES is small relative to the market. Hence, *ceteris paribus*,

Hypothesis 1: The larger the plant-level MES for a given product, the less likely that that product will be manufactured by Japanese firms in the United States.

Transportation costs

High transportation cost results in an increase in delivered cost, and, everything else constant, encourages foreign production over exports. This negative relationship between transportation costs and FDI propensity holds if the firm's production is sold to customers in the target market. Everything else constant,

Hypothesis 2: The higher a product's transportation costs, the more likely it will be manufactured by Japanese firms in the United States.

Tariff and nontariff barriers

A firm can bypass tariff and nontariff barriers on its exports by establishing manufacturing facilities abroad. Hence, everything else constant,

Hypothesis 3: The higher the level of U.S. tariff and nontariff barriers imposed on the imports of a given Japanese product, the more likely its manufacturer will choose to manufacture it in the United States.

Relative production costs

Everything else constant, foreign production is also more likely when production costs are lower abroad than at home. International differences in production costs are higher for inputs which incur high transportation costs, for example natural resources and unskilled production workers, than for factors which are more mobile, such as capital and management. In our case, Japan is poor in natural resources while the U.S. is relatively resource-abundant. Hence, Japanese firms in natural resource-intensive industries are less likely to serve the U.S. market through exports, and more likely to serve it through U.S.-based plants.

Hypothesis 4: The higher a product's natural resource intensity, the more likely its Japanese maker will manufacture it in the United States.

Presence of customers

Firms may find it desirable to follow their long-standing customers into foreign markets. One

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characteristic of the Japanese industrial system is the presence in many industries of vertical Keiretsu, tight vertical relationships between a main assembler (the first-tier firm) and a large number of smaller subcontractors (second-tier firms). It has been argued that many Japanese second-tier subcontractors have invested in the U.S. at the request of their first-tier customer (Encarnation, 1987). Hence,

Hypothesis 5: A second tier member of a vertical Keiretsu is more likely to manufacture in the United States if its first tier Keiretsu customer is already manufacturing there.

Governance factors

The market for intangibles, such as proprietary knowledge and goodwill (reputation), is often imperfect, and hence firms which invest in the generation of these intangibles have also a high propensity to invest abroad (Hypothesis 6, Hypothesis 7). Experience and scope economies also reduce the cost of subsequent investments (Hypothesis 8).

Knowledge

The basic problem with the transfer of knowledge is one of information asymmetry. The patent system offers a potential solution to this problem, making it theoretically possible to transfer knowledge on the market (licensing). But knowledge is often difficult to codify into patents, and patent rights are costly to enforce, and hence offer uneven protection against infringement. Therefore, firms which invest in the generation of knowledge will often find it necessary to exploit it abroad through internalization, i.e., through foreign manufacture (Buckley and Casson, 1976; Rugman, 1981; Teece, 1981, 1986; Hennart, 1982, 1991a).

Hypothesis 6: The more research and development intensive a Japanese firm, the more it is likely to manufacture its products in the United States.

This relationship has been shown to hold in a number of empirical studies of the determinants of FDI by U.S. and non-U.S. MNEs (Caves, 1974; Swedenborg, 1979; Kimura, 1989; Kogut and Chang, 1991; Drake and Caves, 1992).

Reputation

Another type of firm-specific advantages is reputation (goodwill) (Hennart, 1982, 1991a). Trademarks are property rights on reputation. The ability of a firm to exploit its reputation depends on the extent to which trademarks are protected from unauthorized imitation. Reputation can be shared with foreign producers by renting them the use of a trademark (franchising). The efficiency of this solution depends on the cost of preventing the renter from debasing quality. When this cost is high, the firm which has invested in reputation will internalize its transfer by operating outlets bearing its trademark (Hennart, 1982). In our case,

Hypothesis 7: The more advertising intensive a Japanese firm, the more it is likely to manufacture its products in the United States.

This hypothesis has received empirical support in the case of U.S. MNEs (Caves 1974; Pugel, 1981).

Experience and scope economies

A foreign firm which is already manufacturing product *j* in the U.S. market should have a higher propensity to manufacture other products *k* ... *n* (Davidson, 1980; Davidson and McFetridge, 1985; Yu, 1990). This for two reasons: first, the knowledge gained in producing one product in the U.S. can be transferred to another product. For example, Honda used the experience of the U.S. it gained through motorcycle production to produce automobiles (Kinugasa, 1984). Second, the manufacture of additional products may benefit from scope economies in production or distribution.[2] Therefore, everything else constant,

Hypothesis 8: The probability that a Japanese firm will manufacture product k ... n *in the United States is greater if it already manufactures product* j *there.*

Strategic factors

We have seen that for transaction cost theorists the decision to manufacture abroad depends on

[2] We thank Joseph Mahoney for bringing this point to our attention.

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a firm's resources and on location factors. Strategic interaction theorists argue that a firm's decision to engage in FDI hinges on the behavior or expected behavior of its rival.

For a firm to react to its rivals, it must be affected by their actions and be aware of it. That is, strategic interaction will be prevalent in oligopolistic industries, where a firm's position is affected by the actions of identifiable rivals (Friedman, 1983).

Firms in tight oligopolistic industries are able and have incentives to collude. They may also avoid taking competitive actions against their rival's moves due to the fear of retaliation (avoidance). On the other hand, firms in loose oligopolistic industries are quite sensitive to their rival's moves, and can be expected to react so as to maintain their competitive position, and hence to exhibit various types of strategic behavior such as 'follow-the-leader,' 'exchange-of-threat," and 'competitive dynamics' (Knickerbocker, 1973; Graham, 1974).[3]

The strategic rationale for FDI can thus be explained by four different types of strategic behavior: (1) avoidance or collusion, (2) exchange-of-threat, (3) follow-the-leader, and (4) competitive dynamics. If firms from different countries are involved, strategic interaction is either avoidance (or collusion) or exchange-of-threat. On the other hand, if interactions are between firms from the same country, strategic interaction takes the form of follow-the-leader or competitive dynamics. The four types of strategic interactions among Japanese and/or U.S. firms are described in Figure 2.

Avoidance or collusion

Strategic considerations suggest that entry will be discouraged in highly concentrated target markets. Greenfield entry creates additional capacity. This in turn may depress prices, and trigger retaliation by incumbents. Even entry by acquisition may be opposed because it disturbs stable collusion patterns. Foreign investors may therefore avoid entering concentrated industries, displaying avoidance or collusion (Solvell, 1987; Lall and Siddharthan, 1982; Kogut and Chang, 1991). On the other hand, high concentration usually means high barriers to entry, and hence high profitability. As Yip (1982) notes, the second effect will dominate the first if potential entrants have strong competitive advantages.[4] Multinational firms are in this category, because they usually possess strong firm-specific advantages and because they can cross-subsidize entry with profits earned in other markets. Hence, while highly concentrated U.S. industries may deter entry by weaker domestic firms, we expect that they will attract multinational firms (Knickerbocker, 1976).

> *Hypothesis 9: The higher the concentration ratio of the target U.S. industry, the more likely it will invite Japanese manufacturing investment.*

Exchange-of-threat

A good strategy for firms who see foreign firms enter their own domestic market is to retaliate by invading the invader's home market, a strategy called 'exchange-of-threat' (Graham, 1974, 1978; Vernon, 1974; Watson, 1982; Karnani and Wernerfelt, 1985).[5] Hence the probability that a Japanese firm will invest in the United States should increase if an American firm has previously invested in its domestic market.

> *Hypothesis 10: The larger the number of U.S. firms manufacturing in a given industry in Japan, the greater the probability that a Japanese firm in that industry will choose to manufacture in the United States.*

The impact of the 'exchange-of-threat' principle on the propensity to manufacture abroad was investigated by Graham (1974, 1978) and Flowers (1976). Graham examined whether European and Canadian FDI in the U.S. was a response to previous U.S. investment in Europe and Canada. His findings that the total number of investments made by European MNEs in the

[3] The range of a loose oligopoly is between 50 and 70 in terms of 8-firm concentration ratio (Knickerbocker, 1973; Scherer, 1980) and between 1000 and 1800 in terms of the Herfindhal-Hirschman Index, (Seno, 1983; Oster, 1990).

[4] We thank an anonymous referee for this point.

[5] The terms exchange-of-threat, exchange of hostages, cross-entry, and cross-investment have been used interchangeably. Exchange-of-threat is a type of 'tit-for-tat' strategy (Axelrod, 1984).

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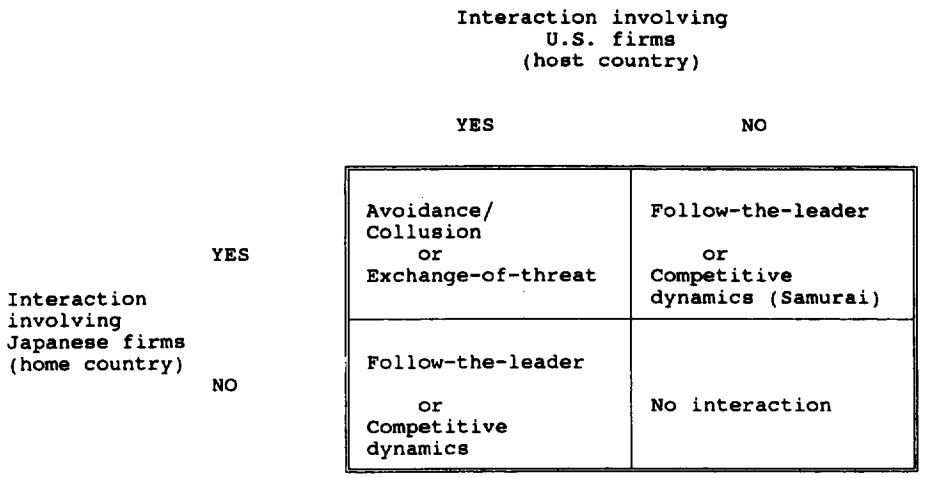

Figure 2. Types of strategic interactions

U.S. was correlated with the number of U.S. subsidiaries previously established in the respective European countries offers only weak empirical support for the theory because European investment in the U.S. was increasing over the time period under study. Hence, the longer the time lag, the greater the correlation between U.S. investments in Europe and European FDI in the U.S., even in the absence of an exchange-of-threat effect. In addition, a 2-digit SIC industry classification is too broad to test the presence of exchange-of-threat (Solvell, 1987). Exchange-of-threat interaction was also found to be prevalent in the banking industry (Choi, Tschoegl, and Yu, 1986). One criticism that can be levied against all these studies is that they did not control for location and governance determinants of FDI.

Follow-the-leader

In the maturing stage of the product cycle, the foreign investment of one industry member threatens the established market position of all others and triggers their subsequent investment (Vernon, 1966, 1974), a type of behavior which has been called 'follow-the-leader' (Knickerbocker, 1973; Graham, 1974). The pattern of Japanese FDI in the U.S. and Europe has been explained by this type of behavior (Encarnation, 1987; Gittleman and Dunning, 1991). As argued before, follow-the-leader behavior is prevalent only in a loose oligopolistic industry because firms in a tight oligopolistic industry will collude instead. Hence the propensity of a Japanese firm to invest in the U.S. should be greater, *ceteris paribus*, (1) if its rivals have already invested in the U.S. *and* (2) it is in a loose oligopolistic industry. In other words,

Hypothesis 11: Japanese firms in loose oligopolistic industries are more likely to manufacture in the United States if other Japanese members of that industry have already invested in the United States.

Knickerbocker (1973) and Flowers (1976) attempted to test for the existence of this motive by measuring the extent to which foreign entry was clustered in time (their 'entry concentration index,' or ECI) and regressing it on the concentration ratio of the investor's industry. They uncovered the presence of a quadratic relation between industry concentration and the ECI, with entry bunching increasing up to a certain level of industrial concentration ratio, but decreasing above this level (see also Caves *et al.*, 1980). These empirical findings only offer weak support because neither Knickerbocker nor Flowers controlled for location and governance factors. In addition, entry bunching, as measured by the ECI, does not necessarily show oligopolistic reaction but may indicate that all firms are faced with profitable investment opportunities at the same time. A positive relationship between industry concentration ratio and ECI may also

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reflect the fact that large firms have a greater tendency to invest abroad (Swedenborg, 1979).

A more persuasive test is that by Yu and Ito (1988). They explained FDI by both governance (R&D and advertising intensity) and strategic variables (oligopolistic reaction). Follow-the-leader motives were measured by the number of other firms in the industry which had previously invested in the host country. However, as the authors indicate, this measure may also reflect the fact that an increase in the number of investors generates additional information about this market, thus lowering entry costs for firms which have not yet invested. Hence it is difficult to know whether their results reflect follow-the-leader behavior or information diffusion. Another limitation is that they analyzed a limited number of industries (tires, textiles, and advertising).

Competitive dynamics

The incentive to invest abroad may be also influenced by a firm's domestic market position (Mascarenhas, 1986; Ito and Pucik, 1993; Roehl, 1989). It may be useful to distinguish between dominant and dominated firms. Dominant firms are firms who have a solid domestic foothold and strong competitive advantages (e.g., reputation, economies of scale, cumulative learning, and preferred access to suppliers and distribution) as well as the resources for retaliating and damaging challengers (Porter, 1985). Such firms have the largest domestic market shares.[6] Dominated firms, on the other hand, may choose to venture abroad in order to avoid the retaliation from dominant firms in their home market (Ito and Pucik, 1993; Porter, 1990) and because they enjoy a relative competitive advantage over local firms in foreign markets (Mascarenhas, 1986). Small dominated firms may not have, however, enough financial and managerial resources to invest abroad. Hence, we would expect dominated firms with medium market shares to have a greater tendency to manufacture abroad than dominant firms or dominated firms with smaller market shares.

Hypothesis 12: The probability that a Japanese firm will manufacture in the United States is a quadratic function of its market share in Japan.

There is some evidence that this factor may explain Japanese FDI in the U.S. As Abbeglen and Stalk (1985) note, it is not the firms with the largest market share that have been the most active investors abroad. Sony entered the U.S. before Matsushita, Honda before Toyota, and Epson before NEC (for other examples see Roehl, 1989). This pattern of entry seems to support the hypothesis that being a dominated firm with medium market share (a 'samurai') may increase the probability of investing in the United States.

Location, governance, and strategic factors should therefore affect the probability that a Japanese firm would manufacture a given product in the United States. The relative importance of each of these three categories of factors, both in general and in the case of Japanese FDI in the U.S., can be ascertained by entering these variables simultaneously. To this we now turn.

DATA AND METHODOLOGY

Methodology and dependent variable

Our population consists of all Japanese manufacturing firms listed in the 1986 Japan Company Handbook.[7] This list includes firms listed on the First and Second Sections of the Tokyo, Osaka, and Nagoya stock exchanges. After excluding firms with more than 50 percent foreign ownership or with less than 200 employees and those with missing values, we were left with 680 firms. Comparison between the population and our sample shows that it is representative of the population. From *Principal International Business* we obtained the list of all products (at the 4-digit SIC level) manufactured by these firms. The dependent variable (INV) (n = 1,799) is whether or not product j of firm i was manufactured in the United States at the end of 1986. **INV** is equal to 1 if this is the case, and 0 otherwise. In 343 cases (or 19.1% of our sample), a Japanese firm was manufacturing one of its products in the United States.

[6] Porter classified firms into two types: industry leaders and followers. In his study, industry leaders were defined as 'the largest firms in the industry, accounting for approximately 30 percent of industry sales revenues (1980: 220).

[7] Trading companies are excluded.

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Because of the nature of the dependent variable, a binomial logistic model is used in which the probability of producing product j in the U.S. is explained by the independent variables. The regression coefficients estimate the impact of the independent variables on the probability that a firm will manufacture the product in the U.S. A positive coefficient means that the variable increases the probability of manufacturing product j in the U.S. The model can be expressed as

$$P(Y_i = 1) = 1/(1 + \exp(-a - X_iB)),$$

where Y_i is the dependent variable, X_i is the vector of independent variables for the ith observation, a is the intercept parameter, and B is the vector of regression parameters (Amemiya, 1981).

Independent variables

Three categories of variables are entered: location-specific, governance, and strategic. Table 1 lists the independent variables and their predicted signs.

Location-specific variables

Scale economies (**SCALE**) were measured by plant-level MES (sum of the shipments of plants in the median and all higher classes divided by the number of plants in these classes at the 4-digit SIC level) over total industry shipments[8] (Hladik, 1985). Industry shipments data were taken from the *Census of Manufactures* (1982). Everything else constant, **SCALE** should be negatively related to FDI propensity.

The transportation cost (**TRANS**) of a given product was measured by the radius within which 80 percent of its total tonnage (R_{80}) is shipped (Weiss, 1972). Data on tons shipped by distance of shipment was taken from the *1977 Census of Transportation*. The higher transportation cost, the smaller the radius, so transportation cost is inversely related to **TRANS**. Hence the sign of **TRANS** should be negative.

U.S. trade barriers (**TB**) are represented by a dummy equal to 1 if a product category is subject to a high tariff rate or export restraints, and zero

[8] MES is calculated with shipments in the median and higher classes because shipments in classes below the median are typically very small.

Table 1. Summary of variables and expected signs (+ = encourages FDI)

Variable name	Description	Expected signs
Dependent variable		
INVT	whether a Japanese firm i manufactured product j in the U.S. at the end of 1986 dummy: 1 = yes, 0 = no	
Independent variables		
Location-specific variables		
SCALE	MES/industry shipment in the U.S. for product j	−
TRANS	transportation radius in the U.S. for product j	−
TB	U.S. tariff and non-tariff barriers for product j dummy: 1 = yes, 0 = no	+
RES	whether product j is a resource-intensive product dummy: 1 = yes, 0 = no	+
FOLLCUS	whether firm i is a member of the Keiretsu group whose 1st-tier firm manufactured any product in the U.S. dummy: 1 = yes, 0 = no	+
Governance variables		
RND	R&D/sales for firm i	+
ADV	ADV/sales for firm i	+
EXP	whether firm i was already manufacturing any other product, k ... n in the U.S. dummy: 1 = yes, 0 = no	+
Strategic variables		
USCON	U.S. industry concentration ratio for product j	+
EXTH	number of U.S. firms manufacturing product j in Japan during 3 years preceding firm i manufactured the same product in the U.S. at 3-digit SIC level	+
FOLLOW	whether firm i is in a Japanese loose oligopolistic industry and it is not the first one to manufacture product j in the U.S. dummy: 1 = yes, 0 = no	+
SHARE	firm i's market share in Japan	+
SHARE^2	square of firm i's market share in Japan	−
Control variable		
GROWTH	average 10 years U.S. industry growth rate of product j	+

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otherwise. Data was taken from U.S. International Trade Commission (1989). Everything else constant, the sign of **TB** should be positive.

A product's natural resource intensity (**RES**) is described by a dummy variable equal to 1 if it is natural resource intensive and zero otherwise.[9] Everything else constant, **RES** should be positively correlated with FDI propensity.

Our follow-the-customer hypothesis (Hypothesis 5) is modeled by a dummy variable (**FOLLCUS**) equal to one for all second-tier firms within a Keiretsu if their first-tier firm manufactured any product in the U.S. at the end of 1984,[10] and to zero for first-tier firms, for second-tier firms within a Keiretsu if their first-tier firm had not invested by 1984, and for firms which are not part of Keiretsu groups. **FOLLCUS** should enter with a positive sign.

Governance variables

The amount of technological know-how held by a Japanese firm (**RND**) was measured by its R&D expenses divided by its total sales normalized by the industry's average R&D intensity (source: *Yukashoken Hokokusho, Japan Company Handbook*, and Toyo Keizai, 1991). We expect a positive relationship between **RND** and the propensity to manufacture in the U.S.

The Japanese parent's endowment of goodwill or reputation (**ADV**) was measured by its domestic media advertising expenses divided by its domestic sales normalized by the industry's average advertising intensity (source: *Yukashoken Hokokusho* or Toyo Keizai, 1991). The sign of **ADV** should be positive.[11]

Our experience/scope economies hypothesis (Hypothesis 8) is modeled through a dummy variables (**EXP**) equal to 1 if a Japanese firm previously produced any product in the U.S., and to zero otherwise.[12] **EXP** should have a positive sign.

Strategic variables

As per Hypothesis 9, Japanese entry is more likely the more highly concentrated the U.S. target industry. The concentration ratio (**USCON**) of the target U.S. industry was measured by the Herfindhal-Hirschman index for the 50 largest companies at the 4-digit SIC level, as listed in the *Census of Manufactures* (1982).

We hypothesized (Hypothesis 10) that a Japanese firm is more likely to manufacture a product in the U.S. if U.S. firms are manufacturing this product in Japan. Following Flowers (1976), exchange-of-threat (**EXTH**) is measured by the number of U.S. firms which had invested in the Japanese firm's industry three years before a Japanese firm's reverse investment in the U.S. (or 1986 in the case of noninvestment). As per our earlier discussion, we only count U.S. entries if the Japanese industry is loosely oligopolistic. **EXTH** should be positively related to the propensity of Japanese firms to manufacture in the U.S.

Everything else constant, the probability that a Japanese firm will manufacture in the U.S. should be higher if it finds itself in the type of situation where follow-the-leader behavior is likely to take place (Hypothesis 11). In contrast to previous studies, which have relied on indirect measures, we gauge directly the intensity of pressures to follow-the-leader. We first checked whether a Japanese firm was in a loose oligopolistic industry. We then ascertained whether any other Japanese firm in the same industry had previously invested in the U.S.[13] Follow-the-leader (**FOLLOW**) is described by a dummy variable, equal to 1 if the Japanese firm is in a

[9] SIC 20 (food and beverages), 24 (wood except furniture), 26 (pulp and paper), 29 (petroleum), 30 (rubber), 32 (stone and glass), and 33 (primary metals), are classified as resource-intensive industries.

[10] First entries of first-tier Keiretsu firms made in 1985 and 1986 are not counted because we assumed that it takes at least 2 years for this 'follow-the-customer' pattern to take effect.

[11] Data for R&D and advertising intensity of a Japanese firm were taken at the firm—rather than the product—level due to the unavailability of product-level data. However, most Japanese firms are not highly diversified (Clark, 1979). Hence, firm-level data are good substitutes for product-level data. Another problem in using R&D and advertising intensity as proxies for technological know-how and reputation is that inputs are used to measure outputs. However, we can expect that a firm with high R&D and advertising intensity will accumulate in-house technological know-how and reputation.

[12] Firms which entered the U.S. for the first time in 1985 and 1986 are coded as inexperienced.

[13] First entries made in 1985 and 1986 are not counted, since the lag would be too short for us to observe subsequent 'follow-the-leader' investments.

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loose oligopolistic industry[14] *and* if its domestic rivals have already made previous investments in the U.S., and zero otherwise. **FOLLOW** should be positively related with FDI propensity.

We expect Japanese firms with medium domestic market shares (the 'samurai') to have a higher propensity to manufacture products in the U.S. than firms with either a large or a very small market share (Hypothesis 12). A Japanese firm's domestic market share (**SHARE**) was calculated as the ratio of its sales to the total sales of its industry. Since a medium **SHARE** should lead to a greater propensity to manufacture in the U.S. than a very high or a very low **SHARE**, we use the quadratic form of the domestic market share (i.e., **SHARE** − **SHARE**^{2}). **SHARE** should enter with a positive sign, and **SHARE**^{2} with a negative one.

Other control variable

The growth rate of the target U.S. industry (**GROWTH**) was used as a control variable. Japanese investors should have greater incentives to manufacture products in the U.S. when the demand for these products is growing rapidly.

> *Hypothesis 13: The higher the growth rate of the U.S. target industry, the more likely a Japanese firm will manufacture this product in the United States.*

GROWTH is the average 10-year growth rate of industry shipments in the 4-digit SIC U.S. target industry, as listed in the *1982 Census of Manufactures*. **GROWTH** should be positively related to a Japanese firm's propensity to manufacture in the U.S.

The correlation matrix of the independent variables (Table 2) suggests little collinearity except for the correlation coefficient between **SHARE** and **SHARE**^{2} (0.92).[15] Almost all other correlations are low, the highest correlation coefficient being the one between **SCALE** and **USCON** (0.52).

RESULTS

The results of the binomial logistic regression model are presented in Table 3. A positive coefficient for an independent variable means that it tends to increase the probability that a Japanese firm manufactured a product in the U.S. at the end of 1986: a negative coefficient signifies the opposite.

Equation 1 in Table 3 reports the main results. The model, which converged after six iterations, has a high overall explanatory power, with a chi-square of 239.37 ($p = 0.0000$). One can also measure how well a maximum likelihood model fits the data by using it to classify observations (Amemiya, 1981). The classification rate thus obtained can be compared to the rate that would have been obtained by chance. Table 4 shows that our model correctly classifies 82.4 percent of the observations, slightly better than the simple prediction that no firm will invest, which would be right in 80.9 percent of the cases. As Morrison (1974) argues, however, this criterion is inappropriate when one seeks to correctly classify occurrences in both categories, as opposed to maximizing the percent correctly classified. The true criterion should reflect the fact that any attempts to classify into the smaller category (here investment) bucks the odds, and should reward attempt to do so. Morrison shows that the standard should be his 'proportional chance criterion' which he defines as $a^2 + (1-a)^2$, where a is the proportion of investors. In our case that base rate is 69 percent. Hence our model's classification rate (82.4%) is quite satisfactory. Although the model's sensitivity rate, which describes its ability to correctly predict positives (manufacture in the U.S.) leaves room for improvement, its specificity—its capacity to correctly classify cases of noninvestment—is excellent.

All significant variables have the predicted signs. The coefficient of plant MES (**SCALE**) is negative and significant at 0.05 level as predicted by Hypothesis 1. Japanese firms centralize at home the manufacture of products with large MES and presumably serve the U.S. market through exports, a finding consistent with those of previous empirical studies (Swedenborg, 1979; Pugel, 1981; Lall and Siddharthan, 1982). As hypothesized (Hypothesis 3), the coefficient of the tariff and nontariff barriers (**TB**) variable is

[14] The range of loose oligopoly is between 1000 and 1800 in terms of Herfindhal and Hirschman Index (Seno, 1983; Oster, 1990).

[15] The results were not sensitive to this correlation, as excluding **SHARE**^{2} did not affect the coefficients.

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Table 2. Correlation matrix

	INVT	SCALE	TRANS	TB	RES	FOLLCUS	RND	ADV	EXP	USCON	EXTH	FOLLOW	SHARE	SHARE^2	GROWTH
SCALE	−0.03	1.00													
TRANS	0.10	−0.04	1.00												
TB	0.06	0.02	−0.03	1.00											
RES	−0.02	0.10	−0.29	−0.08	1.00										
FOLLCUS	−0.03	0.01	0.08	−0.01	−0.06	1.00									
RND	0.18	0.02	0.02	0.04	−0.05	−0.10	1.00								
ADV	0.05	−0.03	0.05	0.03	−0.00	−0.04	0.14	1.00							
EXP	0.18	0.03	0.06	0.00	0.01	−0.03	0.18	0.05	1.00						
USCON	0.04	0.52	0.08	0.13	−0.05	0.06	0.09	0.00	0.00	1.00					
EXTH	0.04	0.06	−0.08	0.02	−0.21	−0.08	0.05	−0.05	0.02	0.01	1.00				
FOLLOW	0.04	−0.11	0.12	0.20	−0.06	0.00	0.08	−0.01	0.01	0.02	0.29	1.00			
SHARE	0.27	0.06	−0.02	0.03	0.05	−0.09	0.20	0.15	0.35	0.06	0.02	−0.03	1.00		
SHARE^2	0.22	0.03	0.02	0.01	−0.00	−0.04	0.13	0.14	0.27	0.05	0.02	−0.03	0.92	1.00	
GROWTH	0.18	−0.14	0.49	0.05	−0.14	−0.00	0.05	0.03	0.08	−0.00	0.05	0.01	0.03	0.04	1.00

Table 3. Results of logistic regression (+ = encourages FDI)

Variable Name	Description	Coefficients (*t*-statistic)	
		1	2
Intercept		−3.1991	−3.1750
		(11.65)***	(11.59)***
SCALE	MES/industry shipment in the U.S. for product *j*	−17.3730	−16.4980
		(1.90)**	(1.84)**
TRANS	transportation radius in the U.S. for product *j*	0.003	0.0003
		(1.01)	(1.01)
TB	U.S. tariff and nontariff barriers for product *j*	0.2226	0.2282
		(1.32)*	(1.40)*
RES	whether product *j* is a resource-intensive product	0.0847	0.1055
		(0.50)	(0.63)
FOLLCUS	whether a firm *i* is a member of the Keiretsu group whose 1st-tier firm manufactured any product in the U.S.	0.0947	0.1017
		(0.43)	(0.46)
RND	R&D/sales for firm *i*	0.2149	0.2157
		(4.27)***	(4.27)***
ADV	ADV/sales for firm *i*	−0.0137	−0.0130
		(0.35)	(0.33)
EXP	whether firm *i* is already manufacturing any other product *k*...*n* in the U.S.	0.3390	0.3005
		(2.28)**	(2.00)**
USCON	U.S. industry concentration ratio for product *j*	0.0002	0.0002
		(1.52)*	(1.49)*
EXTH	number of U.S. firms manufacturing product *j* in Japan during 3 years preceding firm *i*'s U.S. investment	0.0573	0.0556
		(0.86)	(0.87)
FOLLOW	dummy = 1 if firm *i* is in a loose oligopolistic industry and is not the first one to manufacture *j* in the U.S.	0.0738	
		(0.44)	
FOLLOW1	dummy = 1 if firm *i* is in an enterprise group and is not the first one to manufacture product *j* in the U.S.		0.6005
			(2.31)**
SHARE	firm *i*'s market share in Japan	0.0863	0.0824
		(6.67)***	(6.32)***
SHARE²	square of firm *i*'s market share in Japan	−0.0009	−0.0009
		(3.88)***	(3.61)***
GROWTH	average 10 years U.S. industry growth rate of product *j*	0.0406	0.0396
		(4.42)***	(4.34)***
model chi-square		239.37	247.15
p-value		0.0000	0.0000
n		1799	1799
correctness		82.4	82.3

*$p = 0.1$, **$p = 0.05$, ***$p = 0.01$

positive and significant at the 0.1 level, suggesting that trade barriers incite Japanese firms to manufacture in the United States. Kogut and Chang (1991) and Drake and Caves (1992) reached similar conclusions.

Early studies of Japanese foreign direct investments in the U.S. (Tsurumi, 1976; Yoshino, 1976; Sekiguchi, 1976) found that many were motivated by a desire to locate close to natural resources. Examination of more recent entries in the United States by Womack, Jones, and Roos (1991) and Kenney and Florida (1993) shows that Japanese foreign investment is now motivated by the exploitation of a superior production technology—what Womack has called the 'lean production system' and Kenney and Florida call 'innovation-mediated production'.[16]

[16] See also Dunning's (1986) study of Japanese investment in the U.K.

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Table 4. Classification table

		Predicted		
		Not invest	Invest	Total
True	Not invest	1427	29	1456
	Invest	287	56	343
	Total	1714	85	1799
	Sensitivity:	16.3%		
	Specificity:	98.0%		
	Correct:	82.4%		

Our results provide some quantitative support for these recent observations. Our proxy for firm-specific technological advantages, **RND**, the Japanese firm's R&D intensity, is positive and significant at the 0.01 level.[17] Technology intensive Japanese firms manufacture in the U.S. in order to internalize the market for their know-how (Hypothesis 6), a finding consistent with those of Kogut and Chang (1991), Drake and Caves (1992) and Kimura and Pugel (1992) at the industry level.

By contrast, the natural resource intensity of production, **RES**, is not significant. Although some of the early resource-seeking manufacturing plants may still be operating in the U.S., the search for natural resources no longer motivates the more recent investments. Since the latter make up the bulk of Japanese entries, it is not surprising that Hypothesis 4 is not supported. Drake and Caves (1992) also found natural resource intensity to be unrelated to Japan's share of foreign investments in the U.S.

The coefficient of **EXP** is positive and significant at 0.05 level. Hence Hypothesis 8 is supported, suggesting the presence of scope economies in tangibles and intangibles (including market knowledge) which facilitate subsequent investments.

Two strategic variables, the U.S. industry concentration ratio and the Japanese firm's domestic market share, are significant. **USCON** is positive and significant at the 0.1 level, suggesting that Japanese firms are attracted by concentrated U.S. product markets (Hypothesis 9). Previous findings on the relationship between U.S. host country concentration and investment propensity have been ambiguous, with Kogut and Chang (1991) finding a significantly negative relationship and Caves *et al.* (1980) reporting a significantly positive one.[18] As argued earlier, foreign direct investors are strong potential entrants. Another possible explanation for our findings is that Japanese investors have employed niche strategies to overcome entry barriers prevalent in highly concentrated U.S. industries. For example, the Japanese have avoided manufacturing large refrigerators in the U.S., focusing instead on compact refrigerators, for which there was no American competition (Solvell, 1987). Similarly, Japanese firms entered the U.S. market with subcompacts, a niche then poorly defended by the Big Three. Since in each case both products are classified in the same 4-digit SIC industry, the level of avoidance by Japanese

[17] An interesting question raised by an anonymous referee is whether it is absolute R&D intensity or relative R&D intensity that determines investment. Using relative intensity assumes that the R&D intensity percentages are somewhat influenced by industry-specific factors that do not really affect the amount of nonmarketable, firm-specific know-how. It is based on the assumption that, for example, 10 percent R&D intensity is a baseline in electronics, while 2 percent is the baseline in textiles. The baseline can be interpreted as the amount of investment necessary just to keep up, and beyond which one must proceed to generate competitive advantages in technology. According to this view, a firm that has a 5 percent R&D intensity in textiles is likely to have more nonmarketable proprietary know-how to exploit through investment than an electronics firm that does 10 percent. Using absolute numbers assumes that it is the absolute level of R&D that counts, and hence that poor relative performers in R&D intensive industries are more likely to invest than good performers in non-R&D intensive industries.

To investigate this, we ran the model again using a firm's absolute R&D intensity. The results are unchanged, suggesting that both measures are equally good at predicting investment. The significance level is basically unchanged, and the signs and significance of the coefficients remain basically the same (**TB** and **USCON** gaining significance to the 0.05 level). To explore further, we ran a regression with a dummy equal to 1 if the industry in which the parent is classified had a R&D ratio higher than the average of all industries in our sample (this specification avoids the problem of having sectoral dummies which are correlated with our other industry variables, **GROWTH** and **USCON**). The results show that the dummy for R&D intensive industries has a mildly significant (at the 0.10 level) negative coefficient when entered with a firm's absolute R&D spending (all coefficients and overall significance levels are unchanged). Hence firms with high absolute R&D spending are less likely to invest, everything else constant, than their R&D intensity would predict if they happen to be in industries characterized by average high R&D spending, thus providing some support for our use of relative R&D.

[18] Kimura and Pugel (1992) found significant positive coefficients for their whole sample and for entries into Asia, but an insignificant coefficient for entry into the United States.

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investors may be understated. A third reason is that the entry of Japanese investors in a number of concentrated industries has been encouraged by U.S. incumbents eager to leave the business. This was the case in steel and in electronics, where initial Japanese investments were in plants sold off by U.S. producers (Kenney and Florida, 1993).[19]

The Japanese firm's domestic market share (**SHARE** and **SHARE**^{2}) is another significant strategic variable. As hypothesized (Hypothesis 12), firms with medium market shares are more likely to manufacture their products in the U.S. than those with large or small market shares. The quadratic relationship between propensity to manufacture in the U.S. and domestic market share (**SHARE** − **SHARE**^{2}) is significant at the 0.01 level. This confirms the view that domestic pressure from dominant firms stimulates Japanese dominated firms to invest abroad (Mascarenhas, 1986; Roehl, 1989; Porter, 1990).

GROWTH, the coefficient of the growth rate of the target U.S. industry, is positive and significant at the 0.01 level. As per Hypothesis 13, high demand growth attracts Japanese investors to manufacture in the U.S.

The coefficients of the transportation costs (**TRANS**), follow-the-customer (**FOLLCUS**), advertising intensity (**ADV**), exchange-of-threat (**EXTH**), and follow-the-leader (**FOLLOW**) variables are all insignificant. A similar measure of transportation costs (**TRANS**) was also insignificant in two previous empirical studies of FDI (Pugel, 1981; Caves *et al.*, 1980). One likely reason is that our measure reflects land transport costs, whereas ocean transport costs should be relevant.[20] Data on maritime transport costs is unfortunately only available at a high level of aggregation and is somewhat out of date (Clark, 1981).

Our 'follow-the-customer' hypothesis (Hypothesis 11) is not supported (**FOLLCUS** is not significant). This may be explained by the fact that we are looking at Japanese investment as of 1986; few second-tier suppliers had by then followed their first tier Keiretsu customers to the United States.[21]

Contrary to Hypothesis 7, a firm's advertising intensity (**ADV**) in Japan has no impact on the probability it will manufacture in the U.S. This finding, which is consistent across recent studies of Japanese entries in the U.S. (Hennart, 1991b; Drake and Caves, 1992; Kimura and Pugel, 1992; Hennart and Park, 1993), suggests that goodwill earned in Japan is not easily transferrable to the U.S. market due to differences in culture and language.

Neither Hypothesis 10 nor Hypothesis 11 are supported (the **EXTH** and **FOLLOW** coefficients are insignificant). One possible explanation for the lack of significance of the exchange-of-threat variable is that there is very little investment by U.S. firms in Japan. Hence, as noted by Graham (1991), Japan is a major exception to the exchange-of-threat principle.

Our follow-the-leader variable is defined at the industry level. In other words, we assume that Japanese firms react to the entry of their industry rivals. One possibility, however, is that rivalry does not take place between firms in an industry, but between enterprise groups[22] (Gerlach, 1987). To test this hypothesis, we constructed a dummy variable **FOLLOW1** which takes a value of one for firms in enterprise groups *b...z* manufacturing product *j* in Japan if the corresponding firm in enterprise group *a* has already invested in the U.S., and zero for first investors (if they are within an enterprise group) and for firms manufacturing *j* in Japan but which are not members of an enterprise group. As expected, the sign of **FOLLOW1** is positive and significant at the 0.05 level (Equation 2 in Table 3), and the significance of other variables remains unchanged. This confirms Encarnation (1987) and Kester's (1991) anecdotal evidence of follow-

[19] Kenney and Florida (1993: 161) argue that the Japanese entry in steel was facilitated by the desire of some steel executives to leave the steel industry entirely: joint venturing with Japanese firms was a way to achieve this goal. Japanese entry in electronics was also facilitated by U.S. divestment: Matsushita's first U.S. investment was the purchase of a Motorola plant near Chicago; Sanyo entered the U.S. by buying a Sears plant in Arkansas; Toshiba bought a Westinghouse factory in Elmira, N.Y. (Kenney and Florida, 1993:220).

[20] We thank Richard Caves for bringing this point to our attention.

[21] Honda's Marysville plant, the first Japanese automobile assembly plant in the U.S., did not start operation until 1982. The bulk of the Japanese investment in automobile parts and components is posterior to 1985 (Kenney and Florida, 1993).

[22] We thank Koji Taira for this suggestion. Enterprise groups are groups of horizontally-related firms, in contrast to Keiretsu groups, in which members are vertically related.

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the-leader behavior by Japanese investors in the U.S., and underlines that this rivalry takes place between enterprise groups.

CONCLUSIONS

This paper offers the first large scale product-level study of the factors which influence Japanese firms to manufacture in the United States. We hypothesized that location, governance, and strategic factors all influenced a firm's decision to manufacture abroad. We simultaneously entered variables that measure location, governance, and the influence of four different types of strategic motives.

Our work significantly improves upon previous empirical studies of FDI. First, we use firm-level data, not industry data, to measure firm-specific advantages such as technological know-how and reputation. As noted above, conducting the analysis at the firm level is much preferable for both theoretical and empirical reasons. Second, while previous investigations of the impact of strategic motives on FDI used an indirect approach, we measure strategic interactions directly. For example, while Knickerbocker tested the impact of 'follow-the-leader' by regressing an industry's entry concentration index on its concentration ratio, we look directly at whether a firm is more likely to manufacture in the U.S. if its rivals are already manufacturing there. Lastly, by entering location, governance, and strategic variables simultaneously, we are able to evaluate their relative impact. For these reasons, the degree of confidence that can be attached to the results is greater than that of previous studies.

By and large, our results confirm our hypothesis that foreign direct investment responds to location, governance, and strategic variables. They support the predictions of the modern theory of FDI, which combines location and transaction costs variables (see Hennart, 1991a, for a recent survey). Economies of scale and trade barriers have the expected impact, though transportation costs and natural resource intensity do not. Technological intensity is a strong determinant of Japanese FDI, as in the case of American and Swedish firms (Pugel, 1981; Swedenborg, 1979). Earlier studies of Japanese investment in the U.S. had downplayed the role of technology exploitation, and highlighted that of natural resource-seeking (Yoshino, 1976; Tsurumi, 1976). Our results suggest that the distinction between a U.S. and a Japanese type of FDI is blurring. One remaining difference, though, is in the impact of advertising expenditures: while advertising intensity is a strong determinant of U.S. investment abroad, we find that it has no impact on Japanese investment in the United States.

But while location and governance variables are important, strategic variables also play a role. A Japanese firm's domestic market share influences its propensity to enter the United States, thus confirming Roehl's (1989) hypothesis that competition between Japanese rivals in their home market plays a major role in explaining patterns of Japanese FDI. Our results also show that Japanese investors react to investment moves by their rivals, and that this game is played between enterprise groups. We find that highly concentrated U.S. industries do not repel, but instead attract, Japanese FDI. The insigificance of our exchange-of-threat variable is probably due to the small U.S. investment stake in Japan which does not present much of a threat to Japanese firms.

While this paper offers significant improvement over previous studies, it suffers from a number of limitations, some inherent in large sample research.

Our proxy for the need to invest to internalize the international transfer of know-how is the Japanese parent's overall R&D expenditures to sales ratio, an input measure; the relevant figure should be the firm's output of knowledge whose market transfer is subject to high transaction costs, since easy to license knowledge will, *ceteris paribus*, be transferred through noninvestment modes. Data on a firm's endowment of difficult-to-market know-how, while extremely difficult to obtain across industries, might be available for firms within a given industry, and this points to the value of conducting studies of the determinants of foreign direct investment within an industry. Similarly, our modeling of the 'follow the customer' motive for investment does not reflect interactions between suppliers and customers who are not members of the same keiretsu. Lastly, as Aharoni (1966) has shown, decisions to invest abroad are based on judgments by top executives. These judgments are inherently

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personal. A given objective situation may lead, in the short term, to divergent responses. A model like ours that ties investment to a number of objective economic factors ignores the complex process by which decision makers perceive and respond to these external stimuli.[23]

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[23] All these factors may account for our low specificity rate (16.3%).

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