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INTERNATIONAL PLANT CONFIGURATION STRATEGIES: A STRUCTURED DECISION MAKING APPROACH AND PRODUCT LEVEL TEST

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ABSTRACT

We analyze the determinants of the decision to invest abroad and the choice of spatial configurations of overseas plants for 120 Japanese firms active in 36 well-defined electronic product markets. We find support for a structured internationalization decision model in which the decision to internationalize is taken at the product level after scanning for all possible profitable foreign plant configurations based on the locational advantages of different regions. In addition, strategic drivers related to the competitive position of the firm's in the product market and its technology base have a critical impact on the choice between alternative international plant configurations. Regional configurations focused on Asia are chosen by firms with weaker competitiveness for products with established manufacturing technologies. Plant configurations focused on the US and the EU are pulled by restrictive trade policies and are chosen by technology intensive firms facing competitive threats in foreign markets. Global configurations are chosen by firms with a strong competitive position in the Japanese and world market for their core product businesses and are more common in case of strong oligopolistic rivalry between Japanese firms.

Keywords: Foreign Direct Investment, Plant Location, Multinational Firms

INTRODUCTION

Since the mid-1980s it has been argued that the increasingly global character of competition in industries is pushing multinational firms to configure and coordinate manufacturing activities on a global basis. Leading scholars such as Porter (1986), Ohmae (1985), and Bartlett and Ghoshal (1987) saw an emerging trend towards networks of decentralized but interdependent plants. Decentralization was seen as a necessity because of strong swings in exchange rates, rising protectionism and a growing need to respond quickly to changing and differentiated consumer demands. Real option theory has been shown to be able to put a value on the operational flexibility gained through operating a global manufacturing network with establishments in different currency areas (Kogut and Kulatilaka, 1994). Global coordination moreover was to allow firms to benefit from major scale and scope economies associated with shortened product cycles and increasing development costs. A presence in major markets reduces the lag between the introduction of new and improved products between the home and foreign markets, necessary to increase revenues within a shorter time frame. Kalish et al. (1995) derive that the simultaneous introduction of new products in domestic and foreign markets is more likely to be preferred in case of short product cycles in combination with large and growing foreign markets and strong foreign competition. Moreover, increasing global competition as well as the desire of firms to acquire foreign technology are considered as major motives why firms are spreading their manufacturing operations across countries (Bartlett and Goshal, 2000).

These motivations of direct foreign investments appear to contrast with more traditional explanations, such as internalization theory and resource based theory emphasizing the exploitation of intangible assets and competitive resources abroad (e.g. Caves, 1996; Chang, 1995), and the incremental and sequential internalization pattern suggested by international product cycle theory (Vernon, 1966, 1979) and the stage (process) theory of internationalization (Johanson and Vahlne, 1977, 1990). The views in the emerging motivations literature have often been juxtaposed with these traditional views on foreign direct investment (e.g. Bell, 1995; McDougall et al., 1994) without verifying their complementary nature in explaining the direction and scope of foreign direct investment decisions. Moreover, although the literature has suggested a trend toward global presence and global manufacturing strategies, there has been very little empirical testing of the actual importance and the conditions under which global manufacturing occurs.

In this paper, we argue that the various traditional and emerging explanations are not mutually exclusive but are often complementary with their applicability depending on the

industry environment, firms' strategic positioning, and the characteristics of the foreign location under consideration. The contribution of the paper is two-fold. We develop a structured strategic decision making framework that allows for simultaneous but differentiated explanations of the decision to invest abroad and the plant location decisions, integrating the effects of industry and firm characteristics as well as locational characteristics. The model allows for the determination of conditions under which global manufacturing configurations are most likely to occur. Second, it is the first study to provide a joint empirical test, at the firm and finer product level, of both internationalization and manufacturing location decisions at the global level. It broadens the scope of previous empirical work that has limited analysis to location decisions for plants in a specific country or region taking the foreign direct investment decision as given (Mayer and Muchielli, 1999; Head, Ries and Swenson, 1995; Devereux and Griffith, 1998; Belderbos and Carree, 2000); and studies that have analyzed the foreign direct investment decision for a specific host country only (e.g. Hennart and Park, 1994; Kogut and Chang, 1996; Chang, 1995; Pugel et al., 1996).

The model we adopt structures international manufacturing decisions into basic competitive and resource based factors driving -or pushing- the firm to invest abroad and locational factors pulling the firm to invest in a particular region or set of regions. The firm takes the potential profitability of the different locations into account in taking the decision to internationalize production. This approach in simultaneously analyzing the internationalization strategy and location strategy reflects the important strategic role overseas subsidiaries can play (Ferdows, 1997; Bartmess, 1993) and the notion that global location decisions are an essential part of the wider strategy of the firm (e.g. McCormack et al., 1997). It recognizes that the international plant configuration chosen by a firm is a key factor in its internationalization strategy with important repercussions for performance (e.g. Porter, 1986; Morrison and Roth, 1992; Yip, 1995). The implication is that the location of foreign direct investments is of major importance not only from an efficiency perspective but as an integral part of the competitive strategy of multinational firms.

Empirically, we analyze the decisions to invest abroad and the choice for global or regionally focused international plant configurations by 120 Japanese firms active in 36 well-defined product markets (which we will term 'industries' in the remainder of this paper). We constructed a database with detailed data on plant locations, market shares, market size, and wage costs, among others, at the product level. This finer level of analysis ensures that we model investment and plant configuration decisions where they are taken: at the business unit

level. It enables us to test simultaneously for the effect firm-level competitiveness and product-level competition as well as region- and product-specific characteristics such as trade protection and market size. The focus on Japanese industry is of interest since Japanese firms' export strategies in the 1970s and early 1980s made them a specific target of protectionist policies in the US and Europe. This coupled with their 'focus' strategies on serving various developed markets with relatively undifferentiated but high quality products made them early adopters of global manufacturing strategies (Ohmae, 1985; Bartlett and Ghoshal, 2000). The focus on the electronics industry is interesting since competition in this industries plays out on a global scale and because it includes high tech sub sectors. A variety of motives for foreign direct investment is of importance: technology sourcing in sectors where Japanese firms lag behind US and EU rivals, market access considerations in a number of sectors with trade barriers, and cost reduction in assembly activities in Asia.

The remainder of this paper is organized as follows. We first summarize the main elements of the different theories of foreign direct investment and plant location. In the following section we present the structured decision model leading and formulate hypotheses concerning the importance of strategic drivers on plant configuration choice. We then describe the empirical methodology and the database and present the empirical results. We conclude with a discussion of the results and final remarks.

THEORIES OF FOREIGN INVESTMENT AND INTERNATIONAL PLANT CONFIGURATION

In order to develop a structured decision model of internationalization and international plant configuration we draw on both plant location theory and the various theories of foreign direct investment established in the literature. Among foreign direct investment theories can be distinguished internalization theory, resource based theory, international product cycle theory, the theory of oligopolistic reaction theory and the stage theory of internationalization. These have often been unnecessarily contrasted while they are partly overlapping and have complementary relevance in explaining foreign investment patterns. Rather than starting from strong priors in favor of one or another theory, we adopt a more integral approach and identify from the various theories a set of firm and industry (product market)-specific drivers pushing firms to invest abroad and a set of pull factors attracting firms to invest in foreign

locations. Elaborating the conceptual frameworks of Yip (1995) and Bartlett and Ghoshal (2000), we consider the decision to internationalize and choose for a particular spatial configuration of production the result of a decision making process responding to various internal and external push and pull factors. Below we will review briefly the different theoretical approaches to foreign direct investment and plant location.

Internalization theory of foreign direct investment suggests that only firms with a competitive advantage based on proprietary assets such as technological strength, brand names, or manufacturing expertise will be able to invest abroad and compete successfully (e.g. Caves, 1996; Dunning, 1993). In order to reduce market transaction costs, the coordination of activities related to the exploitation or generation of the proprietary assets are internalized within the firm through foreign direct investments (Hennart, 1982). Hence, internalization theory defines foreign investment as the internalization of the market for (technological) knowledge or other intangible assets, driven by high transaction cost associated with the sale or rent of such assets. This conjecture has been refined in the evolutionary view of the multinational firm as the relative efficiency of the firm (relative to other firms) in transferring and exploiting proprietary know how in diverse markets explaining successful multinational investment (Kogut and Zander, 1993). Recent studies (Martin and Salomon, 2000; Kogut and Zander 1993), following pioneering work by (Teece, 1977), have shown that the transfer of technological and organizational knowledge is facilitated by a reduced tacitness and complexity as the technology matures, reducing the cost of the transfer. The framework developed by Dunning (1993), extends internalization theory by suggesting that not only internalization advantages of the intra-firm transfer of intangible assets is necessary for foreign direct investment to occur, but also some kind of locational advantage abroad attracting investments, such as low labor costs or protective tariffs making exporting less attractive.

The resource-based theory of the multinational firm emphasizes the application of underutilized productive resources to new business opportunities abroad. Intangible resources, such as technology, marketing or organizational skills, which can be exploited without substantial extra costs in new markets and are difficult to imitate by foreign competitors, encourage firms to expand businesses abroad (Wolf, 1977; Chang, 1995; Delios and Beamish, 1999). Successful deployment of resources abroad is often based on an internationally competitive position for the products concerned (Chang, 1995). The resource based perspective has in common with internalization theory the prediction of a strong correlation between intangible competitive resources and foreign expansion.

The relationship between strategic decision making and foreign investment theory was early emphasized in the product cycle model of foreign investment. The product cycle model was originally presented as a comprehensive model of interacting factors leading firms to invest abroad, linking the internationalization process to the process of innovation and successful introduction of new products. Initial production takes place near the point of innovation because of communication costs within the innovating enterprise and uncertainty about the production process in early stage market development (Vernon, 1966; 1974). Following diffusion and standardization of the product in the domestic market, increasing competition erodes profits and growth opportunities reduce, driving firms to exploit foreign markets. Firms typically start by exporting to developed foreign markets with similar income elasticities, followed by the establishment of plants as those markets reach a critical size, and finally the relocation of production of the matured product in low-cost countries as price competition intensifies. Kalish et al. (1995) have broadened this model in the context of international product introduction and the presence of foreign competition. They distinguish between a product life cycle type strategy of sequential introduction of products in the domestic and to foreign markets, and a 'sprinkler' type strategy of simultaneous introduction domestically and abroad. They derive under which conditions such a simultaneous global introduction strategy is preferred by leading firms. These include large and growing foreign markets, small fixed setup costs abroad, and strong competitors abroad threatening to introduce similar products, with the consequence of shortening the period of monopolistic supply for the leading firm.

The stage theory of internationalization has in common with product life cycle theory the conjecture of a sequential pattern in the process of internationalization, but emphasizes the role of knowledge about foreign markets in determining the direction of internationalization and the commitments firms make in foreign markets (Johanson and Wiedersheim-Paul, 1975; Johanson and Vahlne, 1977; 1990; Fina and Rugman, 1996). Knowledge of foreign markets obtained through exporting facilitates subsequent production abroad, while experience with the process of transferring manufacturing activities abroad reduces the risk and costs of subsequent foreign investments.

According to the theory of oligopolistic rivalry in foreign investment developed and tested by Knickerbocker (1973), the industry environment in the home country may constitute an external push factor for foreign investment. Firms in loose-knit oligopolies follow their rivals in making matching investments overseas to prevent rivals from building up competitive advantages from their foreign presence (e.g. Yu and Ito, 1988). Such rivalry

may lead to an earlier pattern of substantive overseas investments than the other theories would suggest.

The different theories of internationalization imply that the decision to invest abroad depends on the competitive resources of the firm and its international experience and responds to the particular industry environment, in particular the presence of growth opportunities in the domestic market, and the degree of domestic rivalry. These we term firm- and industry-specific drivers pushing firms to consider foreign investment. A number of foreign direct investment theories discussed above also elaborate on the role of location-specific drivers pulling firms towards specific plant locations or configurations. They suggest that the degree of foreign competition, the size and growth of particular foreign markets, protectionist barriers, and the cost advantage of producing abroad are location specific factors that influence investment decisions. These factors also feature in the literature on plant location. The importance of being located close to demand is demonstrated by Krugman (1991). Empirically, evidence of the role of local demand and lower labor cost is found in empirical studies of the location decisions by multinational firms (e.g. Head, Ries and Swenson, 1995; Mayer and Muchielli, 1999; Belderbos and Carree, 2002). The pull effect of tariff and non-tariff barriers (such as voluntary export restraints and antidumping duties) on inward investment in particular regions has been theoretically analyzed in Smith (1987) and Motta (1992) and empirically demonstrated in Belderbos (1997a), Barrell and Pain (1999). Smith (1987) and Horstmann and Markusen (1987) show that the competitive threat posed by potential local entrants in foreign markets provides an additional incentive to engage in foreign direct investment. The literature has also emphasized the role of technology sourcing and knowledge spillovers by locating in countries and regions where best practices and state of the art technologies are used by incumbent firms (e.g. Kogut and Chang, 1991; Shaver and Flyer, 2000). These more intangible benefits of foreign manufacturing are emphasized by Ferdows (1997) who links the different possible motivations for locating manufacturing activity abroad to a variety of strategic roles assigned to foreign subsidiaries based on case studies of large multinational enterprises. Apart from cost reduction and market access considerations, pre-empting local competitors, and learning benefits by interacting with suppliers, clients, competitors and research centers were considered key motivations.

A STRUCTURED DECISION MODEL OF FOREIGN INVESTMENT AND INTERNATIONAL PLANT CONFIGURATION

In past research the decision to invest in a particular region has often been narrowed down to a comparison of conditions in the home country versus those prevailing in that particular country or region without considering alternative configurations. In refining the analysis to foreign investments at the product level considering all possible foreign manufacturing configurations for serving world markets, we have to develop a more comprehensive and structured decision modeling and testing approach. Within the approach, we model the decision to internationalize and the choice for a particular spatial configuration of production as the outcome of a relative profitability function affected by various push and pull factors, similar to standard capital budgeting techniques. Firms taking the decision to internationalize production scan all relevant locations for the relative attractiveness of different plant configurations due to various locational pull factors. Hence, firms do not compare the attractiveness of domestic production with the attractiveness of investing in a given location or configuration in isolation (an approach implicit in most partial models of foreign direct investment). We posit that firms follow an integrated approach considering all the strategic location options available in case they decide to internationalize. A decision model that fits these requirements is treats the decision to invest abroad and the international plant configuration decision as a nested set of strategic options available to the firm. The corresponding empirical model is the nested logit model depicted in Figure 1 (with the number of potential configurations set at three).[1] Following the arguments in the previous section, firm- and industry-specific drivers determine the internationalization decision, while locational pull variables determine the plant configuration decision. There are two novel features in this integrated internationalization and plant configuration model. First, plant configuration choices are not only influenced by locational factors but are also affected by the differential impact of firm- and industry drivers, a conjecture which we will further develop into testable hypothesis below. Second, the potential profitability of all different plant configurations in turn enters the internationalization decision and has an independent positive impact on the decision to invest abroad. Hence, all potential profitable plant configuration

[1] A similar approach has been used in plant location models distinguishing between countries and regions (Mayer and Ries, 1998), where firms are assumed to scan the attractiveness of all regions in a country before decision whether to invest in that particular or another country. Devereux and Griffith (1999) applied this approach to an analysis of the export vs. foreign investment decision and the investment location decisions of US firms in European countries..

due to specific attractions of various foreign markets (such as low labor cost or market potential) jointly impact the strategic decision to invest in international production.

Hypothesis 1: *firms adopt an integrated decision making approach to internationalization, considering the potential profitability of all relevant spatial configurations of foreign manufacturing plants for a product when deciding whether or not to internationalize manufacturing operations.*

Insert Figure1 About Here

Hypothesis 1 is in line with the notion that foreign factories in their local environment have major repercussions on firm profitability and that plant location decisions should be integrated in the firms' strategic decision making (e.g. McCormack et al., 1995; Ferdows, 1996; Bartmess, 1994). It can be falsified in the nested option approach by estimating the impact of the potential profitability of foreign plant configurations on the internationalization decision.

A second hypothesis relates to the role of strategic firm and industry drivers in determining plant configuration decisions. An implication of the theoretical arguments in the previous section is that the choice for particular plant configurations is not only affected by locational factors, but also by firm- and industry factors such as heterogeneities in resources, experience, competitive position and maturity and standardization of technologies and products. Depending on the industry, there is a wide variety of strategic contexts in which firms have to develop and market their products abroad and to decide on appropriate manufacturing location strategies. Our structured decision model posits that the specific resource and competitive profile of the firm at the business unit level as well as the industry strategic environment at the global level have a major impact on plant configuration choices, interacting with location specific pull factors. This does not preclude the fact that most of the strategic drivers have a generic role in pushing firms to operate abroad and hence help to tilt the first stage decision in favor or against a decision to locate capacity abroad. But we argue that in addition to their generic role, the strategic drivers have a specific discriminatory role in deciding which configuration to choose for foreign manufacturing plants.

Hypothesis 2. *strategic drivers at the firm and industry level have a discriminating impact on the choice of particular plant configurations in interaction with locational pull factors.*

In the next section we will elaborate on the specific firm and industry drivers impacting on internationalization decisions, and provide further detail on hypothesis 2 by specifying under which conditions specific plant configurations are most likely to be chosen.

THE IMPACT OF STRATEGIC FIRM AND INDUSTRY DRIVERS ON GLOBAL PLANT CONFIGURATION CHOICE

The empirical literature has tested a large number of hypotheses concerning the determinants of foreign direct investment and location decisions derived from the various streams of literature.[2] The novelty of our structured decision model is the focus on global manufacturing configurations rather than individual foreign direct investment decisions, and a test of hypotheses related to the impact of firm and industry drivers on the probability that specific plant configurations are chosen. Under which conditions is a specific global or regional manufacturing strategy preferred? We address this question by deriving hypotheses on the impact on firm and industry drivers on plant configurations from the viewpoint of (potential) Japanese multinational firms. We distinguish three major foreign plant configurations:

1. Asia-bound configuration: Foreign manufacturing investment in Asia only;
2. West-bound configuration: Foreign manufacturing investment in the US and/or the EU but not in Asia;
3. Global configuration: foreign manufacturing investment in all regions.

Hence, we distinguish between investments in the two main developed markets (the US and the EU), investments in developing and newly industrialized countries attracting a major share of Japanese investments (Asia), and investments in both areas. Previous research has shown major differences in the relationship between technological and marketing capabilities of firms and investment decisions between Asia on the one hand, and Western markets on the

[2] See e.g. Hennart and Park (1994), Belderbos and Sleuwaegen (1996), Tan and Vertinsky (1996), Kogut and Chang (1991, 1996), Pugel et al (1996), Chang (1995) for the foreign direct investment decision and Head et al. (1994), Belderbos and Carree (2002), Mayer and Muchielli (1999), Devereux and Griffith (1999) for the plant location decision.

other. Belderbos and Sleuwaegen (1996) and Fukao et al (1994) find that technological and marketing capabilities are less a prerequisite for investments in Asia. They suggest that one factor explaining this is the role of networks of Japanese plants in the Asian region reducing the (information) cost of investments in the region for weaker Japanese firms. Ernst (1997) finds that up to the 1990s, very few technological resource capabilities were transferred to Japanese subsidiaries in Asia. Kojima (1985) contrasts the trade-creating nature of Japanese investments in Asia, where plants often import components from Japan and export finished goods back to Japanese or third country markets, with the trade substitution effects of 'trade barrier jumping' investments in the US and the EU. No substantial differences have been observed, on the other hand, in investment behavior by Japanese firms in these latter two developed regions (Belderbos, 1997a; Barrel and Pain, 1999). Hence, in order to focus on the main differences between configurations and to keep the empirical model manageable, we treat the EU and the US as one developed region.[3] Based on the various theories of foreign direct investment, we consider the major firm and industry drivers with an expected discriminating impact on these plant configuration choices.

Firm-level competitiveness and the position of the firm on the home market

The theory of the multinational firm suggests that only firms with a competitive advantage based on proprietary assets such as technological strength, brand names, or manufacturing expertise will be able to invest abroad and compete successfully (e.g. Caves, 1996; Dunning, 1993). In order to reduce market transaction costs, the coordination of activities related to the generation and exploitation of the proprietary assets is internalized within the firm through foreign direct investments (Hennart, 1982). Mitchell et al. (1992) found firms' competitiveness in a specific product market to be closely related to their domestic market share. Caves (1996: p.58) suggests that the propensity to invest abroad rises monotonously with domestic market share. With higher market shares, further domestic sales increases are more likely to force a competitive response by rival firms, reducing the perceived price elasticity in the domestic market. This reduces the marginal return on

[3] We explored the determinants of more narrowly defined configuration choices by taking the EU and the US, as separate configurations, but found the determinants of these configuration choices not to differ. Fully separating the EU and the US out of the global and West-bound configurations would introduce 6 additional configurations and increase the number of coefficients by 102. We note that aggregating EU and US investment does not imply that we do not incorporate the different locational characteristics of the US and the EU, but

domestic expansion relative to the marginal return on expansion to serve overseas markets and encourages foreign investment. Similarly, Chang (1995) finds that Japanese firms are more likely to engage in foreign investment for product lines in which they possess the strongest competitive advantage and face the lowest risk of overseas business failure.

On the other hand, previous studies on foreign investment and export decisions have suggested that domestic market leaders are less likely to expand abroad compared with 'follower' firms with intermediate market shares (e.g. Mascarenhas, 1986; Ito and Pucik, 1993; Hennart and Park, 1994). Given a dominant presence of the market leader(s), follower firms face the strongest constraints on domestic expansion and can only reach a larger scale of operations in case they look for expansion abroad in markets with similar demand characteristics. Empirical evidence has suggested that intermediate positions in the domestic market are associated most strongly with foreign investment in other developed markets (Ito and Pucik, 1993; Hennart and Park, 1994). In the context of plant configuration decisions, it follows that this pattern of non-dominant firm expansion abroad is most likely to hold in case of expansion in regions with developed markets such as the US and the EU. Given the more limited resources and scale of non-dominant firms, such firms are likely to choose a focused geographic expansion strategy. Investments in developed markets with similar demand characteristics provide the largest marginal benefit and may in addition allow acquisition and development of additional resources (e.g. through takeovers). Dominant firms on the other hand, have the resources and competitiveness to expand in all regions and to benefit from the scale economies of a global plant configuration. The least competitive firms with the smallest market shares in the domestic market are likely to lack the resources to invest in developed markets but such resources are less of a prerequisite to compete in newly industrializing or developing countries in Asia (Fukao et al., 1994; Belderbos and Sleuwaegen, 1996). Hence, given the decision to internationalize production, firms with weaker positions in the Japanese market are most likely to opt for a purely cost-based internationalization strategy focused on a Asia-bound configuration.

rather that we aggregate over such locational factors, assuming that the form of the investment relationship is the same for the two regions.

Hypothesis 2a: *the stronger the domestic market position of the firm, the more likely it is that the firm chooses a global plant configuration. a west-bound configuration is most likely if the firm is strongly positioned but non-dominant in the japanese market. asia-bound configurations are predominantly chosen by firms without a strong market position.*

Industry level competitiveness and the intensity of competition in foreign markets

In addition to the firm's position in the home market, the position of the home industry on world markets is an important driver of global plant configuration decisions. Internalization theory of the multinational firm suggests that foreign direct investment is more prevalent in industries possessing more valuable intangible assets and greater global competitiveness (e.g. Hennart, 1982; Dunning, 1993). The greater the industry's world market share, the greater it's overseas market penetration and the more likely that scale economies warrant overseas production. Such competitiveness and scale at the industry level leading to greater market penetration at the world level is most likely to enable investments in global plant configurations. On the other hand, dominance of the world industry is not necessarily a driver of a West-bound configuration. Caves (1996), Kalish et al. (1995) and Motta (1992) have shown that firms can engage in defensive investments abroad in order to maintain market share in case of a credible threat of entry by foreign firms in overseas markets. Foreign investment may serve as a strategic commitment to increase market presence and dislodge efforts by foreign competitors to penetrate the market. It may also facilitate adaptation of products to local consumer demand, increased brand recognition and goodwill among foreign consumers, and enable quicker responses to actions of local competitors. These considerations play the largest role in the US and the EU where rival firms pose the strongest threats and where the largest markets are at stake. It follows that investment in a West-bound configuration is more likely in product markets where relatively strong foreign rivals.

Hypothesis 2b: *The stronger the position of Japanese industry in the world market, the more likely it is that a global plant configuration is chosen. A West-bound plant configuration is most likely in case of competitive threats from local firms and hence an intermediate position of Japanese industry in the world market. Asia-bound configurations are mostly associated with a weak international position of Japanese industry*.

C**ore products and the strategic importance of the product line**

Different products manufactured by a firm may vary strongly in their strategic importance to the firm and their ability to affect overall performance and growth. Empirical studies informed by resource based theory and transaction cost theory have shown how firms optimize the exploitation of their proprietary assets in the extension of their product and geographical scope (e.g. Wolf, 1975; Delios and Beamish, 1999; Geringer et al. 2000). Chang (1995) has shown that firms are likely to invest abroad in their core business first and use this investment platform as an option to invest further in less central products after gaining knowledge on how to operate successfully in the overseas location. In case a product constitutes a multinational firm's core business line, the firm is more likely to aspire to achieve a global presence and choose for a global plant configuration. Key resources and capabilities with potential scale economies will underlie the core businesses and are more likely to allow a configuration with multiple foreign plants. The strategic importance of the product forces the firm to seek profit opportunities in multiple markets and the option value of investments in core product manufacturing platforms abroad can be best utilized in a global configuration (Chang, 1995; Kogut, 1985).

Hypothesis 2c: *A choice for a global plant configuration is more likely if the product is part of a core business of the firm.*

Manufacturing experience

One implication derived from Vernon's (1966, 1979) product cycle theory is that production technologies are more easily transferred abroad and adapted to local conditions, and foreign locations are more likely to have cost advantages, if technologies and products are mature and relatively standardized. Recent studies (Martin and Salomon, 2000; Kogut and Zander 1993), following pioneering work by (Teece, 1977), have shown that the transfer of technological and organizational knowledge is facilitated by a reduced tacitness and complexity as the technology matures, reducing the cost of the transfer. In the context of Japanese firms, the degree of standardization and maturity of manufacturing technology used depends on the degree of manufacturing experience the firms have obtained in pilot plants and core factories in Japan focused on improving their technology. Such standardized and mature technologies are more readily transferable in a cost effective way to countries with a

less developed technological infrastructure and a less skilled workforce (Vernon, 1974; Dicken, 1998). This consideration is much less crucial when investing in the developed markets of the EU and the US, where firms may also invest in order to improve manufacturing technologies by learning from foreign rivals and hiring experienced engineers locally.

Hypothesis 2d: *The more experience firms have with manufacturing the product in Japan, the more likely it is that configurations with manufacturing operations in Asia (Asia-bound and global configurations) are chosen and the less likely it is that a West-bound configuration is chosen.*

Oligopolistic rivalry in the domestic market

The relationship between foreign investment and domestic industry-wide competition has been the subject of research since the seminal work of Knickerbocker (1973). Knickerbocker tested the hypothesis that in loose-knit oligopolies firms recognize interdependencies with their oligopolistic rivals and follow these firms as soon as they expand abroad in order to avoid a potential weakening competitive position in foreign as well as domestic markets. In contrast, in tight oligopolies characterized by the highest concentration rates, firms are more likely to invest abroad in a coordinated way that helps to sustain the collusive equilibrium from which they benefit. The hypothesis that in loose oligopolies, rivalry between the firms increases the occurrence and speed of foreign expansion has been supported by various empirical studies (Knickerbocker, 1973; Flowers, 1976; Caves et al. 1980; Yu and Ito, 1988; Chang, 1995; Kinoshita and Mody, 1997). Previous work has however only examined the role of oligopolistic rivalry on investments in specific countries, but not on global manufacturing strategies. We posit that if there is strong strategic rivalry between home country firms, this is most likely to play out on a global scale, rather than in regional configurations. The predicted imitative behavior of firms implies that once a firm invests in a new location, other firms follow to sustain the competitive equilibrium. Hence, such interaction is most likely to involve imitative investment behavior in multiple locaitons, pushing towards global manufacturing configurations.

Hypothesis 2e: *A choice for a global manufacturing configuration is more likely in case the product market in Japan loosely oligopolistic and characterized by strategic interaction*.

Technology intensity

Besides a firm's competitiveness and market position in different product lines, the overall possession of intangible technological assets is expected to allow for successful overseas manufacturing (e.g. Caves, 1996; Hennart, 1982). Competitiveness expressed as high domestic market shares may be based on the repeated introduction of innovative products, but also on brand image in the domestic market and investments in domestic distribution networks. Since technological advantages generally are more susceptible to transfer abroad than marketing advantages (e.g. Hennart and Park, 1994; Kimura, 1989), innovative firms are expected to have a higher propensity to invest abroad. This factor is most crucial if firms compete in developed markets and require state of the art technology to fend off local competitors. At the same time, it has been argued that Japanese firms also locate production in advanced countries to benefit from technological spillovers (Kogut and Chang, 1991) and to source local technology rather than transfer technologies from Japan. The spillover argument is more important for firms with a strong absorptive capacity, which is reflected in their technological intensity (Veugelers, 1997; Cohen and Levinthal, 1990). Scope for such spillovers is by far the largest in the developed markets of the US and the EU. In addition, considering that technology intensive firms use relatively more highly skilled labor and R&D personnel, they will have a greater preference for manufacturing in locations with skilled workforce and a developed technological infrastructure.

Hypothesis 2f: *Technology intensive firms are more likely to choose a West-bound configuration.*

EMPIRICAL METHODOLOGY AND DATA

We apply the structured decision model of internationalization and global manufacturing plant configurations to Japanese firms foreign manufacturing investments in the broadly defined electronics industry.

Insert Table 1 About Here

Table 1 shows the distribution of foreign investment and plant configuration decisions across firms for the 36 products. The number of Japanese manufacturers per product varies between 6 and 27 and the total number of firm-product combinations is 533. In about half of these cases firms are engaged in foreign investment. Among the different plant configurations, the global and Asia-bound configurations are most common (96 and 93 cases respectively), but the West-bound configuration is also well represented (84 cases). The table shows systematic differences across products (e.g. with a global configuration dominant in the VTR, CTV, and fax industries) but at the same time instances of substantial variation across firms within an industry (e.g. in the CD player and dot matrix printer industries). The empirical model we adopt tests the Hypotheses 2a-2f that firm and industry strategic drivers account for this intra-industry and inter-industry variation.

Specification of the model

Following the arguments presented in the previous sections, the strategic choices concerning the decision to invest abroad and the particular plant configurations are considered as nested options in a structured decision model. The corresponding empirical model, which allows for a nested structure and differential impacts of firm and industry specific push factors as well as effects of configuration (location)-specific pull factors, is the nested multinomial logit model. We write the probability that firm i in industry *j* chooses a particular configuration *s* as the product of the probability that the firm chooses to invest abroad ($f = 1$) and the probability that it chooses a particular international plant configuration, conditional on a positive foreign investment decision. Formally:

$$P^{s}_{ij} = P^{f}_{ij} P^{s}_{ij|f=1} \qquad (1)$$

The foreign investment choice P^{f}_{ij} depends on firm and industry specific factors X_{ij} and Y_j. If the firm decides to invest ($f = 1$) the firm has the option to choose one of the three international plant configurations. We write the profitability associated with the plant configurations *s* as:

$$\Pi^{s}_{ij|f=1} = \alpha^{s} + \beta^{s} \ln X_{ij} + \gamma^{s} \ln Y_{j} + \delta \ln Z_{ijs} + \varepsilon_{ijs} \qquad (2)$$

Where α^s alpha is a configuration specific constant and ε_{ij}^s is an error term representing non-systematic idiosyncratic factors. X_{ij} are explanatory variables that may vary over firms and industries with coefficients β^s, Y_j are variables that vary over industries with coefficients γ^s and Z_{ijs} are the configuration-specific (pull) variables that vary over configuration and industry or firm with coefficients δ. If firms adopt the decision rule "choose the configuration with the highest potential profits", and if it is assumed that ε_{ij}^s has a Type I extreme value distribution, the (conditional) probability that the firm will choose configuration *s*, can be described as a conditional logit model:

$$P_{ij|f=1}^{s} = \frac{\exp\left[\alpha^s + \beta^s X_{ij} + \gamma^s Y_j + \delta Z_{ijs}\right]}{\sum_{q=1}^{3} \exp\left[\alpha^s + \beta^s X_{ij} + \gamma^s Y_j + \delta Z_{ijs}\right]} \qquad (3)$$

Equation (3) is a hybrid or 'McFadden' logit model combining a conditional logit specification (configuration-specific regressors Z_{ijs} with generic coefficients δ) with a multinomial logit specification (firm and industry-specific regressors X_{ij} and Y_j with configuration-specific coefficients β^s and γ^s).[4] To identify the model, the coefficients α, β and γ have to be normalized to zero for one configuration. The generic coefficients δ do not vary by configuration and are estimated model-wide.

Turning back to the decision to invest abroad in the nested model, the probability of choosing foreign investment or not depends not only on firm and industry specific push factors, but also on the potential profitability contributions associated with the three options available for international plant configurations (see Figure 1). The sum of profit contributions of the conditional configuration choices is called the Inclusive Value (IV) and is defined as:

$$IV_{ij} = \ln\left(\sum_{s=1}^{3} \alpha^s + \beta^s X_{ij} + \gamma^s Y_j + \delta Z_{ijs}\right) \qquad (4)$$

The Inclusive Value enters the probability of choosing to invest abroad in the first stage, which is expressed as:

[4] E.g. Greene, 1997; McFadden, 1984.

$$P_{ij}^{f} = \frac{1}{1+\exp[\alpha^{f} + \beta^{f} X_{ij} + \gamma^{f} Y_{j} + \sigma IV_{ij}]} \quad (5)$$

Where σ is the estimated impact of the configurations' profit contributions on the propensity to choose to invest abroad. The nested logit model described in equations (1)-(5) allows for a statistical test of Hypothesis 1. In case σ is equal to one, then the internationalization decision of firms does not follow an integrated approach in which all possible configuration are scanned and taken into account. Rather, the decision to invest in a particular plant configuration is based on a pair-wise comparison of domestic production and production in the specific configuration.[5] The parameter σ should neither be zero, since in that case the profit contributions of the plant configuration decisions does not affect the foreign investment decision: that would imply that firms take internationalization decisions without taking into account the attractiveness of foreign countries in relationship with strategic firm and industry drivers. Hence a test for the appropriateness and statistical validity of the nested decision structure and the structured decision model of internationalization is that σ is both significantly different from one and zero. Only in that case, Hypothesis 1 is supported. We followed the two-step procedure proposed by Greene (1997, p.923), by estimating first equation (3). From this estimation we calculated the inclusive values and included these in the estimation of equation (5).

The dataset

We constructed a product-level database of Japanese firms' plant establishments in the United States, the European Union, and Asia for 36 products in the electronics and precision machinery industries.[6] The 36 electronics products (see Table 1) are all final goods in order to focus on products with comparable characteristics in terms of marketing channels and

[5] In that case the unconditional probability to choose a specific configuration ($P_{ij}^{f} P_{ij|f=1}^{s}$) can be rewritten as a one-stage multinomial model with four choices, including a 'domestic' configuration (e.g. Greene 1997; Mayer and Muchielli 1999; Devereux and Griffith 1999). In technical terms, this would imply that we would have to reject the nested logit model in favor of the multinomial logit model production with the three international plant configuration as un-nested choices.

[6] Included are investments in the ASEAN nations (Indonesia, Malaysia, Thailand, Brunei, Singapore, Philippines), China, Hong Kong, Taiwan, and South Korea. Other countries in Asia (e.g. India, Vietnam) were also included but recorded few or no investments in the 36 industries.

manufacturing organization. The products are defined at the four or five digit level, reflecting differences in manufacturing experience and market share between market segments (e.g. laptop vs. desktop computers, and LCD televisions vs. conventional televisions). For each product, Japanese manufacturers were identified based on Japanese electronics industry data.[7] After excluding foreign-owned firms this resulted in a comprehensive list of Japanese producers for each product. In total, the dataset includes 120 individual firms, of which 28 are privately held. The 120 firms on average manufactured between 4 and 5 products, resulting in a total number of firm-product combinations of 533. Fifteen observations had to be omitted because no data were available for the explanatory variables; this reduced the dataset to 518 observations. The dependent variable was created by determining whether the firms had set up manufacturing plants for each product (counting plants in operation in 1992) in the EU or US, and in Asia, using a variety of firm-level data sources. In 266 out of 519 cases foreign investment occurred. In the plant configuration choice analysis this gave us 266 decisions each on a set of 3 choice possibilities, hence 798 observations in McFadden's conditional logit model.

Operational measures: firm and industry specific drivers

We first describe the operational measure of the hypotheses on firm and industry specific drivers, after which we discuss the control variables. Table 2 provides the description of the variables in addition to the means and standard deviations.

Insert Table 2 About Here

Market share data (hypotheses 2a) were collected for the years 1990-1991 primarily from Yano (1990-1992). Since this source generally does not list the precise market shares for smaller players in the Japanese market, market shares could not be determined in percentage terms for a number of firms. We could classify firms into four groups: those with market shares smaller than 5 percent, with market shares between 5 and 10 percent, with market

[7] Mainly Denshi Keizai Kenkyuujo (1993) and Yano (1989-1995).

shares between 10 and 20 percent, and with market shares greater than 20 percent, respectively. The latter group we consider dominant firms; firms with market shares within the 10-20 percent range are considered competitive but non-dominant firms. We measure the global competitiveness of Japanese industry by the *world market share of Japanese firms*. We collected data on Japanese industry's share of the world market in 1990-1992 (Hypotheses 2b) from various sources.[8] Based on the information available, Japanese industry's world market share could be classified as low (< 25 percent), intermediate (25-75 percent) or dominant (> 75 percent)[9] In order to test Hypotheses 2c, we defined a *core product* as a product that is part of a firm's line of business that represents at least 10 percent of total turnover, based on information in the firms' financial reports. *Technology intensity* (Hypothesis 2e) is measured as the number of patents in the five year period 1989-1993 granted to the firm or its subsidiaries by the US patent office, per 1 billion Yen of turnover.[10] *Manufacturing experience* is the number of years since the recorded start of production in Japan for each product.[11] Since the marginal effect on the propensity to invest abroad of an additional year of manufacturing experience is expected to be smaller at the highest levels of maturity, we include the natural logarithm of manufacturing experience to test hypotheses 2d.[12] Based on the market share data of individual firms we calculated the Herfindahl index in Japan for each product. We followed Shepherd (1997) in defining a *loose oligopoly* as an

[8] The main method was to add data on overseas production by Japanese firms to figures on domestic Japanese production and to divide this sum by the figure for world market volume.

[9] The calculated world market shares show low competitiveness in most white goods sectors and computers but a dominant position in world markets for several consumer electronics products (e.g. CD players, VCRs, facsimile machines, cameras)

[10] See Belderbos (2001) for details on Japanese electronics firms' patenting intensity and a description of the data.

[11] This may not be a perfect measure of the degree of the technological maturity of manufacturing in particular in case products were first manufactured outside Japan. We tested whether manufacturing experience had a systematically stronger impact for products that were first commercialized in Japan, but found no significantly different impact. In addition, over time new versions of products may be created that require new manufacturing technologies (e.g. Baden Fuller and Stopford, 1996): our analysis attempts to controls for this potential effect by defining products in the most narrow terms (e.g. three types of printers and three types of televisions are distinguished).

[12] We also tested a linear as well as a quadratic specification and obtained similar but less significant results.

industry with a Herfindahl index greater than 1000 and smaller than 1800.[13] Loose oligopoly is a dummy variable that takes the value 1 for such industries and tests Hypothesis 2f.

Control variables

Control variable in the structured decision model include firm and industry push factors in the internationalization decision, as well as additional firm and industry controls and locational pull factors in the plant configuration decision.

The internationalization decision

Conceived theories of foreign direct investment as well as an abundance of earlier empirical studies have confirmed the impact on the propensity to invest abroad of the firm and industry drivers previously identified: the firm's market share in Japan, Japanese industry's world market share, whether the product is considered a core product for the firm, the technology intensity of the firm, manufacturing experience, and the presence of oligopolistic rivalry. In addition to these, a number of other factors are included as explanatory variables. The first is the *growth of the domestic market*. Both in product cycle theory (Vernon, 1966, 1979) and in foreign direct investment theory (Caves, 1996) it is the lack of domestic growth opportunities that compels firms to expand and invest abroad. We include the recent growth rate in the Japanese market (1990-1992) to control for this influence. Another driver of the internationalization decision is *international experience*. Central to the resource based theory of multinational investment as well as the process view of internationalization (Johanson and Vahlne, 1977) is the role of managerial expertise and the acquisition and exploitation of knowledge how to operate in foreign countries. The cost of acquisition of information about a market is the main set-up cost of entry but once these are incurred in an initial investment project in distribution activities, set-up cost for manufacturing investments decline (e.g. Casson, 1995). Investment in overseas distribution, after-sales service, and marketing increases sales growth potential, provides feedback on

[13] The Herfindahl-Hirschman index is defined as $\sum_{i=1}^{N}(share_i)^2$. We calculated the index by assuming that the market share that was not assigned to the larger players (on average around 5 percent) was evenly distributed over the smallest firms (for which no precise market share data was available).

local market and investment conditions, and generally serves as a platform facilitating expansion into manufacturing. Empirical studies on foreign investment have confirmed the positive impact of previous experience in foreign markets on the decision to invest in manufacturing (Davidson, 1980; Hennart and Park, 1994; Belderbos, 1997a; Chang, 1995; Kogut and Chang, 1996; Martin and Salomon, 2000). We define *international experience* as the number of months since the establishment by the firm of its first sales subsidiary in the US, EU or Asia. Since the effect of an additional month or year of experience will be greater for firms that only recently invested in distribution compared to firms that have been active for, say, 20 years, we chose a logarithmic specification.[14] We also include *firm size* as a control variable. Firm size is often used as an indicator of economies of scale, which favors centralization of production in the home country. On the other hand, firm size may also reflect the ability of a firm to overcome financial barriers to invest in multiple foreign countries and to overcome institutional and other barriers to enter risky foreign markets (Caves, 1996: p.59; Belderbos and Sleuwaegen, 1996). Firm size is measured as the natural logarithm of the firm's turnover. Finally, we control for possible effects of membership of Japanese horizontal and vertical business groups (keiretsu) on investment decisions. Member firms of horizontal keiretsu may benefit from information exchange within the group on foreign investment risks and local conditions (for instance through information gathered by the general trading firm) and may be more able to finance risky foreign investment projects (Belderbos and Sleuwaegen, 1996; Chang, 1995). In vertical business groups, the presence of manufacturing networks abroad established by ‘core’ firms has been found to positively affect foreign investment decisions by related suppliers within the group. The latter can benefit from assistance, experience, and an exclusive overseas market provided by the 'core' firm (Belderbos and Sleuwaegen, 1996; Chang, 1995). This pattern of groups firms following the 'core' firm in it expansion abroad has been found to induce clusters of keiretsu manufacturing plants abroad (Head Ries and Swenson, 1994; Belderbos and Carree, 2000). However, we do not expect these supplier-assembler relationships to play a particularly important role in our analysis. Since we focus attention on consumer (final) goods industries, our sample mainly includes assembling firms and not the typical related suppliers within keiretsu group that produce components for supply to the 'core' firm and other group firms. *Vertical keiretsu* is a dummy variable taking the value one if the firm is listed as a member of one of the larger vertical manufacturing groups in Japan. *Horizontal keiretsu* is a similar

[14] Since the number of months of overseas experience firms can be zero (for firms lacking a sales subsidiary abroad) we added 1 month to all observations before taking the natural logarithm.

dummy variable measuring horizontal keiretsu membership.[15]

Locational pull factors

So far we have introduced firm and industry characteristics that are decisive in the decision to invest abroad and that may have a differential impact across plant configurations. Another set of factors affecting the choice of plant configuration are location- or configuration- specific characteristics of the investment location. These are pull factors influencing the profitability of particular configurations and hence the likelihood that they are chosen. Import *tariffs* are a first location specific pull variable. Tariffs raise the cost of serving the host country market through exports from the home country or from export platform countries (Smith, 1987), and hence increase the relative profitability of local manufacturing. Tariffs have been found to significantly affect inward investments in various previous studies (e.g. Belderbos, 1997a; Campa et al., 1998). We calculated the tariffs that can be avoided by choosing a specific plant configuration as weighted averages of the tariff levels for each country or region. As weights we used the relative size of the countries' markets for each product. Asian tariffs are weighted averages of pre-Uruguay Round tariffs in Taiwan, Malaysia, Thailand, South Korean, Hong Kong, and Singapore: the six largest electronics markets in Asia in the early 1990s. West-bound configuration tariffs are weighted averages of EU and US pre-Uruguay Round tariffs, and global configuration tariffs are weighted averages of tariffs in the other two configurations. US and EU tariffs vary between 2 and 10 percent while average tariffs in East Asia often reach higher than 30 percent for products such as color televisions, VCRs, and white goods. To control for this high variability in the variable and since we expect a larger marginal impact of tariff increases at moderate tariff levels, we include the natural logarithm of the average tariff for the configurations. Besides conventional import duties, Japanese exports to the EU and the US have been affected by voluntary export restraints and antidumping actions, and Japanese electronics producers have been major targets. Antidumping actions remain a popular

[15] For vertical keiretsu we used the list provided in Dodwell Marketing Consultants' *Corporate Groupings in Japan*. For horizontal keiretsu we used the same source as well as a more elaborate Japanese language source, *Keiretsu no Kenkyuu* by Keizai Chousa Kyoukai (the membership definitions of Dodwell and Keizai Chousa Kyoukai differ for a number of firms). We obtained comparable results and report results obtained with the Keizai Chousa Kyoukai definition.

instrument of trade policy to protect domestic industries after GATT and WTO agreements have restricted or abolished he use of import duties and export volume restraints (Belderbos, 1997b). Both voluntary export restraints and antidumping actions have previously been found to impact on Japanese investments in the US and the EU (e.g. Belderbos, 1997a; Kogut and Chang, 1996; 1991; Drake and Caves, 1992). In particular in the second half of the 1980s, a range of Japanese export products, among which mobile phones, PBX systems, CD players, computer diskettes, dot matrix printers, copiers, and typewriters, have been affected by the imposition of antidumping duties by the US or EU administrations.[16] In addition, Japanese exports to the US or the EU have been affected by VERs, quantitative restrictions, or punitary tariffs.[17] Our *antidumping and VERs* measure of trade protection takes the value 1 if antidumping or other trade restrictions have targeted Japanese exports of the product to the US or the EU, and the value 2 if both the US and EU imposed such measures. This reflects that the incentives for trade barrier jumping investment are stronger if both these major markets are difficult to access through exports from Japan. *Market size* is an important locational pull factor attracting foreign investment (e.g. Head, Ries and Swenson, 1995; Wheeler and Moody, 1992; Mayer and Muchielli, 1999). The larger the market, the greater the benefits of adaptation of products to local market conditions, which is facilitated by local production, and the more likely it is that sales levels warrant the fixed costs of setting up local production facilities (Buckley and Casson, 1981; Smith, 1987; Motta, 1992). Market size is measured as he size of region's product market as a percentage of the 'Triad' markets (Western Europe, the US, and Japan/East Asia). It measures the relative importance of the foreign markets included in the plant configuration. Cost reduction is one of the possible motivations for foreign direct investment and *labor cost* has been found to significantly affect locational choices of foreign direct investment (e.g. Belderbos and Carree, 2002; Mayer and Muchielli, 1999; Wheeler and Mody, 1992). We measure labor cost as the unweighted average wage costs per employee paid by Japanese manufacturing affiliates established in the countries included in the specific configuration, using unpublished data of a survey among

[16] See Belderbos (1997b). Asian countries, such as Taiwan and South Korea, only recently have incorporated antidumping articles in their trade legislation.

[17] VERs have been affecting Japanese CTV exports to both the US and the EU, the EU operated a VER for Japanese VCRs in the 1980s and national quota applied to import of stereo sets until 1992. The US imposed a punitive tariff on Japanese PCs imports during 1987-1991 in accordance with its Super 301 bilateral trade policy legislation.

Japanese foreign affiliates.[18] *Internationalization experience* may be region-specific and therewith influence the choice of plant configuration. The more experience a firm has accumulated in a region, the lower the perceived risks and informational costs of entering the region through direct investment in manufacturing. Differences in regional experience can orient the firm towards a configuration building on the strongest regional experience and induce firms to expand investments in the region (Johanson and Vahlne, 1977). To capture regional experience effects, we include a variable measuring the number of months since a firm's first establishment of a distribution subsidiary in the region of the plant configuration. In case of a global configuration, we took the average experience in Asia and the US/EU.

RESULTS

The estimation results are presented in Table 3 for the decision to invest abroad (equation 5) and in Table 4 for the plant configuration decision conditional on a positive investment decision (equation 3). We first discuss the results concerning the decision to invest abroad.

Insert Table 3 About Here

The estimated coefficients presented in Table 3 represent the marginal impact on the odds ratio of the probability of producing abroad relative to the probability of domestic production only. The model generally performs well, with a pseudo R^2 of 0,27 and a correct prediction of of foreign investment or domestic production in 74 percent of the cases. The estimated coefficient for the potential profitability of plant configurations (the Inclusive Value in equation 5) is 0.32 and lies within the hypothesized interval <0,1>. The coefficient is significantly greater than zero at the 5 percent significance level and significantly smaller than one at the 1 percent significance level. These results confirm Hypothesis 1: the

[18] This survey was conducted by MITI (1997) in 1995. Based on the industry classification used, 13 different industries could be distinguished. Although the timing of the measurement of labor cost follows the timing of investment in our analysis, this is not likely to bias our results since firms will to an extent take expected labor cost developments into account, and because the differences in labor costs across industries are likely to be relatively stable.

appropriateness of the structured decision model of the foreign investment and plant configuration choices, with all potential configuration choices and their potential profitability entering the internationalization decision.

Most firm and industry drivers have a significant impact on the internationalization decision, with signs in accordance with conceived theory and earlier empirical results. Higher domestic market shares significantly increase the probability to invest abroad and foreign investments are also more prevalent in industries in which Japanese industry has an intermediate or dominant world market position. Foreign investment is more likely if the Japanese market is no longer growing or even shrinking, and if firms have more experience manufacturing the product in Japan. Foreign investment is also more likely for core products and by firms with previous international experience in the form of investments in non-manufacturing affiliates abroad. Finally, firms in loosely knit oligopolistic industries show a significantly higher probability of investing abroad. Other factors, among which technology intensity, firm size, and keiretsu membership have no additional significant impact on the internationalization decision.

Insert Table 4 About Here

Table 4 contains the results for the plant configuration decision, conditional on a decision to invest abroad. Estimates of the first two sets of coefficients in Table 4 are the marginal impact on the odds ratio of a Japanese firm choosing a global plant configuration as opposed to a West-bound configuration or an Asia-bound configuration, respectively. The third set of coefficients represent the marginal impact on the odds ratio of choosing a West-bound configuration and not an Asia-bound configuration. The latter coefficients are equal to the difference between the first and second sets of coefficients and are included in the table to enable direct inspection of the significant differences between West- and Asia-bound configurations. The location- (configuration) specific variables are variables of type Z_{ijs} for which only one generic coefficient is estimated. For each configuration a constant term is estimated, which captures fixed effects associated with that configuration such as geographic distance, the degree of cultural and economic integration with Japan, and macro economic

factors such as interest rates.[19]

The empirical model rightly predicts the chosen plant configuration in 77 percent of cases and the pseudo R^2 reaches 0.327, which is relatively high for conditional logit models. The results provide qualified support for Hypothesis 2a. Market shares in the 5-10 range have no significantly different impact from the lowest market shares below 5 percent (the omitted dummy variable). Dominant market shares (greater than 20 percent) unambiguously lead to global configurations, as predicted. Among the different market positions, a strong but non dominant position in the Japanese market (a market share in the 10-20 percent range) overall is mostly likely to lead to a West-bound configuration: there is a significantly positive impact compared with Asia-bound configurations, while the negative impact compared with global configurations is considerably smaller than for dominant market shares. On the other hand, the results do not suggest the stronger notion that non-dominant firms prefer West-bound over global configurations. The choice for an Asia-bound configuration overall is most likely for firms with the smallest market shares as predicted. Hypothesis 2b also finds qualified support in the results. The higher the Japanese industry's competitiveness expressed by its world market share, the more likely it is that firms in the industry choose a global plant configuration. As hypothesized, this does not hold for non-dominant but competitive Japanese industries (market shares in the 25-75 percent range) where there is no statistically significant difference between global and West-bound configurations. A non-dominant position overall is most likely to lead to a West-bound configuration choice, while the weakest position (< 25 percent share) is most likely to lead to Asia-bound configurations. Hypothesis 3b finds strong support in the results: if a product belongs to a core business of the firm, the firm is significantly more likely to choose a global plant configuration as opposed to both the Asia- and West-bound configurations. The empirical results also support the manufacturing experience hypothesis (H2d): manufacturing experience has a strongly significant effect on the probability that a West-bound configuration is chosen compared with both an Asia-bound and a global configuration, while the difference is greatest with an Asia-bound configuration. Technology intensity has the hypothesized positive effect on the probability that a West-bound configuration is chosen. The estimated effect is significant in comparison with the choice for a global configuration, partially confirming Hypothesis 2e. The significant effect of the loose oligopoly dummy variable on the probability of choosing a

[19] Given the dummy structure of the model, the estimated constant term represents the fixed effect for firms manufacturing a non-core product with a market share small than 5 percent in industries with low Japanese world market shares not characterized by a loosely oligopolistic structure.

global configuration compared to both Asia-bound and West-bound confirms Hypotheses 2f.

Overall the firm and industry strategic drivers have a marked and significant impact on the plant configuration decision. A loglikelihood ratio test comparing the model in Table 4 with a model with the hypothesized firm and industry drivers left out clearly rejects omitting these variables (the calculated Chi-square test statistic of 82,9 with 18 degrees of freedom is highly significant). The discriminatory impact of the firm and industry drivers can be examined more clearly by calculating the predicted probabilities in the stylized cases for which Hypotheses 2a-2f predict specific plant configurations. Table 5 shows the predicted probabilities for the three stylized cases in which we expect that the configurations are most likely to be chosen. Whereas the predicted probability of choosing a global configuration on average (all variable in the sample mean) is 22 percent, this increases to a dominant 97 percent if the key conditions for global configurations are substituted (dominant market position, dominant industry position, core products, and loose oligopoly). Similarly, the probability of choosing a West-bound configuration increases from 25 to 76 percent in the stylized case of non-dominant market position, intermediate industry competitiveness, non-core product, limited manufacturing experience and high technology intensity. The probability of an Asia-bound configuration increases form 52 to 98 percent if firms have a weak market position, if the industry is weakly competitive, and if Japanese firms have extensive manufacturing experience. These results on the firm and industry drivers confirm that Hypothesis 2 generally holds: firm and industry drivers have a significant and important discriminatory impact on plant configuration decisions, explaining a good deal of the variation across firms and industries in the prevalence of specific configuration choices.

Insert Table 5 About Here

Among the firm and industry control variables, firm size has a positive and significant effect on the probability of choosing a global plant configuration as opposed to an Asia-bound configuration, which is in line with earlier empirical studies (e.g. Belderbos and Sleuwaegen, 1996; Horiuchi, 1989). Membership of horizontal or vertical keiretsu has no significant effect on the plant configuration decision. The finding on horizontal keiretsu contrasts with Chang (1995) but is more in line with Belderbos and Sleuwaegen (1996) and Hunley (1998) who found mixed effects of horizontal keiretsu membership. Hunley (1998)

suggests that the cartel-like properties of horizontal keiretsu shield firms from competition and so provides fewer incentives for innovation and competitive achievement in world markets. The absence of an effect of vertical keiretsu membership is consistent with the view that the effects of vertical keiretsu on foreign investment decisions works primarily through supplier-assembler linkages (Belderbos and Carree, 2002; Head Ries and Swenson, 1995). Since our sample only includes final (consumer) goods industries, these linkages play a lesser role in our empirical model.

All location-specific regional pull variables have the expected sign, and three of them are statistically significant. The existence of VERs and the imposition of antidumping measures has a strongly significant effect on the plant configuration choice. Market size has the expected positive impact and labor cost a negative impact. The average level of import tariffs and local international experience at the firm level fail to reach conventional significance levels

DISCUSSION AND CONCLUSION

Overall, the empirical results lend strong support to the notion of a structured decision model of internationalization of production at the product level, in which different international plant configurations are treated as nested strategic options of the decision to invest abroad. Firms take a global strategic approach to the internationalization decision and scan for all possible profitable plant configurations with their respective locational advantages (such as cost, market size, and potential to 'jump' trade barriers) before deciding to invest abroad. These locational 'pull' factors interact with firm and industry specific drivers related to firm resources and competitiveness, domestic and overseas competition, and changing technological manufacturing and domestic market conditions pushing the firms to invest abroad. A second major finding is that the subsequent choice for a specific spatial configuration of plants is not only determined by locational characteristics, but also crucially affected by firm and industry specific strategic drivers. Hence, we could define a set of conditions under which a global plant configuration is most likely to be chosen: when the firm has strong competitive advantages in a product market with relatively weak foreign competition, when strategic interaction between Japanese firms takes place in a loosely oligopolistic home market, and when the product is a 'core' product for the firm and of strategic importance. Asia-bound configurations are chosen by firms with weaker

competitiveness when Japanese firms have standardized manufacturing technologies through extensive manufacturing experience at home. West-bound configuration are chosen by firms with intermediate levels of competitiveness for non-core products but overall high technology intensity. These investments are likely to be made in order to gain access to foreign technology and in order to learn from overseas markets and may also include acquisitions of foreign firms. This finding is consistent with the important role of technology sourcing and acquisitions in the expansion of Japanese firms' operations in the US and the EU (e.g. Kogut and Chang, 1991; Belderbos, 2001). The differential impacts of strategic drivers on the configuration choice demonstrates the relevance of distinguishing between the possible strategic roles that plants occupy within the international production systems developed by firms (e.g. Ferdows, 1997; Bartlett and Ghoshal, 2000; Bartmess, 1994, Vereecke and Van Dierdonck, 2002). The results are consistent with a more pronounced role of West-bound configurations in gaining access to technology, and Asia-bound configurations focusing on transfer of mature technologies for lower margin products to reduce costs.

The empirical results provided broad support for the complementary explanatory power of various foreign direct investment theories distinguished in the literature: internalization theory, resource based theory of the multinational firm, the stage (process) theory of the internationalization, and the theory of strategic interaction. Two exceptions merit further discussion. First, technology intensity of the firm had a counter-intuitive negative but insignificant coefficient in the internationalization decision. This appears at odds with a large body of existing literature on foreign investment, which has found significantly positive effects of the possession of intangible assets (Caves, 1996). One explanation is that the inclusion in the empirical model of market share data at the product level, in addition to a measure of Japanese industry world competitiveness, sufficiently expresses the impact of the relevant intangible assets in terms of product-level competitiveness. Market share has also in other studies appeared to be a superior predictor of foreign investment (Caves 1996, p.59). In addition, with a given level of competitiveness as measured by market share, higher overall R&D intensity of the firm may indicate a stronger emphasis on improving margins through increased quality and performance of existing product lines. This may require continuous interaction between R&D centers and manufacturing operations favoring the location of production in Japan (cf. Dubois et al., 1993; Belderbos, 2001). Second, while international experience had a significantly positive impact on the internationalization decision in accordance with the stage theory of foreign direct investment, regional experience had an insignificant impact on the choice of plant configuration. While the first steps in the

internationalization process in terms of gathering information on foreign markets and operating marketing and distribution affiliates are important for the foreign investment decision, the choice of plant configuration is less experience-dependent. This is consistent with the strategic approach to global plant configurations in the structured decision model. Firms that are operating internationally take a strategic approach rather than an incremental approach to plant configuration decisions and these choices are largely determined by the attractiveness of the different regions for investment (market size, market access and cost). This finding appears inconsistent with the stage theory of internationalization, but we note two possible caveats. Experience effects are most pronounced at the country level such that our more aggregated regional level analysis may not adequately measure these effects. In addition, a proper test of stage theories has to adopt a longitudinal empirical approach, which goes beyond the cross section nature of our data.

The novel approach in our empirical analysis was to examine global plant configuration decisions rather than individual foreign investment decisions. The marked differences found between West-bound configurations and global configurations suggests that previous research limiting analysis to the determinants of (Japanese) investments in developed markets has obscured a number of important aspects of internationalization strategies. The fact that a firm invests in the US or the EU in itself does not reveal information on the firms' internationalization strategy and plant configuration choice, which in turn is associated with a substantial variability in firm-level competitiveness and technological intensity as well as different conditions in the Japanese and global industry.

An interesting observation is that the differences between the two regional configurations (Asia-bound and West-bound configurations) in terms of the roles of firm and industry strategic drivers, though substantial, are not as marked as the differences with a global configuration. The is related to a relatively more important role of pull factors in the choice between Asia-bound and West-bound configurations with their respective contrasting locational characteristics. Wage costs in Asia for Japanese electronics plants are between 10 and 25 percent of wage costs in US and EU plants, pulling cost competing firms towards Asia. At the same time, there were strong locational pull factors attracting Japanese firms in particular product industries to invest in the EU and the US at the time of our investigation. Restrictive trade policy measures, in particular antidumping duties and voluntary export restraints, provided strong incentives to jump these trade barriers by investing in local manufacturing. The strongly significant impact of trade policy as a locational pull factor corroborates previous empirical findings of substantial effects of antidumping measures on

(Japanese) investments in the US and the EU (Belderbos, 1997a; Barrell and Pain, 1999). It is conceivable that firms let trade policy restrictions dominate plant configuration choice without due regard to their competitive strength and strategic positioning. This may imply that the plant configuration choices are less sustainable in the longer term. A recent study (Belderbos, forthcoming) indeed suggests that Japanese 'trade barrier jumping' manufacturing investments in the EU had a subsequently high probability to fail or be relocate to Asia, in particular after antidumping measures expired. Firms with a well developed-technology base were positive exceptions, consistent with the finding in our structured model that technology intensity is a major underlying strategic driver of West-bound configurations.

For the strategy practitioner our model and results may help to underscore the importance of giving plant configuration decisions a central role in strategic planning and implementation for optimizing performance. Although the internationalization decision taken at the product level requires a global scanning view taking into account all options linked to foreign manufacturing configurations, the outcome of this analysis will only imply a decision on a global configuration under a specific set of conditions. Through empirically identifying the impact of major strategic drivers and locational factors on the implied profitability of specific configurations, our results may help practitioners not to overlook viable alternatives. At the operational level this would imply that in the scanning process appropriate weights are given to a list of useful regional location variables in line with the chosen competitive strategy and actual competitive profile of the firm. For instance, non-dominant high tech firms will give a higher priority to local agglomeration forces in regions that show a strong technological potential for the product or product cluster concerned. Following the outcomes of such a scanning process, the potential large set of alternative configurations may be narrowed down to a limited number of relevant alternatives, for which in depth feasibility studies may be undertaken (c.f. McCormack et al., 1997).

Limitations and further research

In concluding we point out some important limitations of our study and suggest possible avenues for further research. We consider the cross section nature of the micro level data the main limitation of our research. The data are not well suited to uncover paths of dynamic internationalization processes, which are subject to two contrasting hypotheses. McDougall et

al. (1994) and Bell (1995) argue that many international new ventures at the product level are radically and quickly implemented in all developed markets. For such ventures international competencies are of great importance and there is only limited dependence on domestic competencies and growth. This globalization model in which firms exploit the domestic and major foreign markets in a simultaneous fashion, contrasts with an incremental approach to internationalization described in the process view of international investment (Johanson and Wiedersheim-Paul, 1975; Johanson and Vahlne, 1977). Testing these alternative hypotheses would necessitate the use of longitudinal data, for instance by extending or repeating the dataset at 5-year intervals. Given the formidable task of gathering the micro-level data, we consider this a major challenge for future research.

A second limitation is that we did not examine the relationship between different plant configurations and actual performance. Findings in Beamish and Delios (1999) suggest that geographic scope of operations has a separate positive feedback on the performance of Japanese firms, which they attribute to increased scale economies and cost reduction as well as potential benefits of technology spillovers and global learning. Geringer et al. (2000) found more mixed effects of international diversification on Japanese firm performance. Recent work by Barkema and Vermeulen (2002) showed that the performance effects of international expansion is moderated by the process of foreign direct investment, with speed, irregular expansion, and increased scope reducing the positive impact on profitability. Our model suggests that the appropriateness and profitability of different levels of geographic scope in international production depend on the push and pull factors affecting the firm in the specific product market. Depending on firm resources and domestic and foreign competition, a more limited geographic scope of overseas production may result in a better performance than a wider scope. The mixed findings on the relationship between performance and geographic scope in the existing literature may not only stem from lack of attention to the process of foreign direct investment but also from aggregation bias when summing over the different product markets in which the firm is active. Our more detailed predictions concerning the international operations of firms at the product level suggest that future research on (geographic) diversification and performance should attempt to analyze this relationship at the business unit level rather than at the firm level.

More detailed insight into the rationale of different international plant configurations could also be obtained with more precise information on the geographic mandate of the manufacturing operations abroad. In particular in Asia, a distinction can be made between plants exporting to EU and US markets, and plants serving the local or Asian markets. Such a

distinction would allow us to trace further to what extent firms have rationalized their global operations along their internationalization path (Douglas and Craig, 1992; Sleuwaegen, 1992) or have circumvented European and US trade barriers by setting up operations in other Asian countries. Further research could aim to set up global profiles of firms and determine the scope of their operations, which would enable further decomposition of international manufacturing strategies.

A final and obvious limitation is the restriction of our data to the (broadly defined) electronics sector and to Japanese firms. Our structural decision model in principle has general applicability and was tested on a sample of product level industries with varying characteristics and levels of internationalization. Since the variety of plant configurations, related to a diversity in foreign investment motives (market access, technology sourcing, cost reduction), and the 'footloose' nature of assembly plants may be quite particular to the electronics industry, application of the model in other settings does imply different weights of the respective strategic drivers and locational pull factors. The results for Japanese firms may be less easily generalized to the extent that the home country of the firm and its regional context of operations matter for foreign expansion choices. On the other hand, in industries characterized by international competition, industry conditions may effectively imply similar roles of strategic drivers and locational factors on plant configuration choice by US and EU firms. Application of the model to a different regional context would necessitate modification of the plant configuration alternatives. While for Japanese firms South East Asia appears as a geographically close low-cost region, for US firms Mexico and other Latin American countries may provide a similar regional context while the comparative region for EU firms would be Eastern Europe. Future comparative research using data on other industries and US or European firms could bring out such major similarities and dissimilarities.

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FIGURE 1:

Internationalization and plant configuration in a structural decision model

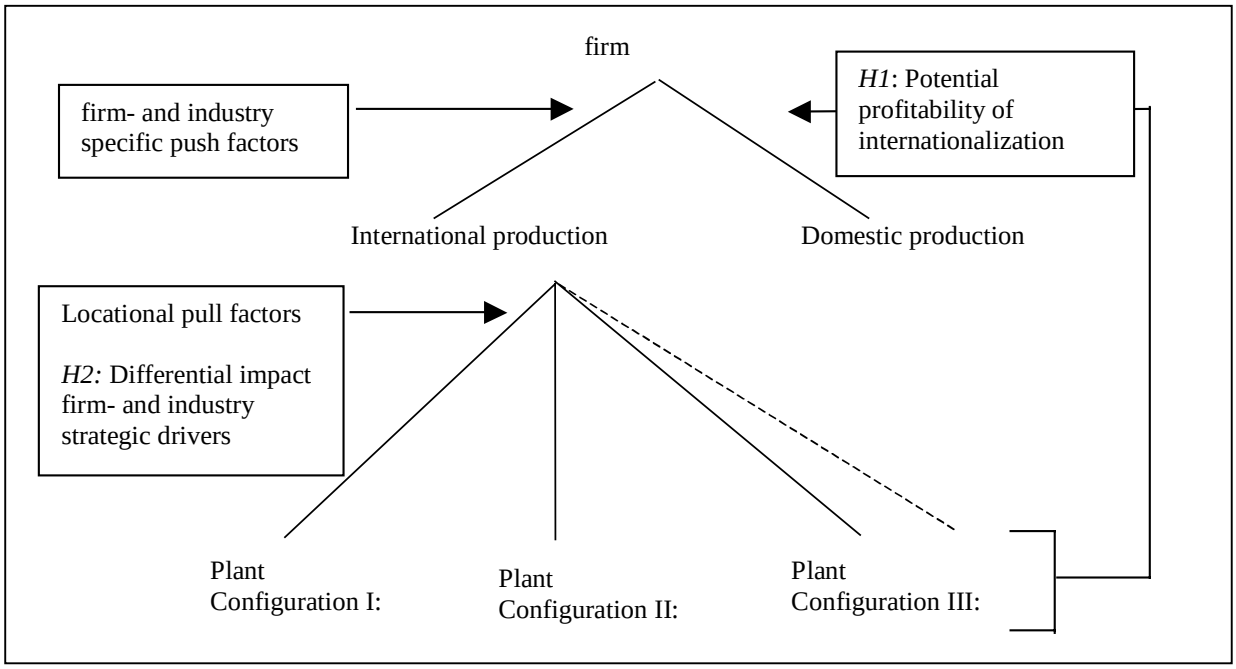

TABLE 1:

Foreign Investment and Plant configuration: Variation across Firms and Industries

		Foreign production in plant configurations:			
Number of Japanese firms:	**Production in Japan only**	**Asia-bound**	**West-bound**	**Global**	**All Firms**
Airconditioners	2	5	0	5	**12**
Audiotapes	5	0	2	2	**9**
Calculators	3	6	0	0	**9**
Camcorders	9	0	0	1	**10**
Cameras	2	8	0	0	**10**
Car audio	7	4	2	7	**20**
CDPs	10	5	4	7	**26**
Cellular Mobile Phones	13	0	3	5	**21**
Copiers	9	2	5	2	**18**
CRT TVs	2	5	0	9	**16**
Desktop PCs	15	3	1	1	**20**
Dot matrix printers	6	2	7	6	**21**
Facsimiles	15	1	4	7	**27**
FDD	7	7	0	4	**18**
HDD	15	0	3	2	**20**
headphone stereo	3	6	0	0	**9**
Inkjet printers	5	0	0	1	**6**
Laser printers	21	0	4	0	**25**
Laser Disk Players	14	0	0	0	**14**
LCD TVs	11	2	0	0	**13**
Microdisks	9	0	8	0	**17**
MWOs	4	0	4	2	**10**
Pagers	11	0	0	3	**14**
PBX	11	1	6	2	**20**
Portable PCs	10	0	4	3	**17**
Projection TVs	1	0	7	0	**8**
radiocassetteplayers	6	10	0	1	**17**
Refrigerators	3	6	0	1	**10**
Stereosets	2	11	3	7	**23**
Typewriters	6	0	5	1	**12**
Vacuum cleaners	5	1	1	1	**8**
Videotapes	4	0	3	2	**9**
VTRs	6	0	2	12	**20**
Washing machines	3	5	0	0	**8**
Watches	1	3	0	2	**6**
Workstations	4	0	6	0	**10**
Total	**260**	**93**	**84**	**96**	**533**

Note: Asia-bound is number of Japanese firms with foreign manufacturing but in Asia only, West-bound with manufacturing in EU or US only, and Global in both Asia and EU/US.

TABLE 2:

Explanatory Variables: Hypotheses, Means and Standard Deviations

Variable		Mean	Standard Deviation
Firm and Industry Strategic Drivers			
Firm's domestic market share 5-10% (dummy)	H2a	0.108	0.311
Firm's domestic market share 10-20% (dummy)	H2a	0.162	0.369
Firm's domestic market share 20-60% (dummy)	H2a	0.087	0.282
Japan industry's world market share > 25%, < 75% (dummy)	H2b	0.615	0.487
Japan industry's world market share > 75% (dummy)	H2b	0.254	0.454
Core product (dummy)	H2c	0.775	0.418
Manufacturing experience (ln years)	H2d	2.567	0.636
Technology intensity (US patents per 1 bln Yen sales)	H2e	1.027	1.275
Loose oligopoly (dummy)	H2f	0.545	0.498
Potential profitability of all plant configurations (Inclusive Value)	H1	3.841	1.205
Firm and industry controls			
Internationalization Experience (ln months)		5.401	1.462
Growth Japanese market (%)		0.112	0.280
Firm size (ln sales)		12.931	1.726
Vertical keiretsu (dummy)		0.592	0.492
Horizontal keiretsu (dummy)		0.326	0.469
Locational pull variables			
Tariffs (ln %)		2.430	0.651
Antidumping & VERs (dummy)		0.476	0.675
Market size (% of world market)		0.555	0.311
Labor cost (wage cost per employee in mln Yen)		2.548	1.850
Local experience (ln months)		5.425	1.111

Notes: Means and standard deviations for 518 choosers (observations) for firm and industry characteristics and control variables, and for 266 choosers x 3 choices (798 observations) for configuration specific variables.

Table 3:

Logit Model of the Internationalization Decision

	coefficient	t-ratio (asymptotic)	
Firm's domestic market share 5-10%	1,17	3,17	***
Firm's domestic market share 10-20%	1,73	4,42	***
Firm's domestic market share > 20%	2,79	4,80	***
Japan industry's world market share > 25%, < 75%	1,02	2,72	***
Japan industry's world market share > 75%	0,78	1,91	*
Growth Japanese market	-1,44	-2,59	**
Manufacturing experience	0,58	2,77	***
Core product	0,84	3,16	***
Internationalization experience	0,30	2,90	***
Loose oligopoly	0,58	2,36	**
Technology intensity	-0,07	-0,73	
Firm size	-0,08	-0,87	
Vertical keiretsu	0,20	0,71	
Horizontal keiretsu	-0,31	-1,29	
Intercept	-5,52	-4,10	***
Potential profitability of all plant configurations	0,32	2,28	****
Number of observations		519	
Pseudo R^2		0.27	
Loglikelihood		-261.8	***
% correctly predicted		74	

Note: Z-value is asymptotic normally distributed *=significantly different from zero at the 10 percent level, ** = 5 percent level, *** = 1 percent level. A choice is correctly predicted if the predicted probability is greater than the sample frequency.

TABLE 4: Conditional Logit Model of the Choice Between International Plant Configurations

Reference state:	**Global** *Asia-bound*		**Global** *West-bound*		**West-bound** *Asia-bound*	
	Coef.	t-ratio	Coeff.	t-ratio	Coef.	t-ratio
Intercept	-10,10	-3,29 ***	-7,30	-2,85 ***	-2,80	-0,94
Firm and Industry Strategic Drivers*:*						
Firm's domestic market share 5-10%	0,76	1,30	0,46	0,80	0,30	0,47
Firm's domestic market share 10-20%	2,08	3,70 ***	0,91	1,88 *	1,17	1,92 *
Firm's domestic market share > 20%	2,10	3,48 ***	2,47	3,96 ***	-0,37	-0,52
Japan industry's world market share > 25%, < 75%	1,60	2,46 **	0,57	0,73	1,03	1,40
Japan industry's world market share > 75%	2,02	2,62 ***	2,22	2,56 **	-0,21	-0,25
Core product	1,80	2,85 ***	1,39	2,09 **	0,41	0,73
Manufacturing experience	-0,64	-1,53	0,97	2,69 ***	-1,61	-3,58 ***
Loose oligopoly	1,26	2,66 ***	0,79	1,84 *	0,47	0,99
Technology intensity	-0,34	-1,64	-0,43	-2,10 **	0,09	0,46
Firm and Industry Controls						
Vertical keiretsu	0,13	0,25	0,13	0,33	-0,15	-0,27
Horizontal keiretsu	0,35	0,83	0,28	0,55	0,22	0,45
Firm size	0,34	2,03 **	0,05	0,28	0,29	1,61
Location-Specific Pull Variables:						
Tariffs	0,65	1,22	0,65	1,22	0,65	1,22
Antidumping & VERs	1,53	5,05 ***	1,53	5,05 ***	1,53	5,05 ***
Market size	3,97	3,04 ***	3,97	3,04 ***	3,97	3,04 ***
Labor cost	-0,24	-2,31 **	-0,24	-2,31 **	-0,24	-2,31 **
Regional experience	0,002	1,40	0,002	1,40	0,002	1,40
Number of choosers (choices)			266 (3)			
Pseudo R^2			0,327			
Loglikelihood			-196,8 ***			
% correctly predicted			77			

Note: Z-value is asymptotic normally distributed *=significantly different from zero at the 10 percent level, ** = 5 percent level, *** = 1 percent level. For configuration-specific variables of the form Z_{js}, one generic coefficient δ is estimated. A choice is correctly predicted if the predicted probability is greater than the sample frequency.

TABLE 5:

Effects of Firm and Industry Strategic Drivers on Predicted Probabilities

	Predicted Probabilities		
	Global	**West-bound**	**Asia-Bound**
Typical Global:	97	1	2
Firm has dominant position on domestic market			
Japanese industry has dominant position world market			
Strategic interaction in loosely oligopolistic industry			
Product is core product for the firm			
Typical West-bound:	20	76	4
Firm with non-dominant position on the domestic market			
Intermediate position of Japanese industry in the world market			
Non-core product			
Limited manufacturing experience			
High technology intensive firm			
Typical Asia-bound:	1	1	98
Firm has weak competitive position on domestic market			
Japanese industry has weak international position			
Extensive manufacturing experience			
All Variables in Sample Mean	22	25	52

Note: predicted probabilities calculated with all other variables taken in the sample mean. Non-dummy variables in the table are taken as mean plus (high) or minus (low) one standard deviation.