**Divesture of Foreign Manufacturing Affiliates:
Country Platforms, Multinational Plant Networks,
and Foreign Investor Agglomeration**

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January 2005

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Keywords: Divesture, agglomeration, multinational firms, networks

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ABSTRACT

We develop hypotheses concerning the impact of multinational firms' international plant configuration and host country foreign investor agglomeration on the divesture of manufacturing affiliates, drawing on real option theory and location and agglomeration theory. We test our hypotheses on a comprehensive sample of 1080 Asian manufacturing affiliates of Japanese multinational firms in the electronics industry during the turbulent years preceding and into the Asian financial crisis (1995-1999). We find evidence that multinational firms both create flexibility options through maintaining a multinational plant network of platform affiliates in multiple Asian countries, and exercise this flexibility option through divestments and relocation of manufacturing activities within the network. Firms most responsive to Japanese investor agglomeration or inter-firm buyer-supplier agglomeration within vertical business groups have a higher probability of divesture, suggesting that agglomeration leads to 'adverse selection' of firms and affiliates with weaker competitiveness.

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INTRODUCTION

The expanding literature on multinational firms has devoted substantial attention to strategic issues related to their foreign expansion, such as the firm-level determinants of international expansion (Belderbos and Sleuwaegen, 1996; Kogut and Chang, 1991; 1996), the choice of entry mode abroad (e.g. Delios and Beamish, 1999b; Hennart, 1991; Barkema and Vermeulen, 1999), the choice of location of new affiliates (Head et al., 1995; Shaver and Flyer, 2000), and the impact of multinational expansion and geographic scope on overall firm performance (Delios and Beamish, 1999a; Hitt et al, 1997; Tallman and Li, 1996). These empirical studies have been based on an abundance of, mostly complementary, theories of multinational enterprise and foreign investment drawing on transaction costs theory (e.g. Caves, 1998, Dunning, 1993; Hennart, 1988), the theory of oligopolistic interaction (Knickerbocker, 1973), location and agglomeration theory (Chung and Kalnins, 2001, Krugman, 1991, Chung and Alcacer, 2002), the resourced based theory of the firm (e.g. Chang, 1995), process and organizational learning theory (Johansson and Vahlne 1977; Kogut and Zander, 1995), and the theory of real options (Kogut and Kulatilaka, 1994a, 1994b).[1]

Comparatively little attention has been paid to multinational firms' decisions to withdraw from foreign operations, i.e. foreign divesture. Previous studies have examined the implications of several streams of foreign investment theory for divestments and uncovered a number of factors systematically affecting the survival of foreign affiliates, such as the mode of entry (Li, 1995; McCloughan and Stone, 1998; Shaver, 1998), size and experience of the affiliate (Benito, 1997; Shaver et al, 1997; Zaheer and Mosakowski, 1997), the market focus of the affiliate (Chen and Wu, 1996; Pan and Chi, 1999), the extent of diversification of entry (Li, 1995), parent experience gained through previous international expansion (Li, 1995; Shaver et al, 1997; Delios and Beamish, 2001), human capital and technology advantages (Mata and Portugal, 2000; Delios and Beamish, 2001; Belderbos, 2003) and affiliate capabilities related to local embeddedness (Song, 2002). A limitation of most of these studies is that they examined the determinants

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[1] See also Belderbos and Sleuwaegen (forthcoming) for an overview.

of survival and divesture of foreign affiliates in a single country setting, e.g. in the US (Li, 1995; Shaver, 1998; Shaver et al, 1997), Portugal (Mata and Portugal, 2000; 2002), Taiwan (Chen and Wu, 1996), Ireland (McCloughan and Stone, 1998), Belgium (Pennings and Sleuwaegen, 2000), Japan (Yamawaki, 1999) and China (Pan and Chin, 1999). Partly as a result, previous studies have largely ignored the potential impact of the role of the affiliate in the larger international plant network of the multinational firm.[2] Affiliates could play the vital role of a country platform investment (Kogut and Kulatilaka, 1994b) within the network, but at the same time may face greater odds of divestment in case of international relocation of manufacturing operations to other affiliates in the network. Real option theory stresses the potential value of country platform investments and the flexibility value of a network of manufacturing plants in different currency areas. It has been applied to explain sequential investments by parent firms (Kogut and Chang, 1996), the formation of multinational networks as a competitive advantage (Kogut and Kulatilaka, 1994a; Tang and Tikoo, 1999), and entry mode decisions (Kouvelis, et al. 2001; Kogut, 1991) but the implications for divesture decisions have not been examined.[3]

A second relative discrepancy between foreign investment theories and divestment studies concerns the role of foreign investor agglomeration. Foreign investor agglomeration may benefit affiliates in a country due to potential knowledge spillovers, externalities in business services, intermediate input provision, or positive demand effects (e.g. Chung and Kalnins, 2001; Wheeler and Mody, 1992). Empirical studies of location decisions by multinational firms have found that agglomeration effects have a positive impact on location choice (e.g. Smith and Florida, 1994; Head and Ries, 1996; Head et al., 1995), in particular where they concern agglomerations of buyers and suppliers within Japanese vertical business groups (Keiretsu). Recent work has uncovered that there are heterogeneous responses to agglomeration depending on investing firms' characteristics (Belderbos and Carree, 2002; Shaver and Flyer, 2000; Delios and Henisz, 2000), with smaller or inexperienced firms more attracted to agglomerated areas than larger firms with international experience. The implications of these findings for divestment behavior have however not been investigated in detail.[4]

In this paper we develop hypotheses concerning the impact of multinational firms' international plant network and foreign investor agglomeration on the probability of divesture of manufacturing

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[2] Studies that did examine divestments in multiple countries, e.g. Benito (1997) for Norwegian firms, Belderbos (2003) for Japanese firms in Europe, Park and Park (2000) for Korean firms, and Song (2002) for Japanese firms in Asia (1988-1994) did not examine the impact of multinational operations from a real options perspective.

[3] An exception is Pennings and Sleuwaegen (2000), analysing plant closures and plant relocations by domestic and foreign owned firms in Belgium.

[4] A few studies have examined the link between agglomeration and foreign affiliate firm survival. Shaver and Flyer (2000) found that industry agglomeration in US states is associated with a greater probability of exit of foreign affiliates. They suggested, but did not explore, that this could be due to more intense competition and the greater attraction of agglomerated areas to smaller firms with fewer managerial and technological resources. Kim and Delios (2003) found that the presence of larger numbers of Japanese affiliates in China in geographic proximity to the affiliate negatively impacted affiliate survival.

affiliates, drawing on real option theory and the theory of agglomeration and location choice. The importance of these theoretical insights has been explored in the context of international expansion by multinational firms, but is yet to be examined adequately in the context of foreign divestures.[5] We explicitly take into account that foreign affiliates are often part of an intra-firm multinational network of affiliates and can have strong inter-firm ties with other affiliates in foreign investor agglomerated locations, in particular if local affiliates belong to the same vertical business group. We test our hypotheses on a large sample of 1080 manufacturing affiliates operated in nine Asian countries by Japanese electronics multinationals during the years preceding and into the Asian financial crisis (1995-1999). This is an interesting setting for our analysis from several perspectives. Multinational firms operating in Asia in these years faced great uncertainty concerning exchange rates, inflation, and economic recovery and demand in different Asian countries. This increased the option value of operating a network in various countries, while at the same time great divergence in labor costs pushed firms to use their networks for international relocation. Japanese firms have also been shown to operate networks of interrelated manufacturing plants in the area making use of differences in real labor cost (Belderbos and Sleuwaegen, forthcoming). The plant location choices of Japanese firms have furthermore been found to be responsive to agglomerations of other Japanese-owned plants abroad, in particular if the investing firms are suppliers within vertical business groups that follow the leading assembler abroad (e.g. Belderbos and Sleuwaegen, 1996; Head et al. 1995; Martin et al. 1995;1998; Delios and Henisz, 2003).

LITERATURE AND HYPOTHESES

Literature Review

Studies on survival of foreign affiliates drew their early inspiration from industrial organization theory on industry and firm dynamics, dealing with firm entry, exit, and post-entry performance. Theoretically, Jovanovic (1982) modeled the expansion of firm as an adaptive learning process. He argued that firms learn about their efficiency only gradually and, under uncertainty, tend to enter with a relative small size. Successful firms subsequently increase their size incrementally as their efficiency reveals itself, and unsuccessful firms exit at an early age when they are still small. His model predicts that, at a given point in time, larger firms and older firms are more likely to have been growing successfully in the past and hence have a higher probability of survival, compared with their smaller and younger counterparts.

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[5] In this, we follow the suggestion of Boddewyn (1983) that any theory of divestment should consider the conceived determinants of foreign investments.

Evidence in support of this prediction has been found in several empirical studies: e.g. Evans (1987) found that the probability of firm survival increases with firm size and firm age, and Dunne et al (1988) found that small and younger firms have the highest rate of failure.[6] The relationships between establishment size, age and the probability of survival have also been tested in the context of foreign owned affiliates. Li (1995) found a positive relationship between affiliate size and its survival rate for foreign owned affiliates in the US, Yamawaki (1999) for foreign owned affiliates in Japan, Chen and Wu (1996) for foreign subsidiaries in Taiwan and Belderbos (2003) for Japanese affiliates in Europe. The relationship between foreign affiliate age and survival, however, appears substantially more complex. On the one hand, earlier evidence supports a positive relationship between firm age and firm or affiliate survival (e.g. Mitchell, 1994; Mata and Portugal, 1994; Yamawaki, 1999; Benito, 1997; Shaver et al, 1997). On the other hand, Li (1995) and Hennart et al (1998) found the exit rate to be particularly low in the first years after establishments. This suggests the presence of a "honeymoon" effect: firms give affiliates, even if they are not performing well, a number of years to prove their success. Mata and Portugal (2002), analyzing foreign owned firms in Portugal, found evidence of a "liability of adolescence": exit rates increased for older affiliates, suggesting that there is increasing organizational rigidity or obsolescence of organizational resources as new establishments age (cf. Hannan, 1998).

The international business literature has further focused on the determinants of survival of foreign affiliates specifically, drawing on a number of theories. Conceived theory of foreign direct investment (e.g. Hymer, 1976; Caves, 1996; Dunning, 1993) posits that firms entering foreign markets face a much higher information and adaptation costs and are put in an inferior position through their "liability of foreignness" vis-à-vis local firms. Hence, foreign entrants require a compensating competitive advantage, often based on the possession of intangible assets that can be transferred and exploited abroad in order to survive (e.g. Buckley and Casson, 1976). A number of empirical studies have confirmed a positive impact of technology, advertising, or human capital intensity on foreign affiliate survival (e.g. Delios and Beamish, 2001; Mata and Portugal, 2000; Belderbos, 2003).

A complementary view on foreign direct investment, the process or "stage" theory of internationalization, suggests that firms tend to circumvent the "liability of foreignness" problem by following an incremental pattern of foreign market involvement (Johanson and Valhne, 1977). Firms build up internationalization experience through acquiring foreign market knowledge from previous involvement, enhancing the capability to efficiently exploit their intangible assets on (more distant) foreign markets (Kogut and Zander, 1995), and reducing the probability of foreign affiliate failure. Chang (1995) found evidence that Japanese firms follow a sequential pattern for their entries into U.S. markets, with first entries focusing on core, competitive, product lines and subsequent entries focusing on non-core

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[6] See also Caves (1998) for an overview of this literature.

business. Li (1995) and Barkema et al. (1996) found that subsequent entries of multinational firms were less likely to exit than first time entries. Delios and Beamish (2001) showed that host country experience of the investing parent not only increases the survival probability, but also enhances the profitability of the affiliates by allowing a more efficient exploitation of intangible assets in the foreign market. Shaver et al. (1997) extended the argument on experience effects by suggesting that firms can also learn from other firms' host country experience, by examining what previous entry strategies have worked or failed. They found a positive relationship between the survival of foreign affiliates and the presence of other foreign affiliates in US industries. Kim and Delios (2003) highlighted a duality of host country experience for investing firms: experience allows for learning and positively impacts survival of subsequent entries, but can also lead to organizational inertia if previous experience is largely irrelevant to the subsequent entries.

An expanding literature in international business has examined the entry mode decisions for foreign operations and the impact of entry mode on affiliate survival, with a focus on the longevity and stability of international joint-ventures (Gomes-Casseres, 1987; Kogut, 1991). Most findings suggest that foreign joint venture have a systematically higher probability of exit than wholly owned greenfield entries (e.g. Li, 1995; Yamawaki, 1997; Hennart et al, 1998; Kim and Delios, 2003).[7] This has been related to failure to deal with management conflicts and cultural differences, but also to a real option view of joint ventures: foreign firms may withdraw from a joint ventures once they have gained sufficient experience in the local market to go it alone (Kogut, 1988; Yan and Zeng, 1999; Inkpen and Beamish, 1997). This may lead them to buy out the local partner, or to sell to the local partner. Hennart et al. (1998) indeed suggest that the higher termination rate of joint ventures is predominantly explained by a higher probability of selling the equity stake instead of by a greater probability of liquidation. Dhanaraj and Beamish (2004) provide a more fine-grained analysis of the role of equity ownership in the dissolution of foreign affiliates and found that minority stakes are most associated with divesture, but not majority stakes. Besides entry through joint ventures, acquired affiliates also appear to exhibit higher divesture probabilities, which has been attributed to difficulties related to post-acquisition integration (Li, 1995; Shaver et al, 1998; McCloughan and Stone, 1998; Mata and Portugal, 2000).

Other strategic variables that have been suggested to impact foreign affiliate survival are the degree of diversification and the market orientation of the firm. Diversified affiliates are more likely to fail, mainly due to the fact that investing firms have to deal at the same time with unfamiliar markets and unfamiliar products (Benito, 1997; Li, 1995; Yamawaki, 1997). With regard to the market orientation of the firm, it has been suggested that export oriented foreign affiliates are more footloose because they are established by their parent firms to arbitrage the factor cost differentials across production locations. This

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[7] Although other studies (e.g. Benito, 1997; Pan and Chi, 1999) have not found a differential rate of survival between the two types of foreign establishments.

makes the affiliates more sensitive to changes in cost conditions (Caves, 1996), or less embedded in the local economy in terms of supplier and other linkages (Belderbos et al, 2001; Song, 2002). Chen and Wu (1996), in their study based on foreign investment projects in Taiwan, related the proportion of affiliate sales generated from export to the survival of the affiliate, and confirmed that affiliates with higher export proportion are more likely to withdraw. Pan and Chi (1999) on the other hand, studied the impact of market focus of foreign affiliates in Taiwan on their survival and performance but did not find evidence of a systematic impact.

HYPOTHESES

Two issues that have not received due attention in the divestment literature but have been found relevant for FDI decisions are the real options perspective on FDI and manufacturing networks, and the role of agglomeration in location decisions by multinational firms.

Most of the literature on foreign affiliate survival implicitly associates exit with the failure of the foreign affiliate. However, exit may be due to reasons other than affiliate failure, and poor performance is only one of the identified factors of foreign divesture (Boddewyn, 1979). The literature on multinationality and firm performance emphasizes the importance of the operational flexibility achieved by maintaining a multinational network (Grant, 1987; Gomes and Ramaswamy, 1999; Tang and Tikoo, 1999). Within such a network, firms can easily shift production from one location to another, without having to incur fixed cost, if the manufacturing environment in a particular location proves to be unfavorable. Hence, it is relative profitability and efficiency rather than affiliate performance per se that may cause divestment and relocation decisions. Real option theory puts a value on this international operational flexibility due to the operation of networks of dispersed manufacturing plants. Under the condition of uncertainty concerning future relative cost and market conditions in host countries, the ability to shift manufacturing operations quickly between locations in response to changing cost differentials can provide an important competitive advantage. Kogut and Kulatilaka (1994a) formally showed that the option value of this flexibility could be substantial when there is high uncertainty concerning demand or manufacturing costs. Such shifts in manufacturing operations between plants can involve changing capacity loadings of plants or transferring production lines between plants, but they can also involve the closure of plants. The advantage of operating a network of manufacturing plants in potentially competing manufacturing locations is that multinational firms face lower costs of relocation, which facilitates rapid adjustments to changing market circumstances and cost conditions. Lower relocation costs imply lower costs of divesture of an individual affiliate, which makes such divestures more likely.

Hypotheses 1: a foreign manufacturing affiliate has a higher probability of divesture if its parent firm operates a larger network of plants in potentially competing locations.

Following the same line of reasoning, the operational flexibility of a manufacturing network is only maintained if the firm keeps operations in several countries with potentially diverging demand and cost characteristics. In order to flexibly react to market opportunities and changes in labor costs and other environmental factors, it is necessary to maintain a platform investment in individual market, which represents a valuable option for future expansion (Kogut and Chang, 1996, Kogut and Kulatilaka, 1994b). Maintaining manufacturing operations in a country also allows the firm to capitalize on country-specific investments it made in developing local operational know-how and relationships with local suppliers and customers, and government institutions (Song, 2002; Belderbos et al, 2001).

Hypotheses 2: a foreign manufacturing affiliate that serves as a country platform (it is the only affiliate of the parent in a country) has a lower probability of divesture.

It has long been suggested that firms can enjoy positive externalities stemming from geographic industry clustering through the provision of specialized inputs, specialized business services, greater demand due to lower search costs of customers, or spillovers of technological and organizational knowledge (Marshall, 1922; Chung and Kalnins, 2001). These possible externalities motivate firms to choose locations where similar establishments are clustered, and this motivation also holds for international expansions. This intuition has been supported by both formal economic models (Krugman, 1991; David and Rosenbloom, 1990) and by empirical studies on location decision of both domestic and foreign plant investments.[8] It is consistent with the notion that industry clusters enhance the overall competitiveness of the location as well as the competitiveness of the population of firms (Porter, 1990). Agglomeration effects have been found to be particularly strong in the case of Japanese multinational firms' foreign investment decisions (e.g. Head et al, 1995; Mayer and Muchielli, 1998). This has been attributed to the use of 'national' amenities such as Japanese schools, the ease of communication and information exchange between Japanese companies, reliance on just-in-time (JIT) delivery systems that require close spatial concentration of manufacturing plants and strict production flow control by suppliers, and quality control requirements imposing strong demands on suppliers, which can be satisfied more

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[8] E.g. Carlton, 1983; Bartik, 1985; Wheeler and Mody, 1992; Head et al, 1995; Head and Ries, 1996; Belderbos and Carree, 2002; Shaver and Flyer, 2000; Delios and Henisz, 2000. Shaver et al. (1997) argue that a larger presence of foreign owned firms also provides an informational externality to new entrants: firms can learn from other firms' success or failure, and adjust their entry strategies to increase the probability or survival.

easily by Japanese firms with experience in total quality management (e.g. Smit and Florida, 1994; Belderbos and Carree, 2002).

At the same time, studies have pointed out that co-location of firms within the same industry is also likely to increase competition which may lead reduced survival probabilities of firms. Several studies of foreign entrant survival have found a positive correlation between divesture rates and the number of firms operating in a host country industry (Shaver et al, 1997; Li, 1995, Zaheer and Mosakowski, 1997).[9] Kim and Delios (2003) found that geographic proximity to other Japanese affiliates in the same industry negatively impacted Japanese affiliate survival in China. Chung and Kalnins (2001) found both positive demand enhancing effects of agglomeration on firm performance as well as a negative competition effects in the Texas hotel industry, with the latter impact coming from the presence of 'like' firms operating in the same market segment.

A number of recent studies emphasize that firms can be heterogeneous in their location choice response to agglomeration benefits (Shaver and Flyer, 2000; Belderbos and Carree, 2002; Delios and Henisz, 2000), due to differences in the firms' net contribution to such agglomeration benefits. Firms with the most innovative technologies and organizational and process skills contribute relatively more to knowledge spillovers within industry clusters and therefore receive relatively fewer net benefits. Hence the presence of agglomeration economies can lead to 'adverse selection': a selection process through which the firms with relatively weaker competitiveness are more likely to opt to locate within the cluster, and the most competitive firms more likely to locate outside the cluster (Shaver and Flyer, 2000).

The above findings also have consequences for the survival or divesture of manufacturing affiliates. Those firms that were most responsive to agglomeration benefits at the time of entry because their net benefits from agglomeration were greater, have inherently weaker competitiveness. These firms are less likely to sustain a sufficient level of competitiveness to survive rivalry in agglomerated areas if the economic environment becomes less attractive and are more likely to exit. This leads to the following hypothesis:

Hypotheses 3: Foreign manufacturing affiliates whose location choice has been strongly responsive to foreign affiliate agglomeration have lower inherent competitiveness and have a higher probability of divesture.

Agglomeration benefits and clustering have been found to be even more pronounced for firms belonging to vertical business groups (vertical keiretsu), centered around large 'core' firms in the automobile and electronics industry such as Toyota or Toshiba (Head et al., 1995; Smith and Florida, 1994;

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[9] Although these studies did not explicitly analyse the geographic clustering of these firms.

Dyer, 1996). Vertical keiretsu are characterized by intensive inter-firm flows of information and the core firm may give active assistance to member firms in the process of overseas expansion. Suppliers within vertical keiretsu often manufacture specialized components to the design specification of the 'core' firm, and such supplier relationships are replicated abroad (Martin et al. 1998; Martin et al. 1995). Since economies of scale in the production of the component can be reaped with larger keiretsu activities in the location, a location becomes more attractive for supplier investments with larger 'core' firm activities. Belderbos and Carree (2002) find evidence of a differential response to vertical business group agglomeration: member firms are strongly responsive to agglomeration but the 'core' firm is less responsive and often explores alternative locations. Member firms have also been able to expand internationally even if they had weaker capabilities (in terms of R&D and human capital intensity) due to the presence and assistance of the 'core' firm manufacturing networks abroad (Belderbos and Sleuwaegen, 1996). Summarizing, firms in vertical business groups can overcome barriers and costs of foreign expansion through the replication of supplier-buyer linkages with a local network of group manufacturing plants and need fewer inherent competitive advantages to overcome the 'liability of foreignness'. This implies that 'adverse selection' is a phenomenon linked to the presence of vertical business group agglomeration and leads to the following hypothesis:[10]

> *Hypotheses 4: Foreign manufacturing affiliates whose location choice has been strongly responsive to vertical business group agglomeration have lower inherent competitiveness and have a higher probability of divesture.*

DATA AND EMPIRICAL METHODS

Data

Our dataset consists of 1098 manufacturing affiliates in early 1995 that were wholly or partially controlled by 412 Japanese firms in the broadly defined electronics industry in 9 Asian countries or regions, i.e. South Korea, Taiwan, China, Hong Kong, Singapore, Indonesia, Philippines, Malaysia, and Thailand. The data are compiled by the Research Institute of Electronic Industry as "Asia Shinshutsu Denshi Meika" (Survey of Japanese electronic firms in Asia) in Tokyo for 1995 and early 1999. It is an

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[10] We note that such agglomeration effects are much less a feature of horizontal keiretsu members' investments abroad. Henisz and Delios (2001) find only weak influences of horizontal keiretsu membership on investment decisions and argue that potential impacts are due to imitative behaviour under uncertainty rather than agglomeration economies. In the industry setting of the current paper, the effect of horizontal groups spanning a wide array of industries is furthermore difficult to examine.

authoritative source on Japanese foreign investments in Asia in the electronics industry with complete coverage of investments by both large firms, small and medium sized firms, and specialized suppliers to the electronics industry (glass, plastic, metals, chemical materials).[11] The data gives a reliable picture of investments by both leading electronics firms and smaller vertical business group-related or unrelated suppliers along the value chain of the electronics industry. The database contains information on the affiliates' paid-in capital, number of employees, equity stake held by Japanese investors, direction of sales, and products manufactured, and it also contains parent firm information on sales, number of employees, paid-in capital, and recent developments in the firms' overseas operations. We included in our dataset those manufacturing affiliates in which (Japanese) parent firms have an equity stake of at least 10 percent. A divesture case was identified if we could confirm with certainty that a 1995 affiliate was either closed or its stake sold to a local or foreign firm by its parent within the 1995-1999 period.[12] The confirmation was given by the parent information provided for each Japanese firm on such decisions in the 1999 edition, combined with information from other publications by the Research Institute on Electronics Industry on developments in Japanese electronics firms (such as quarterly compilations of press releases), other sources on Japanese affiliates abroad (Toyo Keizai, 1999), and coverage in Japanese newspapers drawn from the Nikkei web news service. As a result, 99 out of 1098 overseas manufacturing affiliates in operation in early 1995 were identified as having been divested by early 1999. Since for 18 affiliates a number of explanatory variables (primarily parent sales and affiliate employment) had missing values, our empirical analysis is performed on 1080 observations, out of which 97 are divesture cases.

The country distribution of the affiliates in 1995 and the country distribution of divestures are presented in Table 1. China had the largest share of affiliates in our sample (22), followed by Malaysia (21) and Taiwan (13). The distribution of divestures is rather different, with divestures mostly occurring (in terms of the share of divested affiliates) in the NIEs: Singapore (19), Hong Kong (16), and South Korea (14).

Insert Table 1

Model specification

Our dependent variable is binary, taking the value 1 if a 1995 affiliate is divested prior to early 1999 and 0 if it survived as a parent affiliate in the 1995-1999 period. We use a Probit model to relate the

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[11] The coverage is much broader, in particular for smaller and privately held firms, than the coverage of the often used directory compiled by Toyo Keizai Inc. (e.g. Delios and Beamish, 2001).

[12] In line with previous work, we examine all divestments. We focus on relocations in an extension of the analysis in the empirical results section.

probability of divesture to the explanatory variables. In the Probit model there is a latent variable measuring the likelihood of divesture of each affiliate (y_i^*), which can be related to a set covariates. We observe divestment if this latent variable exceeds a certain threshold value (e.g. Greene, 1997).

$$y_i^* = \beta_0 + \beta_1 x_i + \varepsilon_i$$
$$(1) \qquad Y_i = 1 \qquad if \quad y_i^* > 0$$
$$Y_i = 0 \qquad if \quad y_i^* < 0$$

We use a discrete choice model rather than a duration model. The main reason is that the exact year of the divestments could not be determined in all cases. While differentiating between the year of divestment would provide more variation in the dependent variable by specifying spells, given the four year time frame this advantage would be rather limited and the results would not be very different.[13] A potential problem with analysing divestment decisions in a fixed time frame is left censoring. We only observe affiliates that have survived until 1995 and not those that were divested sometime between establishment and the year 1995. We believe that this censoring problem is not likely to lead to appreciable biases in our empirical results for two reasons. First, the evidence suggests that divestments were rather rare before 1995. The press release and newspaper screening on investments and divestments in Asia as well as earlier reports on foreign affiliates by the Research Institute for Electronics Industry did not result in more than a handful of divestments. Song (2002) also reports only few cases of divestments in his sample of Asian affiliates of Japanese electronics firms in 1988-1994. Second, in order to control for a possible bias due to left censoring, the model includes a flexible quadratic specification for affiliate age as a control variable. If censoring (early divestments before we are observing these) is occurring, it is most likely to occur for older affiliates rather than more recently established affiliates, since the performance of older affiliates has been evaluated more frequently and over a longer period. The older affiliates that survived until 1995 are therefore more likely to have performed relatively well. This implies that age may pick up an unobserved type of competitiveness, which should imply a negative correlation with divesture. However, the empirical results described below show the opposite effect (divesture probabilities increase with affiliate age) which indicates that left censoring bias is not likely to feature in our analysis.[14]

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[13] Shaver and Flyer (2000) also report similar results of duration and probit models in their analysis of divestments by foreign affiliates in the US.

[14] Right censoring is not an issue with discrete choice models such as the probit model.

Operational measures

To test Hypothesis 1, we use two alternative variables measuring the size of the firm's plant network in potentially competing regions. These variables both relate to the multinational plant network in Asia, since other Asian plants provide the most important options for shifts in manufacturing operations.[15] The first variable, *Asian manufacturing network size*, is the overall size of the firm's plant network (number of manufacturing affiliates) in Asia in other countries than the country of the focal affiliate, taken in natural logarithm. Alternatively, we count the number of Asian countries in which the firm has manufacturing operations, with the restriction that only countries with lower labor costs than the country of the focal affiliate are counted *(Asian low cost country presence)*. The latter variable may have two advantages over a general affiliate count. First, both press releases and newspaper reports collected, as well as earlier empirical evidence, indicate that labor cost is one of the major concerns for firms' relocation decisions (Pennings and Sleuwaegen, 2000). For instance, the presence of a large number of plants in high cost South Korea is not likely to be relevant to a divesture or relocation decision for a plant in Malaysia if this is a response to an increase in Malaysian wages. Second, one could argue that the ease of relocating production to locations with lower cost is mostly related to the question whether a firm operates a plant in a specific low cost country and less to the question how many affiliates it operates in that country. Hypothesis 1 predicts a positive impact on divesture of both measures. To test Hypothesis 2, we include a dummy variable (*country platform affiliate*), which takes the value 1 if the affiliate is the only manufacturing affiliate of its parent in the country in 1995, and 0 otherwise. In particular given the uncertainty and turbulence in the Asian region in the late 1990s, divesting a manufacturing platform in an Asian country would reduce the size and option value of the Asian manufacturing network. Hypothesis 2 predicts a negative impact on the probability of divesture.

Both Hypothesis 3 and 4 concern the degree to which the firm responded to agglomeration benefits at the time of entry and its implication on the probability of this entry being divested. To test Hypothesis 3, we include in the model a measure of foreign agglomeration at the time of entry, which is the logarithm of the total number of manufacturing affiliates established in the country by all other Japanese firms in the electronics value chain at the time of the affiliate's entry (*Japanese agglomeration at entry*). We cannot measure adverse selection directly, but this measure assumes, consistent with earlier findings (e.g. Head et al, 1995), that firms take the level of Japanese affiliate agglomeration strongly into consideration when they choose locations for their manufacturing plants, and that firms with weaker competitiveness are most likely to be attracted to such agglomerations. Hypothesis 3 predicts a positive sign for *Japanese agglomeration at entry*. An alternative measure of agglomeration and adverse selection takes into account that firms do not respond in a homogenous fashion to agglomeration. Shaver and Flyer

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[15] In our analysis of the data books and newspaper reports, not one case was discovered of relocation outside of Asia.

(2000) and Belderbos and Carree (2002) found that small firms are much more responsive to agglomeration than larger firms. Hence, agglomeration at entry should be more closely correlated with adverse selection among smaller firms. There will still be larger firms that do invest in a country with strong agglomeration, but they are less likely to do so because of agglomeration benefits per se. To capture this effect, we add an interactive term of *Japanese agglomeration at entry* and *parent firm size*. While *Japanese agglomeration at entry* is expected to impact the probability of divesture positively, the interaction effect is expected to have a negative sign, as agglomeration benefits are less important for larger firms and therefore less associated with adverse selection of such firms.

To test Hypothesis 4, we calculate the logarithm of the number of manufacturing affiliates established in the country by other Japanese firms belonging to the same vertical Keiretsu for each affiliate at the time of entry (*Keiretsu agglomeration at entry*). Hypothesis 4 suggests that there is an adverse selection process present in firms' responses to Keiretsu agglomeration benefits, as the cost of entry abroad and the need for compensating competitiveness are substantially reduced for new affiliates that benefit from local intra-group transactions and assistance. Earlier work on locational determinants of Japanese multinationals has confirmed the strong impact of keiretsu agglomeration on location decisions of member firms (e.g. Head et al, 1995; Mayer and Muchielli, 1998). In addition, there is evidence of differential responses to keiretsu agglomeration by member firms and the core firm of the vertical groups (Belderbos and Carree, 2002; Pugel and Kimura, 1996), with member firms more responsive to agglomeration (following the core firm) while core firms appear also involved in pioneering new locations without previous keiretsu establishments. To allow for this type of heterogeneity in the response to keiretsu agglomeration, we split the Keiretsu agglomeration into two variables: Keiretsu agglomeration for *core firm*s and for *member firms*. Following the adverse selection argument, we expect that the Keiretsu agglomeration measure for member firms has a stronger positive impact on divesture than for core firms[16].

Control variables

The model includes an extensive set of control variables representing factors at the parent, affiliate, and host country level suggested to have a potential impact on divesture in earlier studies. We distinguish parent firm characteristics, affiliate characteristics and host country characteristics.

Parent firm characteristics

We include two control variables for the competitiveness of the parent firm expected to impact the probability of divesture. *Parent firm patent intensity* (the number of US patents granted to the parent firm

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[16] Out of 1080 affiliates in our sample, 266 belong to keiretsu core firms and 279 are owned by member firms.

during 1993-1999 times 1000, divided by parent sales in 1995). Patent intensity proxies for competitive advantages based on advanced technology that are likely to increase the probability of affiliate survival. In addition, *parent competitiveness in Asia* (the change in the number of other manufacturing affiliates of the parent firm operated in the nine Asian countries between 1995 and 1999) is an indicator of the overall success of the parent firm in its Asian operations. A strong reduction in the number of other Asian plant will indicate reduced competitiveness of the Japanese firm vis-à-vis other Japanese or Asian firms.

We include two other parent control variables: *parent size*, and *parent prior country experience*. *Parent size* (the logarithm of parent firm sales in 1995) has been found to impact the probability of divesture positively (Li, 1995; Hennart et al, 1998; Belderbos, 2003), but also negatively (Park and Park, 2000). On one hand, larger investing firms either find it easier to reach a withdrawal decision and give less weight to the survival of individual affiliates. However, a reverse argument also has appeal: larger firms have more financial or management resources and can exercise more patience for poorly performing affiliates. *Parent prior country experience* (the logarithm of the number of affiliates established by the parent firm in the country prior to the establishment of the focal affiliate) captures that multinational firms can reduce their "liability of foreignness" by learning from prior experience in the host country. Previous studies have generally found a positive impact of the host country experience on the probability of affiliate survival (Hennart et al. 1998; Park and Park 2000; Shaver et al, 1997; Kim and Delios).[17]

Affiliate characteristics

We include two control variables at the affiliate level, consistent with the entry and exit theory of Jovanovic (1982). *Affiliate size* (the logarithm of the number of employees of the affiliate in 1995[18]) has been found to be positively associated with firm survival (Dunne et al, 1989; Mitchell, 1994; Mata et al, 1995). Studies have also shown that this positive relationship between firm size and survival applies to foreign affiliates (e.g. Mata and Portugal, 2000; Li, 1995). *Affiliate age* (the number of years the affiliate has been in operation until 1995) is included to capture that newly established affiliates suffer more from "liability of newness" and still face greater uncertainty concerning their efficiency, while older affiliates have been able to improve their operations to adapt to host country conditions. Earlier evidence supports a positive relationship between firm age and firm or affiliate survival (e.g. Mitchell, 1994; Yamawaki, 1999; Benito, 1997; Shaver et al, 1997). On the other hand, evidence has also been found of the presence of a "liability of adolescence" (Hannan, 1998), with the probability of survival increasing with age over a range of years (Mata and Portugal, 2002; Li, 1995). To accommodate a more complex relationship between age and divesture, we include the quadratic term as well as the linear term of *affiliate age*.

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[17] We also employed as an alternative measure the number of previous entries time each entry's age at the time of entry of the focal affiliate (a measure of cumulative experience) and found similar results as those reported in Table 3.
[18] The dataset does not include reliable sales figures for all affiliates.

The entry mode of the affiliate is also likely to impact divesture probabilities. We include three dummy variables with wholly owned greenfield affiliates as reference group: *majority owned JV (*taking the value 1 if the affiliate is a joint venture in which the Japanese parent held a majority stake, 51-95 percent), *minority owned JV* (taking the value 1 if the affiliate is a joint venture in which the Japanese parent held a minority or 50 percent stake), and *acquired affiliate* (taking the value 1 if the affiliate was acquired by the Japanese parent).

The last affiliate characteristic is it's market orientation. Multinational firms have different motives for foreign affiliate establishments: they can use their foreign affiliates as a production base serving export markets, or to manufacture products serving, and often adapting to, the local market. Export-oriented affiliates established in Asia by Japanese electronic firms are often a vehicle to take advantage of the comparative advantages in these countries in terms of manufacturing costs. They may be more sensitive to changes in comparative advantages, and they tend to be less embedded in the local economy in terms of supplier and other linkages (Belderbos et al, 2001). Local-orient affiliates, in contrast, give more weight to local adaptation and are comparatively more integrated into local economy. Belderbos et al (2001) found evidence that foreign affiliates of Japanese firms that are local market oriented demonstrate more intensive backward linkages with local suppliers. Development of ties with local suppliers can be seen as country-specific assets that increase local capabilities but loose their value once the firm decides to divest, increasing exit costs (e.g. Song, 2002). Pan and Chi (1999) argue that local market oriented firms may perform better since they are more shielded from fierce competition on world markets, but found no evidence in a sample of foreign owned affiliates in China. We include two market orientation variables: *Export orientation* (dummy variable taking the value of 1 if all affiliate sales are on export markets), *Mixed market orientation* (dummy variable taking value of 1 if the affiliate sells on both the local and export markets). Affiliates that are only selling on the domestic market serve as the reference group.

Country characteristics

The analysis controls for the potential impact of *Japanese agglomeration in 1995* (the logarithm of number of manufacturing affiliates in the electronics value chain in operation in the country in 1995, excluding those affiliates belonging to the parent firm of the focal affiliate). The current agglomeration measure may have a negative effect on the probability of divesture due to the beneficial effects of agglomeration, but this impact may be mitigated if agglomeration is associated with increased competition (e.g. Chung and Kalnins, 2001). We also include a measure of *labor cost increase* (the average increase in annual wage for manufacturing workers in the host country's electronics industry between 1995 and 1997). In particular in an assembly industry such as electronics, labor input is an important cost factor and labor

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cost is an important determinant of the relative attractiveness of a location (e.g. Belderbos and Carree, 2002; Song, 2002).[19] A third factor in location and divesture decisions is the growth of the local market. Market growth allows manufacturing affiliates to grow without intensifying competition for market share, reducing the likelihood of divestment (e.g. Li, 1995; Benito, 1997). We include as a measure of the growth in the relevant market the average yearly percentage growth in the country's electronics market between 1992 and 1998 (*Electronics market growth).*

Summary statistics for the dependent variable, operational measures and control variables are provided in Table 2, and the correlation matrix is given in Appendix I.

Insert Table 2

EMPIRICAL RESULTS

The results of the Probit model relating the probability of manufacturing affiliate divesture to the operational measures and control variables are presented in Table 3. In models 1 and 2 we include as operational measure for hypothesis 1 the "*Asian manufacturing network size*". In model 3 we substitute the alternative measure *Asian low cost country presence.* Model 1 contains the undifferentiated agglomeration measures at the time of entry of the affiliate, *Japanese agglomeration at entry* and *Keiretsu agglomeration at entry*. In models 2 and 3, *Japanese agglomeration at entry* is interacted with *parent firm size*, and the effect of Keiretsu *agglomeration at entry* is estimated separately for member firms and core firms.

Insert Table 3

The three models are highly significant as indicated by the Chi-square test statistic. The Chi-square statistic and fit of the model improves if we allow a differentiated impact of agglomeration in models 2 and 3. In model 1, the coefficient of *Asian manufacturing network size* is positive and significant. The coefficient remains significant (at the 5 percent level in a one-sided test) in model 2, while the alternative operational measure *Asian low cost country presence* is significantly positive in Model 3.[20]

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[19] Song (2002) found a positive relationship between labor cost and downsizing of country operations for a sample of larger Japanese electronics firms (member firms of the Japanese Electronics Industry Association) in Asia during 1988-1994.

[20] The correlation coefficient between the two variables is 0.61 as seen in the Appendix. Firms with the largest Asian plant network also tend to have a substantial number of manufacturing affiliates in lower cost countries.

These results lend strong support for Hypothesis 1. Hypothesis 2 is also firmly supported by the empirical results: the variable *country platform affiliate* has the predicted negative sign and is strongly significant in all three models. Support for Hypothesis 3 is more qualified. In model 1, *Japanese agglomeration at entry* has an unexpected negative sign but is not significantly different from zero. If we drop the assumption that agglomeration plays an equal role in investment location decisions for all firms, but allow a differentiated response related to parent firm size in models 2 and 3, then our results do provide support for Hypothesis 3. In models 2 and 3, *Japanese agglomeration at entry* is now positive and significant, while the interaction effect between *Japanese agglomeration at entry* and *parent firm size* is significantly negative. This is consistent with the notion that agglomeration plays a lesser role in the investment decisions by larger firms, such that larger firms are less likely to be adversely selected, while adverse selection is a more common phenomenon among smaller firms. The combined effect of the coefficients implies that agglomeration at time of entry has a positive impact on divesture for firms with annual sales less than 22.48 billion Yen (about 210 million dollars in 1995), which applies to a majority (56%) of investing firms in our sample. The estimates for keiretsu agglomeration provide support for Hypothesis 4. The coefficient of *Keiretsu agglomeration at entry* in model 1 is positive and significant as predicted. If the effect of keiretsu agglomeration is estimated separately for *core* and *member* firms in models 2 and 3, the coefficient for member firms remains significant at the 5 percent level, while the coefficient for core firms is positive and even larger, though with a higher estimated standard error (significance at the 10 percent level). Overall, these results indicate that not only member firm investments abroad are subject to adverse selection, but also manufacturing entries by the core firms themselves.

The estimated coefficients for the operational measures also imply a substantial magnitude of impacts. The probability of divesture with all variables in the sample mean is 6.3 percent based on the estimations in model 2. This probability of divestment increases by about 2 times (from 6.3 percent to 18.8 percent) if the *Asian manufacturing network size* is increased by one standard deviation. The increase in probability of divestment is even larger (an increase of roughly 4 times) if the *Asian low cost country presence* is increased in the same manner. The probability of divesture for a non-country-platform affiliate is 9.1 percent, about twice as large as for a country platform investment (4.6 percent). For an affiliate belonging to the parent firm with the lowest sales level in our sample, the probability of affiliate divestment increases by 40 percent (from 22 to 31 percent) if *Japanese agglomeration at entry* is increased by one standard deviation. For member firms of a Keiretsu, a one standard deviation increase in *Keiretsu agglomeration at entry* increases the probability of divesture by around 36 percent, while for a core firm affiliate this proportional increase is 67 percent.

Control variables

The estimated coefficients of the control variables are largely consistent with perceived theory and results in previous empirical studies. The two indicators for parent competitiveness, *parent firm patent intensity* and *parent competitiveness in Asia*, both have an expected negative sign, with parent competitiveness in Asia strongly significant and parent firm patent intensity marginally so (at the 10 percent level). *Prior country experience* has a negative sign but is not significant. *Parent size* is negative and significant in model 1 but this effect disappears in models 2 and 3: it is the interaction effect with agglomeration rather than a pure size effect that reduces the probability of divesture. Consistent with earlier studies, larger affiliates are less likely to be divested (*affiliate size* is negative). Minority owned joint ventures, but not majority owned joint ventures, have a greater probability of divesture than wholly owned greenfield affiliates. This confirms the non-linear impact of equity stake on affiliate survival found in Dhanaraj and Beamish (2004). The coefficient for acquired affiliate is positive but only significant (at the 10 percent level) in model 1.[21] Divesture is related to affiliate age in an inverted U-shape manner. The probability of divesture increases with age up to a certain point and then starts to decrease. The coefficients indicate that this decrease only occurs for affiliates that have been operational for more than 35 years. These results are in line with a 'liability of adolescence' view (e.g. Hannan, 1998) of organizational age and survival. Older affiliates may still rely on mature technologies or focus on markets with less growth potential. In dynamic markets with rapid technological developments such as electronics, age is not necessarily an advantage (Li, 1995). The market-orientation of the affiliate has a marginal impact on divesture: export oriented firms are more likely to be divested than domestic market oriented affiliates, the reference group (significant at the 10 percent level), but no such difference is found between affiliates with a mixed market orientation and domestic market oriented firms.

Of the country variables, *labor cost increase* has a positive impact on divestures, and is consistently significant in all models. The coefficient of *electronics market growth*, on the other hand, has a counter-intuitive positive sign and is marginally significant in model 3, but not significantly different from zero in models 1 and 2. Apparently, labor costs are the dominant consideration for location and survival of electronics plants in the Asian electronics industry.[22] Japanese agglomeration in 1995 has a

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[21] We note that the number of acquisitions is small scarce in this sample of electronics investments in Asia. We identified only five acquisitions, which does not allow to estimate the impact of this type of entry mode with precision.

[22] Complicating the estimation of the impacts of labour cost and demand increases are the exchange rate changes (depreciations and devaluations) for several Asian countries during the period, which reduced both labour costs and market demand in dollar terms, and introduce a positive correlation between the two variables. We could also expect that export oriented firms are more sensitive to changes in labor cost than domestic market oriented firms. Indeed, a test including the interaction effect of exporting affiliates and labor cost growth produced a significantly positive coefficient. Interacting domestic market orientation with market growth resulted in the expected negative sign but the interaction effect was not significant.

negative sign throughout and is significant at the 5 percent level in models 1 and 2, indicating that the benefits of agglomeration dominate over competition increasing effects.

Divesture and Relocations

Hypothesis 1 refers to a parent firm's ability to flexibly shift plant capacity loading in times of changing cost and demand conditions. Divestures are more likely if manufacturing operations can be transferred more smoothly to plants in other countries. Hence, implicit in this hypothesis is that divestures in such cases concern relocations to other Asian sites. In order to check the robustness of the evidence in favor of the hypothesis, we attempted to ascertain whether each divesture was a relocation within Asia or a simple dissolution without relocation. In several cases, direct evidence on relocations was provided in the survey by the Research Institute of Electronics Industry. In others, we defined divestures as relocations if the parent firm during 1995-1998 established a new plant or increased employment in an existing plant in another Asian country, and if that plant produced identical products as the divested affiliate. As a result we could classify 28 divestments as relocation cases. Given the small number of relocations, it is not useful to treat relocations and non-relocating divestures as separate choices and to estimate a full model (e.g. a nested logit model specification). This would introduce 20 new coefficients to be estimated and would reduce the degrees of freedom to an unworkable level for the relocation choice (28 observations). Instead we estimated a basic auxiliary model explaining whether a divesture is a relocation or not. The variables of interest are *Asian manufacturing network size* and *Asian low cost country presence*, which should make it more likely that a divesture is a relocation, instead of a dissolution without clear relocation motives. We include in the model a number of variables that could be expected to have an impact on the relocation decision. The parent competitiveness variables are expected to be positively related to relocations, as simple dissolutions are more likely to be due to a lack of general competitiveness, while relocations are less likely to be related to failure. *Labor cost increase* is expected to induce relocations, while in the case of negative *electronics market growth* dissolutions are perhaps a more likely response. We include the variable *country platform investment* (the affiliate is the only affiliate in the country), since firms with more manufacturing affiliates in a country have more opportunities for rationalization and production transfer on a country basis and may choose that option rather than international relocations. Also, given that it is a platform investment that is divested, firms may see the need to compensate the loss of network diversity by extending the network to other countries instead. Finally, the model includes parent size as a control.

The results of Probit model estimations with the two different operational measures for Asian plant networks are presented in Table 4. Both measures of plant network size are positive, but only the

Asian low cost country presence is significant (at the 5 percent level) and is the most robust measure. This indicates that it is not the entire network size that matters for relocations, but rather the possibility to shift production to an existing production base in countries with lower labor costs. Among the other variables, *parent competitiveness in Asia* has the expected positive sign and is significant at the 10 percent level in model 5, while patent intensity has a negative sign but is not significantly different from zero. Country platform investment has a positive effect and is significant in both models. *Country platform affiliates* are less likely to be divested, but if a divesture decision is taken, it is much more likely to involve a relocation. *Electronics market growth* has the expected negative sign and is significant (5 percent level) in model 4. *Labor cost increase* has the expected positive sign but is not significant; neither does parent firm size have a systematic effect on the type of divesture.

Insert Table 4

CONCLUSIONS AND DISCUSSION

We analyzed divesture decisions for a comprehensive sample of 1080 Japanese electronics manufacturing affiliates in operation in 1995 in nine Asian countries in the years leading up and into the Asian financial crisis, 1995-1999. The empirical results gave broad support for a "real options" perspective on divestures as well as for the notion of adverse selection in investment location in agglomerated areas. Affiliates belonging to a parent firm with a large network of plants in Asia are more likely to be divested, in particular if the parent firm operates plants in lower cost countries. This is consistent with the view that multinational firms use Asian manufacturing networks flexibly to adjust plant capacities to changing cost and market circumstances. Analysis distinguishing between relocations and simple dissolution indeed confirmed that international relocations, rather than simple dissolutions or closures, are more likely if the multinational firms operated more plants in lower cost countries. These results show that affiliate divesture decisions should be considered in the context of wider multinational firm strategy and their position in international plant networks, rather than as separate decisions (as has been the approach in most previous work on foreign divestures). The results are also consistent with the notion (Kogut and Kulatilaka, 1994a; Pennings and Sleuwaegen, 2000) that a network of manufacturing plants provides option value of the flexibility to adjust the distribution of manufacturing operations over locations, under conditions of uncertainty concerning exchange rates, labor cost, and market conditions. Such conditions were certainly prevailing in the second half of the 1990s in Asia, and Japanese multinational firms with such a network in place have made use of this flexibility option. At the same time,

the analysis confirmed that 'country platform affiliates', i.e. those affiliates that represent the sole manufacturing presence of a firm in a country, contribute to the flexibility option for the multinational firm and were significantly less likely to be divested. In summary, we find evidence that multinational firms both *create* flexibility option through maintaining a multinational plant network of platform affiliates in multiple Asian countries, and *exercise* this flexibility option through divestments and relocation of manufacturing activities within the network.

The role of foreign investor agglomeration in affiliate divesture and survival proved complex. On the one hand, evidence was found that affiliates operating in countries with a substantial Japanese affiliate presence are less likely to be divested, which is related to the benefits of agglomeration found in location studies (e.g. Belderbos and Carree, 2002; Head et al, 1995). On the other hand, we found evidence that the potential agglomeration benefits are more likely to attract firms with weaker inherent competitiveness ('adverse selection') because these firms benefit more from agglomeration economies and reduced information cost of investment decisions. Firms for which the benefits of agglomeration have been found to be of particular importance, hence those firms that are more likely to be 'adversely selected' into agglomerations, were found to have a greater probability of divesture. This did not apply if we assumed that all firms investing in a location with strong Japanese affiliate agglomerations were similarly attracted to it, but it did hold if we allowed for size heterogeneity in the responses of firms to agglomeration. Divesture was only more likely to occur for firms establishing affiliates in locations with strong Japanese affiliate agglomeration if the investing firms were not large-sized. This is consistent with previous findings on location decisions (Belderbos and Carree, 2002; Shaver and Flyer, 2000), suggesting that agglomeration benefits play a much smaller role in location choices by large firms. The empirical results also confirmed the presence of adverse selection for affiliates established by firms belonging to vertical business groups (keiretsu). Location studies have suggested that keiretsu affiliate agglomerations provide additional benefits for investing member firms and facilitate the decision to invest abroad (e.g. Smith and Florida, 1994; Pugel and Kimura, 1996; Belderbos and Sleuwaegen, 1996). The empirical results showed that affiliates established by keiretsu firms in countries with a strong existing presence of affiliates of the same keiretsu were significantly more likely to be divested. This pattern was not only found for member firms in the keiretsu but also for affiliates established by the leading core firm of the keiretsu.

The finding of a positive impact of current agglomeration on firm survival warrants further discussion. This positive impact contrasts with earlier results (e.g. Shaver and Flyer, 2000; Kim and Delios, 2003) where negative impact on firm survival was attributed to a higher intensity of competition associated with agglomeration. The difference with the results in the present study may be partly due to the scope of the industry cluster under consideration, since our definition of the broad electronics industry included material and component suppliers as well as final goods manufacturers. Hence, the direct

competition effect of 'like' firms competing in the same market segment is likely to be of less importance compared with the benefits of agglomeration such as the provision of specialized high quality inputs, information spillovers, and the availability of skilled labor (c.f. Chung and Kalnins, 2001). At the same, it is clear that by exploring firm heterogeneity in the impact of agglomeration and by distinguishing different types of agglomeration, further insights into the complex relationship between agglomeration and firm performance can be obtained. In particular, it was shown that in order to bring out adverse selection effects it is helpful to distinguish agglomeration at the year of entry and current agglomeration, with the former directly indicative of selection processes in location choice. Only after controlling for this impact of adverse selection, an indicator of current agglomeration is likely to bring out the real effect of agglomeration externalities or the real impact due to increased competition. In this regard, our approach follows the notion in Shaver (1998) that one has to control for endogeneity of strategic choices (in this case location choices) of firms in analyzing the impact of such choices on firm performance.

A second finding that requires further discussion is the increased exit probability for core firms in vertical keiretsu investing in countries with large agglomeration of other plants belonging to the vertical group. A possible explanation for this result is that later investments by the 'core' firm in agglomerated locations tend to be operations in non-core business lines in which the firm has inherent lower competitiveness (Chang, 1995), which may lead to greater odds of business failure. This is also broadly consistent with the finding in Kim et al. (2004) that the most powerful members of keiretsu are able to pursue growth strategies by increasing geographic and product scope.[23] The results contribute to the discussion concerning the efficiency and performance enhancing or competition reducing impact of horizontal and vertical keiretsu (e.g. Miwa and Ramseyer, 2002). Hundley and Jacobsen (1998) found mixed export performance effects of keiretsu membership, and suggest that preferential intra-group trading may shield firms from competitive pressures reducing performance. Weinstein and Yafeh (1995) found keiretsu firms to engage in overinvestment financed by the main bank, which led to significantly reduced profitability of keiretsu firms compared to independent firms. Our results similarly suggest that vertical keiretsu presence in foreign countries, although it allows for transfer of efficient Japanese business practices such as just-in-time delivery systems and quality control (e.g. Martin et al. 1995;1998; Smith and Florida, 1995), may also involve overinvestment in affiliates by weakly competitive member firms and in less competitive operations of core firms.

The results on the effects of agglomeration can be seen to qualify to an extent earlier policy conclusions concerning the need for countries to attract major investors in order to generate agglomeration

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[23] Lack of a control for diversified entry, due to unavailability of adequate data, may also be partly responsible for this result. In the context of the Japanese electronics industry, diversification is more prevalent in terms of entry in to vertical related businesses (components) and new product markets rather than entry into different industries, such that diversification measures would have to be constructed at the detailed product level.

benefits sustaining incoming investments flows. Investment agglomeration also attracts lower quality investments and is likely to be associated with higher rates of turbulence and divestures in the operation of foreign firms. The findings furthermore show that labor cost (growth) has a strong impact on divesture and relocations decisions, suggesting that Asian countries are competing on cost for Japanese electronics manufacturing investments.

Limitations and Further Research

A limitation of this study is the restriction of our sample to Japanese affiliates in the (broadly defined) electronics sector in Asia, which reduces the scope for generalizations. The existence of extensive plant networks by multinational firms in different countries, the importance of labor costs, and the 'footloose' nature of electronics assembly plants, are to an extent particular to assembly industries such as the electronics industry. The role of vertical industrial groups and suppliers networks is particularly in the industrial organization of Japanese firms. Hence, it would be of interest to investigate to what extent similar systematic patterns of divesture occur in other industries and for affiliates owned by multinationals based in other countries. Second, our analysis of divesture only covered a time span of 4 years. This was a proper setting for our analysis, as this was a period of major uncertainty concerning exchange rate changes and market performance in Asia, during which divestures and relocation became a common phenomenon. A longitudinal analysis of affiliates' survival probabilities by extending the time period of analysis would however have important benefits. It would allow use of survival models to investigate the dynamic impact of agglomeration and plant networks on divesture, and would introduce spell variation in the dependent variable and time variation in the covariates.[24] An extension of the analysis would also provide further insights into the reaction of multinational firms to the Asian financial crisis and its aftermath, and could allow derivation of country-specific uncertainty indicators impacting the option value of country platforms (cf. Kouvelis et al. 2001, Pennings and Sleuwaegen, 2000).

Another avenue for future research is to analyze the impact of agglomeration economies and competition effects in more detail. A possible improvement of the analysis would be to estimate the impact of agglomeration at the level of regions rather than countries. This will allow for more accurate measurement of relevant agglomeration and labor costs at the regional level, which is of importance in

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[24] Unfortunately, the Research Institute of Electronics Industry has ceased publishing the Asian affiliate data books and replaced this with a volume focusing on affiliates in China only, complicating an extension of the current analysis.

particular for the growing number of affiliates established in the various regions of China.[25] Further insights could also be obtained by differentiation of the type of agglomerated establishments (e.g. Chung and Kalnins, 2001) with an expected diverging impact on affiliate survival. There may be differences between affiliates established by firms with the same country of origin, affiliates under other foreign ownership, and domestic firms. Agglomeration economies should dominate competition effects for affiliates further in the value chain but not for directly competing firms. In the context of the electronics industry, a first distinction could be made between component suppliers and final goods producers. These issues suggest an extensive agenda for future research.

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[25] We performed a rough test of the impact of regional location in China by including dummies for location, distinguishing the South (with Guangdong a dominant province), East (Shanghai) and North (Beijing). We found no significant impact of these location dummies, with other results left unchanged.

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Table 1: Distribution by country of overseas plants and divesture

Host countries or regions	Manufacturing affiliates in 1995		Divested affiliates: 1995 - early 1999		% divested affiliates (row%)
	Number	**Share in total %**	**Number**	**Share in total %**	
China	237	21.94%	16	16.49%	6.75%
Hong Kong	45	4.17%	7	7.22%	15.56%
Indonesia	58	5.37%	2	2.06%	3.45%
Korea	99	9.17%	14	14.43%	14.14%
Malaysia	228	21.11%	11	11.34%	4.82%
Philippines	35	3.24%	3	3.09%	8.57%
Singapore	126	11.67%	24	24.74%	19.05%
Thailand	108	10.00%	2	2.06%	1.85%
Taiwan	144	13.33%	18	18.56%	12.50%
Total	**1080**	**100%**	**97**	**100.00%**	**9.02%**

Table 2: Descriptive statistics of dependent and explanatory variables

Name	Description	Mean	Stdev	Hypo-thesis: sign
Divesture	Binary variable denoting if the affiliate is divested or not	0.09	0.29	
Asian manufacturing network size	Logarithm of the number of affiliates (+1) belonging to the parent firm in countries in Asia other than the country of the focal affiliate	1.46	1.06	H1: +
Asian low cost country presence	Logarithm of number of countries (+1) in which parent firm has manufacturing operations, but only those countries with lower labor cost than the country of the focal affiliate	0.63	0.64	
Country platform affiliate	Dummy taking the value of 1 if the focal affiliate is the only manufacturing affiliate of the firm in the country in 1995	0.55	0.50	H2: -
Japanese agglomeration at entry	Logarithm of the total number of manufacturing affiliates (+1) established in the country by all other Japanese firms in the electronics value chain at the time of the focal affiliate's entry	4.27	1.09	H3: +
Parent size * Japanese agglomeration at entry		46.96	15.10	
Keiretsu agglomeration at entry	Logarithm of the number of manufacturing affiliates (+1) established in the country by other Japanese firms within the same vertical keiretsu at the time of entry of the focal affiliate	0.41	0.75	H4: +
- for member firms	Keiretsu agglomeration at entry measure for keiretsu member firms	0.29	0.68	
- for core firms	Keiretsu agglomeration at entry measure for keiretsu core firms	0.12	0.41	
Parent firm Patent intensity	Number of US patents granted to the parent firm during 1993-1999 times 1000, divided by parent sales in 1995	0.89	1.49	
Parent competitiveness in Asia	Change in the number of other manufacturing affiliates of the parent firm operated in the nine Asian countries between 1995 and 1999	2.39	5.19	
Parent size	Logarithm of 1995 sales (million Yen) of the parent firm	11.13	2.36	
Parent prior country experience	Logarithm of the number of manufacturing affiliates (+1) established by the parent firm in the country prior to the entry of the focal affiliate.	0.38	0.57	
Affiliate size	Logarithm of the number of focal affiliate employees in 1995	5.65	1.41	
Affiliate age	The number of years the affiliate has been in operation until 1995	8.95	8.08	
Majority owned JV	Dummy taking the value 1 if the affiliate is a joint venture in which the parent holds a majority stake (51 - 95 percent)	0.25	0.43	
Minority owned JV	Dummy taking the value 1 if the affiliate is a joint venture in which the parent holds a minority or 50 percent stake	0.30	0.46	
Acquired affiliate	Dummy taking the value 1 if the affiliate was acquired by the parent firm	0.005	0.07	
Mixed market orientation	Dummy taking the value 1 if the affiliate markets its output both in the local market and in export markets	0.48	0.50	
Export orientation	Dummy variable taking the value 1 if the affiliate exports all output	0.27	0.44	
Japanese agglomeration in 1995	Logarithm of the total number of Japanese manufacturing affiliates in the broadly defined electronics sector in the country in 1995, excluding those affiliates belonging to the parent firm of the focal affiliate	5.20	0.50	
Labor cost increase	The average yearly growth in annual wages of manufacturing workers in the host country's electronics industry , 1995-1997	0.09	0.09	
Electronics Market growth	The average yearly growth in the country's electronics market between 1995 and 1998	0.08	0.37	

Table 3: Probit model of Japanese manufacturing divesture in Asia 1995-1999

	Model 1	Model 2	Model 3
Asian manufacturing network size	0.22*** (0.09)	0.18** (0.09)	
Asian low cost country presence			0.29** (0.15)
Country platform affiliate	-0.36*** (0.15)	-0.35** (0.15)	-0.36*** (0.15)
Japanese agglomeration at entry	-0.07 (0.09)	0.57** (0.29)	0.57** (0.29)
Parent size * Japanese agglomeration at entry		-0.06*** (0.02)	-0.06*** (0.02)
Keiretsu agglomeration at entry	0.19** (0.09)		
- For member firms		0.20** (0.09)	0.20** (0.09)
- For core firms		0.42* (0.28)	0.46* (0.29)
Parent firm Patent intensity	-0.06* (0.04)	-0.06* (0.04)	-0.07* (0.05)
Parent competitiveness in Asia	-0.05*** (0.02)	-0.06*** (0.02)	-0.06*** (0.02)
Parent size	-0.15*** (0.04)	0.10 (0.11)	0.13 (0.11)
Parent prior country experience	-0.07 (0.15)	-0.04 (0.15)	-0.04 (0.16)
Affiliate size	-0.14*** (0.05)	-0.13*** (0.05)	-0.13*** (0.05)
Affiliate age	0.07*** (0.03)	0.09*** (0.03)	0.08*** (0.03)
Square of affiliate age	-0.002** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Majority owned JV	-0.15 (0.16)	-0.17 (0.17)	-0.17 (0.17)
Minority owned JV	0.35*** (0.14)	0.33** (0.14)	0.32** (0.14)
Acquired affiliate	0.91* (0.65)	0.81 (0.64)	0.75 (0.62)
Mixed market orientation	0.09 (0.15)	0.10 (0.15)	0.09 (0.15)
Export orientation	0.26* (0.17)	0.27* (0.18)	0.25* (0.18)
Japanese agglomeration in 1995	-0.30** (0.18)	-0.36** (0.18)	-0.25* (0.19)
Labor cost increase	1.57** (0.84)	1.62** (0.85)	1.19* (0.88)
Electronics Market growth	0.14 (0.21)	0.22 (0.21)	0.33* (0.21)
Observations	1080	1080	1080
Chi Square	81.45***	85.85***	86.43***
Log likelihood	-282.07	-279.35	-278.80

Note: *, **, *** indicate significant at the 10, 5, 1 percent level, respectively (one-tailed test); Huber-White-Sandwich robust standard errors in parentheses.

Table 4: Probit model of relocation vs. dissolution

Variables	Model 4	Model 5
Asian manufacturing network size	0.16 (0.20)	
Asian low cost country presence		0.60** (0.27)
Country platform affiliate	0.82*** (0.34)	0.85*** (0.33)
Parent size	-0.03 (0.11)	-0.07 (0.11)
Parent firm Patent intensity	-0.008 (0.22)	-0.10 (0.24)
Parent competitiveness in Asia	0.08 (0.07)	0.11* (0.07)
Labor cost increase	1.00 (2.01)	0.52 (2.02)
Electronics market growth	-0.85** (0.45)	-0.43 (0.51)
Observations	97	97
Chi Square	10.63*	12.65**
Log likelihood	-52.19	-50.51

Note: *, **, *** indicate significant at the 10, 5, 1 percent level, respectively (one-tailed test); Huber-White-Sandwich robust standard errors in parentheses.

Appendix: Correlation matrix of explanatory variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Asian manufacturing network size	1,00																		
2	Country platform affiliate	-0,52	1,00																	
3	Jap agglomeration in 1995	-0,04	-0,16	1,00																
4	Jap agglomeration at entry	-0,26	0,08	0,41	1,00															
5	Keiretsu agglomeration at entry	0,11	-0,12	0,14	0,26	1,00														
6	Parent size	0,77	-0,49	0,01	-0,20	0,25	1,00													
7	Parent firm Patent intensity	0,29	-0,15	-0,04	-0,10	-0,06	0,38	1,00												
8	Parent prior country experience	0,47	-0,52	0,17	0,23	0,27	0,45	0,12	1,00											
9	Parent competitiveness in Asia	0,62	-0,33	0,03	-0,15	0,19	0,60	0,08	0,48	1,00										
10	Affiliate size	0,39	-0,22	-0,03	-0,37	0,00	0,42	0,18	0,10	0,19	1,00									
11	Affiliate age	0,18	0,01	-0,29	-0,72	-0,22	0,14	0,06	-0,24	0,07	0,27	1,00								
12	Square of affiliate age	0,20	0,00	-0,24	-0,71	-0,19	0,16	0,07	-0,21	0,09	0,24	0,96	1,00							
13	Majority owned JV	-0,01	-0,03	0,05	0,00	0,08	0,03	-0,05	0,03	-0,01	-0,01	-0,03	0,00	1,00						
14	Minority owned JV	0,05	-0,08	-0,01	-0,08	0,05	0,00	-0,05	0,05	0,13	-0,11	0,07	0,07	-0,38	1,00					
15	Acquired affiliate	0,01	0,01	0,02	-0,03	-0,02	0,03	0,02	0,00	0,04	0,02	0,04	0,03	-0,04	-0,04					
16	Mixed market orientation	-0,11	0,12	0,02	-0,03	-0,03	-0,16	-0,11	-0,15	-0,16	0,01	0,12	0,09	-0,03	0,01	-0,01	1,00			
17	Export orientation	0,04	-0,02	-0,09	-0,10	-0,06	0,11	0,10	0,00	0,06	0,24	-0,02	-0,03	-0,05	-0,17	-0,01	-0,58	1,00		
18	Labor cost increase	-0,04	-0,10	0,66	0,25	0,08	-0,05	-0,02	0,14	0,04	-0,06	-0,20	-0,20	-0,03	-0,10	0,00	0,00	-0,01	1,00	
19	Electronics Market growth	0,01	-0,15	0,51	0,14	0,08	0,04	0,04	0,12	0,06	-0,10	-0,32	-0,21	0,10	0,01	0,01	-0,05	-0,01	0,31	1,00