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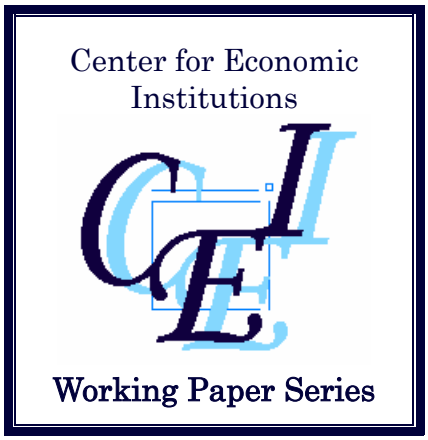

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Are Japanese Firms Failing to Catch up in Localization?
An Empirical Analysis Based on Affiliate-level Data of Japanese Firms and a Case Study of the Automobile Industry in China*

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Abstract

This paper analyzes the degree and the current status of localization of Japanese affiliates in China. For this purpose, we (1) compare the localization (measured in terms of the number of expatriates, local sales, local procurement, and local management) of Japanese and U.S. affiliates in China and other major regions; (2) analyze the impact of localization on the profitability of Japanese affiliates in China and in other major regions; and (3) conduct a detailed investigation of inter-firm transactional relationships in China between automobile manufacturers and parts suppliers. We find that compared with U.S. affiliates, Japanese affiliates tend to be less localized. Using a comprehensive affiliate-level panel data set on Japanese multinationals and concentrating on China, we then examine the effect of localization quantitatively and find that Japanese affiliates with higher procurement ratios and/or local CEOs and procurement managers enjoyed high profits. Next, turning to the factors determining trading relationships between assemblers and suppliers of different nationalities in China, our analysis suggests that even when taking various control variables into account, such as suppliers' productivity level and the distance between assembler and supplier, the transactional relationships of Japanese suppliers are more limited than those of suppliers of other nationalities. Moreover, Japanese automobile assemblers do not choose suppliers based on their current labor productivity level and transactional relationships between assemblers and suppliers are more closed in the case of Japanese firms than in the case of firms of other nationalities. On the other hand, we find that auto parts suppliers dealing with Japanese assemblers see their productivity grow faster regardless of the supplier's nationality. The results indicate that Japanese assemblers may well be choosing business partners which they expect to realize sustainable productivity increases in the future rather than focusing on present productivity levels. This finding provides evidence of business practices based on a long-term perspective characteristic of Japanese enterprises.

1. Introduction

Most Japanese multinationals are relative newcomers in the global arena when compared with their European and U.S. counterparts, some of which started to engage in foreign direct investment (FDI) before World War II. Until the end of the 1960s, Japan's outward FDI was very small and concentrated in two areas, commerce and natural-resource-related industries.[1] Japan's outward FDI stock in the manufacturing industry at that time was negligible.[2]

Probably reflecting their shorter experience in operating internationally, Japanese affiliates – even those in the machinery industry, where Japanese firms tend to be most competitive – were less profitable than U.S. affiliates until the second half of the 1990s (see Table 1). A similar fact is reported by Ramstetter (1999), who uses the statistics of a single host country, Singapore. Comparing various characteristics of the Singaporean plants of firms from the U.S., Europe, Japan, and other Asian countries, he found that, during the period 1980-1996, the average profit-to-sales ratio of manufacturing plants was significantly higher for U.S.- and European-owned ones than for Japanese-owned ones.

INSERT Table 1

Although the gap between the average profit rate of Japanese manufacturing affiliates and U.S. affiliates has been diminishing since the second half of the 1990s (Table 1), Japanese multinationals may still have something to learn from U.S. and European multinationals.

Many earlier studies have found that one of the most important characteristics of Japanese affiliates is that they are less localized than affiliates from other countries. Such studies suggest that Japanese firms exercise tight control over their overseas affiliates (Mason and Encarnation 1994) and are slow to promote local staff to managerial positions (Westney 1996; Belderbos 1997). Ramstetter (1994), focusing on the Thai manufacturing sector in 1990, also shows that in all industries except the motor vehicle and the precision machinery industry, the share of expatriate workers in skilled employment was much higher for Japanese affiliates than for affiliates from other developed industries. For example, in non-oil manufacturing industries, the share of expatriate workers in skilled employment was 5.77% for Japanese affiliates but only 2.67% for affiliates from other developed economies. Table 2 shows that in almost all regions and countries, the share of expatriates in the total number of employees is much higher for Japanese than for U.S. affiliates.

[1] Until the end of the 1960s, Japan suffered a chronic current account deficit and strictly regulated outward investment, including FDI. Each case of outward FDI was screened by the Ministry of Finance and the Ministry of International Trade and Industry. To promote processing trade, the Japanese government permitted outward FDI in commerce and natural resource-related industries. For more details on the history of Japan's outward FDI, see Komiya (1988).

[2] Japanese manufacturing firms actively engaged in FDI before World War II, mainly in Japan's colonies and in China.

INSERT Table 2

Japanese firms also tend to have lower local procurement ratios. Graham and Krugman (1990), Froot (1991), and Murray, Wildt, and Kotabe (1995), for example, found that Japanese affiliates in the U.S. rely more on imported components from their parent firms than affiliates from other countries. Similarly, Maruya (2000) reports that the local procurement ratios of Taiwanese affiliates in China in the electronics industries are around 70-80%, which is much higher than that of Japanese affiliates (approximately 40%).

Japanese firms are, moreover, less local market-oriented than affiliates from other countries. In case studies on Japanese, European and U.S. affiliates in the electrical machinery and electronics industry in Malaysia, Kasuga et al. (2004) found that Japanese affiliates were more exported-oriented than their Western counterparts. One result of this is that, as the Malaysian economy has developed and wage rates have increased, many Japanese firms have retreated from Malaysia. As Table 3 shows, this pattern is widespread: Japanese affiliates tend to have lower local sales ratios than U.S. affiliates. Especially in China, the Japanese affiliates show much lower local sales ratios, except in the transportation equipment industry.

INSERT Table 3

These findings, i.e., that Japanese affiliates are less localized, do not necessarily mean that Japanese affiliates could improve their performance through greater localization. For Japanese affiliates in Asia, whose competitiveness springs from the superior quality of their products, a rapid increase in procurements from local low-tech suppliers would potentially jeopardize the quality of their products and reduce their competitiveness. And the promotion of too many local employees to administrative positions could harm affiliates' close ties with their parent firm and parent firms' global production networks.

The purpose of this paper is to examine what the potential effects of localization are and whether Japanese firms are falling behind in localizing their affiliates abroad. The benefits from localization may depend on the economic conditions in the host country, the industry, and multinationals' characteristics. In the following section, we examine this issue by estimating the profit functions of Japanese affiliates abroad. One of the most interesting findings from our regression analysis is that the profit rate of Japanese affiliates in large and low-wage countries, such as China, is an increasing function of the local procurement ratio. This result is consistent with the fact that in low-wage countries, affiliates can substantially reduce production costs by increasing local procurement. In addition, if the host country is large, it is easier for affiliates to find appropriate

suppliers.

In order to confirm our above regression result on the effects of local procurement on affiliates' performance, we conducted interviews with Japanese affiliates in the automobile industry in Guangdong Province, China. We summarize our interview results in Section 3. Most Japanese affiliates we interviewed answered that the expansion of local procurement plays a key role in reducing production costs. However, we also found that it is very difficult for Japanese affiliates to increase procurements from local firms while at the same time maintaining output quality and smoothly introducing new models.

Another finding from these interviews is that for Japanese affiliates in China, procurements from other Japanese affiliates, which are costly but reliable in quality, and procurements from local suppliers, which are much cheaper but quality is highly uncertain, are two completely different matters. Procurements from other Japanese affiliates are costly because the affiliates import a large part of their intermediate inputs and capital goods from Japan. This finding implies that preceding empirical studies on multinationals' procurement behavior are problematic because they usually do not distinguish between procurements from local suppliers and other types of procurement.[3] This raises the question whether Japanese affiliates procure less from local firms than U.S. or European affiliates.

We examine this question in Section 4 using firm level data of automobile assemblers and parts suppliers in China. In most developing countries and most industries, it is usually very difficult to obtain detailed information on supplier-customer relationships. One important exception is the automobile industry, where parts supplier directories usually report each supplier's customers. An additional reason for focusing on the automobile industry is that automobile assemblers procure many costly-to-transport parts and it is very important for assemblers to find good suppliers in the vicinity of their factories. Section 5 summarizes our results.

2. Does Localization Determine the Profitability of the Chinese Affiliates of Japanese Firms?

In this section, we consider the role of the localization of procurements, sales, and management in determining the profitability of Japanese MNEs' foreign affiliates. We do so by referring to the empirical results of Ito and Fukao (2006), who, using a comprehensive affiliate-level

[3] A small number of empirical studies do make this distinction. Kreinin (1992), for example, found that Japanese affiliates in Australia rarely use open tenders for machinery procurements but (in contrast with European and U.S. affiliates) routinely buy from long-standing suppliers at home. Based on data on Japanese subsidiaries in the Malaysian electronics industry, Capannelli (1993) found that an overwhelming share of Japanese firms' local components purchases are from Japanese-owned suppliers, including those within the same corporate group or vertical 'keiretsu.' However, these studies are based on relatively small samples. There are also several case studies that distinguish these types of procurement (Hiramoto 1992, Guyton 1995, and Paprzycki 2005).

data set for the period from 1989 to 2002 collected by the Ministry of Economy, Trade and Industry (METI), conducted several regression analyses for the five major regions ― China, the USA, the EU15, the NIEs4, and the ASEAN4 ― and examined what key factors determine the profitability of foreign affiliates of Japanese MNEs. The results of that study suggest that local procurement and local sales can play a very important role in improving profitability in China, although the impact of localization on profitability differs across the five regions. In the remainder of this section, let us describe the results in more detail.[4]

Ito and Fukao (2006) conduct a regression analysis to investigate the major determinants of the profitability of Japanese MNEs' foreign affiliates, estimating the following profit equation:

$$\Pi_{it} = \beta_0 + Z'_{it}\beta_1 + \gamma_j + \lambda_k + \omega_t + \varepsilon_{it} \qquad (1)$$

where Π_{it} is the measure of profitability for affiliate *i* in year *t*, β_0 is the intercept, Z_{it} is a vector of affiliate-level control variables likely to influence affiliate performance, γ_j is the industry-specific fixed effect for industry *j* in which affiliate *i* operates, λ_k is the country-specific fixed effect for host country *k* where affiliate *i* operates, ω_t is the year-specific effect for year *t*, and ε_{it} is the error term. Various measures of profitability (the dependent variable) are employed, but the study mainly uses return on sales (ROS), which is defined as the ordinary profit over sales.[5] Ito and Fukao (2006) hypothesize that the following characteristics of affiliates may contribute to their profitability and include them as affiliate-level control variables:

(1) *The level of local procurements and local sales*: Higher local procurements and sales may help to improve foreign affiliates' profitability if they successfully develop local supplier and distribution networks. This is because local linkages, as stressed by Belderbos et al. (2001: 190), "are associated with frequent information flows, which allow for quality improvements, reduced delivery times, and fast upgrading of designs in response to changing demand conditions for final products." However, a greater local procurement ratio may not always have a positive impact on profitability when more efficient suppliers can be easily found in neighboring countries and imports from these countries are cheaper. As for the local sales ratio, a greater penetration of the local market should result in higher profits

[4] The analysis in Ito and Fukao (2006) is based on the affiliate-level data underlying the *Basic Survey on Overseas Business Activities* conducted annually by METI (METI, various years).

[5] One may argue that the return on sales is not an appropriate measure for profitability because particularly for processing and assembly-type industries, value added is relatively small compared with the total sales amount. However, information on affiliates' total assets to calculate profitability in terms of the return on assets is available only in the comprehensive survey conducted every three years, which results in a much smaller sample for the regression analysis. Because of the smaller number of observations on the return on assets (ROA), Ito and Fukao (2006) mainly employ the ROS as the dependent variable, using the ROA, defined as the ordinary profit over total assets, for supplementary estimations. The results they obtain when using ROA as the dependent variable are similar to those using ROS.

when Japanese MNEs have competitive advantages over local firms. However, in vertical FDI-type foreign affiliates which are intended as low-cost production and export bases to third countries, a lower local sales ratio may result in higher profits.

(2) *The Japanese ownership ratio*: It may be hypothesized that profitability is positively associated with the Japanese ownership ratio when the firm's competitive advantage rests on knowledge-based intangible assets. As a greater equity ownership enables parent firms to maintain a higher degree of control over affiliates, affiliates for which knowledge-based intangible assets are important may be able to achieve better performance by protecting their intangible assets from leaking out to other firms in the host country. On the other hand, particularly in developing countries, joint-ventures with local firms sometimes enjoy advantages in negotiations with local government and other local clients. In such cases, a higher Japanese ownership ratio may not be always associated with higher profits.

(3) *The assignment of locals to positions of responsibility*: If locals can be found in many positions of responsibility, this may be an indication that intra-firm technology transfers from the parent firm to the affiliate have been successfully achieved. In this case, more local managers at foreign affiliates may be associated with better performance.[6]

(4) *The size and length of operation of the foreign affiliate*: Profitability is expected to be positively correlated with the size and length of operation of a foreign affiliate, because larger affiliates are likely to have stronger market power and be more efficient, while affiliates with longer experience in a host country usually have better location-specific skills and know-how than new foreign entrants. The variables used for the regression analysis are summarized in Table 4.[7]

INSERT Table 4

The OLS regression results of the basic estimation equation are shown in Table 5. Columns (1) to (5) show the results of pooled OLS regressions without parent firm dummy variables, while columns (6) to (10) show the results of pooled OLS regressions including parent firm dummy variables which control for parent firm-specific factors. The results in Table 5 suggest that in many cases, the size and experience of affiliates (LnSALE and AGE), as expected, have a significant positive effect on profitability, while the Japanese ownership ratio (J_OWN) has a negative effect in all cases (the negative effect is significant in many equations).[8] The coefficients on the other

[6] Urata et al. (2006) have analyzed the determinants of the assignment of local staff to positions of responsibility based on this assumption.

[7] For a more detailed explanation of the hypotheses on the determinants of affiliates' profitability, refer to Sakakibara and Yamawaki (2004) and Ito and Fukao (2006).

[8] When the squared value of the Japanese ownership ratio (J_OWN) is added as an explanatory

explanatory variables, however, vary across regions. As for the effect of localization on profitability, the results show some conspicuous differences between China and the other regions: (1) For affiliates in China, profitability is positively associated with the local procurement ratio (L_PRC) and negatively associated with the local sales ratio (L_SALE), whereas the opposite tends to be the case for affiliates in the other regions; (2) the localization of management, i.e., making a local the CEO (L_CEO), has a significant positive impact on profitability for affiliates in China but no significant effect for affiliates in other regions; (3) having a local as procurement manager (L_PRC_MNG) also has a significant positive impact on profitability for affiliates in China.[9] Even when parent firm-specific factors are controlled for (columns (6) to (10) in Table 5), the sign of the coefficients in the regression for China does not change.

INSERT Table 5

The results shown in Table 5 indicate that the impact of localization on the profitability of affiliates differs across regions, which in turn suggests that the impact of localization may be associated with wage levels, local market size, and host countries' local production capacity and purchasing power. In addition, in the case of China, before the country's accession to the World Trade Organization (WTO), foreign-owned firms had to contend with a variety of wholesale and retail regulations that may have prevented Japanese affiliates from earning higher profits from local sales in China. Ito and Fukao (2006) therefore also examine how the economic conditions of a host country affect foreign affiliates' profitability and whether China's accession to the WTO had a positive impact on profitability. Table 6 shows the estimation results of equations which include a WTO-accession dummy and various sets of interaction terms with the WTO-accession dummy.[10] Column (1) shows that the interaction term of the local sales ratio and the WTO dummy has a significantly positive coefficient while the interaction term of the local procurement ratio and the WTO dummy does not have a statistically significant coefficient. As the overall effect of the local sales ratio on profitability (the sum of the coefficient on L_SALE and the coefficient on

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variable, the estimated coefficient on J_OWN squared is negative, while the estimated coefficient on J_OWN is positive in most cases. Using the estimated values, the Japanese ownership ratio at which profitability in China, for example, is highest is approximately 56%.

[9] A possible explanation of this result was pointed out by Hideshi Itoh, who suggested that a higher Japanese ownership ratio may mean stronger intervention by parent firms and this stronger intervention may negatively affect affiliates' incentives to increase their own profits. In such a case, by assigning a local as CEO and lowering the Japanese ownership ratio, parent firms may be able to convince the affiliate that the parent will not intervene in the affiliate's operation. As a result, the affiliate's profitability may improve.

[10] As for China, the WTO accession dummy takes 1 for years after China's accession to the WTO, i.e., for 2001 and 2002. Although the WTO was established in 1995, the WTO dummy takes 1 for years before 1995 for the original WTO member countries.

L_SALE*WTO) is positive, the local sales ratio contributes to higher profitability in China after the accession to the WTO. Specifications (2) and (3) in Table 6 include the logarithm of GDP as a proxy for local market size (or the size of local production capacity) and the logarithm of GDP per capita as a proxy for local purchasing power (or wage levels). According to the results for these specifications (2) and (3), profitability is negatively associated with the local procurement ratio but positively associated with the local sales ratio. Looking at the interaction terms of the localization variables and GDP or GDP per capita, a higher per capita GDP has a negative impact on profitability for affiliates with a higher local procurement ratio and has a positive impact for affiliates with a higher local sales ratio. The results are the exact opposite for the GDP level. The sign of the estimated coefficients suggests that local procurement may lower profitability in countries with a higher per capita GDP, probably because a higher per capita GDP is associated with higher wage levels and higher production costs. However, per capita GDP also determines the purchasing power of a country and may therefore contribute to the profitability of local sales-oriented affiliates. As for GDP, the results may suggest that a higher GDP, when interpreted as a proxy for a country's production capacity, will improve the profitability of local procurement, probably because foreign affiliates can easily find efficient suppliers in the host country. On the other hand, GDP, interpreted as a proxy for a country's market size, will not improve the profitability of local sales, maybe because there are more competitors in the market and fierce competition lowers firms' profitability.

INSERT Table 6

The above empirical results have important implications for the Chinese affiliates of Japanese MNEs. As China has a better industrial infrastructure and an abundant labor force when compared with other developing countries, promoting local procurements will contribute to higher profitability of affiliates in China. Moreover, local sales expansion is becoming an important strategic element to improve profitability in China as income levels increase and regulations in favor of local firms, particularly in the wholesale and retail sector, have been relaxed under the WTO scheme. Based on the findings of Ito and Fukao (2006), we suggest that localization of both procurement and sales is an important determinant of profitability in China and that the Chinese affiliates of Japanese MNEs should become more aggressive in penetrating China's local market and industries.

3. Multinationals' Local Procurement Practices in China

3.1 Local Procurement Practices of Japanese Manufacturing Firms

The results of the empirical analysis based on affiliate-level data on Japanese MNEs presented in the previous section suggest that the localization of procurements and sales in China is of crucial

importance. In this section, we therefore look more closely at the local procurement and local sales of the Chinese affiliates of Japanese MNEs.

According to a questionnaire survey conducted by the Japan Industrial Policy Research Institute (JIPRI) in 2006, the overseas subsidiaries of Japanese manufacturing firms imported only 41 percent of their total purchases from Japan, while local procurements accounted for 53 percent. A breakdown of local supplies reveals that nearly half of local purchases were from the subsidiaries or affiliates of Japanese firms operating in the same country. Transactions with genuinely indigenous firms and the local subsidiaries of foreign firms from other countries accounted for only a quarter of total purchases. Although at first glance the local content ratio appears to have increased, it should be noted that this is due to the high dependence on Japanese firms since, broadly-defined, transactions with Japanese firms (imports from Japan plus transactions with Japanese firms operating in host countries) accounted for 65 percent of the total.

This very trend is also observable in China, where many Japanese firms are operating. Maruya (2000) shows that in 1998, 52 percent of local parts manufacturer supplying Japanese firms in the Huanan region (Guangdong Province) were other Japanese firms operating in China. In fact, purchases from indigenous Chinese firms accounted for less than 20 percent of local procurement.

Next, let us look at the business performance and the localization of procurement and sales by Japanese affiliates in the automobile industry. Table 7 provides summary statistics of various measures of localization based on the affiliate-level data underlying METI's annual survey.[11] The figures indicate that the average local content ratio of assemblers in China rose from 42 percent in 1996 to 91 percent in 2002. This figure is much higher than that for the ASEAN countries, which stood at 45 percent in 2002. This discrepancy is thought to be due to the fact that it is relatively easy to purchase domestically in China because of the size of the country's economy. In contrast, the average local contents ratio of suppliers in 2002 stood at only approximately 50 percent, the same as in the ASEAN countries.[12] This suggests that while assemblers operating in China are actively purchasing from Japanese suppliers, boosting the apparent local content ratio, suppliers' purchases from indigenous Chinese firms have not made much progress.

INSERT Table 7

3.2 Case Studies of Automotive Companies Operating in China

The authors visited Japanese automotive firms in the Huanan region (Guangdong Province) of

[11] Keiko Ito participated in a project on the internationalization of Japanese business undertaken at the Research Institute of Economy, Trade and Industry (RIETI) in fiscal 2005 and was able to gain access to the affiliate-level data underlying METI's *Basic Survey on Overseas Business Activities*. The figures in Table 7 were calculated by Ito using the affiliate-level data.

[12] Affiliates of non-assemblers in Table 7 are regarded as suppliers.

China in March 2006 in order to study the status of local procurements.[13] The case studies confirm the following two commonly observed facts: (1) Local procurement is important for reducing costs; however, (2) it is difficult to increase purchases from independent indigenous firms if a firm wishes to maintain and/or improve product quality.

3.2.1 Case Study I: The Procurement Strategy of an Assembler

As stated in section 3.1, the local content ratio of Japanese assemblers is high, but the proportion of purchases from independent, indigenous Chinese firms is extremely small. In the case of Guangzhou Honda Automobile Co., Ltd. (Guangzhou City), out of total purchases from primary suppliers, those from Japanese suppliers account for 90 percent in value-terms. The firm states that it wishes to do business with genuinely Chinese suppliers but it finds it difficult to do so because such suppliers are unable to keep pace with the development and production of new car models. Suppliers should be able to cope with design changes required for new car models (e.g., they should have the capacity to make metal molds quickly).

The firm picks suppliers on the basis of their product quality, and geographical distance from a supplier is not much of a concern. Even for heavy materials, such as steel plates, Chinese-made products still present problems with respect to their strength and anti-corrosiveness. Although the firm has purchased from indigenous firms on a trial basis, such as roofing material from China's largest steel-maker, Baoshan Iron and Steel (Group) Corporation, it basically still depends on imports from Japan.

The basic policy of Guangzhou Honda Automobile pertaining to suppliers is to forge long-term business relationships, but this does not mean that it guarantees future business. In all cases, the company requires suppliers to win business in a competitive environment.[14]

3.2.2 Case Study II: The Procurement Strategy of a Parts Maker

An important consideration for primary suppliers is how to raise the local content ratio by purchasing from secondary or lower-level suppliers because this is central to lowering costs. For example, Guangzhou TS Automotive Interior Systems Co., Ltd. (Guangzhou City), which assembles automobile seats, purchases all the urethane foam it uses for seat cushions. It also outsources 55 percent of the sewing of cushion covering and 20 percent of welding work for seat frames. Out of its

[13] The authors carried out interviews with the Chinese affiliates of Japanese auto industry in cooperation with Professor Yanyun Zhao of Renmin University, China, and Mr. Liang Jian of the South China University of Technology.

[14] Among the primary parts suppliers for Guangzhou Honda Automobile, there are at present a few Chinese firms. One example is Guangzhou Xin Zhong Plastic Co., Ltd., a plastics molding company, which the authors visited. However, since this company employs an expert in metal molds who is a former employee of Honda Motor Co., Ltd., this can be considered a special case in which technology transfer has taken place.

81 parts suppliers, 36 are Japanese and 45 are Chinese. In value, local purchases account for 90 percent of its total purchases, with independent Chinese firms accounting for 54 percent of the local purchases.

According to an official at the plant, the firm wishes to raise the share of local supplies, which are less costly, but the quality inspection of Honda, its customer, is extremely rigorous. In order to purchase locally, Guangzhou Honda sends parts and materials to Honda Motor in Japan for inspection, and Honda Motor not only examines them but also tests them in use in its vehicles. Local procurement is authorized only after a product passes these tests. Consequently, there is a high wall to be scaled before the local procurement of secondary parts can proceed.

3.2.3 Case Study III: The Supply Strategy of a Materials Maker

Some Japanese parts and materials makers regard this emphasis on product quality on the part of Japanese assemblers as an excellent business opportunity. For example, Toray Plastics (SZ) Limited (Shenzhen City), an engineering plastics maker, hopes to supply engineering plastics for connectors in dashboards and bonnets. Procedures call for the primary parts maker (Toray Plastics' customer) to inspect Toray Plastics' plants and equipment even after the assembler decides to choose Toray Plastics' products for a specific car model. Because quality reliability from the viewpoint of the customer is given top priority under this system, Toray Plastics is not able to change plants or equipment at its own discretion. Toray Plastics (SZ) Limited reckons that the capacity to cope with the rigorous standards and specifications of assemblers is an element which local materials makers do not possess.

3.2.4 Case Study IV: The Balance between Price and Quality

At present, production costs for Honda's compact car "Fit," which Guangzhou Honda manufactures for export to Europe, are the same in China as in Japan. Guangzhou Honda is aiming to lower local production costs to about 90 percent of the Japanese level within the next few years. To attain this goal, greater localization of secondary suppliers is very important. Unless the firm pushes further ahead to achieve greater genuine local procurements, it will not be able to reduce costs while maintain or improving quality. The key challenge is how to strike a balance between maintaining quality and achieving cost reductions. In the face of criticism that Japanese firms' excessive concern with quality is increasing their costs, Guangzhou Honda states that the emphasis on quality is as it should be, and that it is confident that the firm will earn an excellent reputation for itself by focusing on performance and building vehicles that will not break down even after logging many miles under tough Chinese road conditions.

Striking a balance between product quality and costs is a problem that also besets Guangqi Toyota Engine Co., Ltd., which builds engines. At present, the company's production costs for

engines are the same as those in Japan. Hence, if it wishes to export to Japan, it must reduce its costs to at least offset exporting costs, a fact which makes it necessary to raise the local content ratio of parts. The current local content ratio is high at 86 percent in value, but in terms of the number of parts, local purchases account for only 20-30 percent. The company depends on imports from Japan for most of its parts. Guangqi Toyota Engine plans to reduce costs by purchasing parts made in China, but it has no intention of compromising on quality. The firm believes that pursuing the best quality eliminates waste and losses in production, and thus reduces total costs. Therefore, it will not reduce the level of quality, even if this would make it possible to increase local content.

4. Empirical Analysis of Factors Determining Local Procurements in the Chinese Auto Industry

The analysis so far has suggested that Japanese manufacturing enterprises operating in China could improve their profitability by increasing their reliance on local procurements. At the same time, however, it has frequently been remarked that, generally speaking, Japanese assemblers prefer to do business with Japanese suppliers and tend to be reluctant to expand local procurements. The descriptive analysis in the previous section has shown that this pattern can also be observed in the Chinese automotive industry. Here, we will expand the scope of the analysis and include U.S. and European enterprises in order to identify factors which determine trading relationships between joint venture assemblers and parts suppliers of different nationalities in China.

Specifically, the key point of the analysis is to determine to what extent business relationships are affected if auto assembler and supplier are of different nationalities. Some argue that the close relationship between Japanese enterprises is based on the technological capabilities of Japanese suppliers and that Japanese assemblers' decisions are made on rational grounds. This view holds that Japanese enterprises are not engaged in "closed" practices, in which they select suppliers simply because they are of the same nationality.

In the analysis which follows, various variables relating to suppliers, such as their productivity (which may be considered a proxy for technical capabilities), scale of business, geographic distance from auto assemblers, and number of years of operation in China are controlled.

Many studies have been conducted on the supplier system (i.e., the relationship between assemblers and suppliers) in the Japanese automotive industry. One of the aims of these studies has been to identify the sources of the strong international competitiveness of Japanese enterprises and many of these studies have therefore been made from the viewpoint of international comparison (e.g., Fujimoto, Nishiguchi and Itoh, 1998). However, as Marukawa (2006) pointed out, (1) there have been very few analyses of the automotive industry in China, and (2) little attention has been paid to the *spatial dimension* of core company-supplier relations. The latter refers to the impact of

geographic distance between an assembler and a supplier on their business relationship. Marukawa's model takes two conflicting factors into account: While clustering (suppliers and assemblers locate in close proximity) reduces transaction costs arising from geographic distance, it also reduces sales per supplier due to the opportunity costs which make it impossible to take advantage of economies of scale (i.e., building relatively large plants apart from a specific assembler and deal with a wide range of assemblers).

We will attempt to remedy the two above-mentioned shortcomings of earlier studies. Based on Marukawa (2003) and Marukawa (2006), our analysis pursues the following strategy: (1) It explicitly incorporates the technological capabilities (productivity) of suppliers as an explanatory variable to ascertain if Japanese enterprises give priority to trading with their compatriots even after taking productivity into account; and (2) it focuses on a dynamic relationship in that it examines the effect of differences in the nationalities of assemblers and suppliers on the subsequent performance (change in productivity) of the latter.

4.1 Factor Analysis of the Supplier System

4.1.1 Data

The data used for this analysis were obtained from the "China Automotive Industry Yearbook 2004" and the "China Auto Parts Supplier Directory 2004." The former provides such data as (i) the amount of output, (ii) the amount of value added, (iii) the number of employees, and (iv) the amount of sales, on approximately 1,900 auto parts suppliers in China. The latter contains information such as (i) the nationality of the capital, (ii) a product outline and (iii) customers, on approximately 1,100 suppliers. A set of data was compiled by selecting enterprises on which data were available from both of these sources. The number of observations for transactional relationships is 9,688, which were obtained by multiplying 346 joint venture and Chinese suppliers and 28 joint venture assemblers and excluding transaction relationships for which some data were missing (Table 8). The information was used to construct the following variables for the estimation: (1) for the dependent variable, a binary choice variable indicating whether there was a transactional relationship between an assembler and a supplier (taking 1 when there is a supply of parts and 0 when there is not); (2) variables for the nationality of assemblers and suppliers;[15] (3) suppliers' labor productivity (representing the technological level); (4) suppliers' amount of capital (representing economies of scale); (5) the location of a parts maker (to examine the agglomeration effect; 1 when located in a major car producing area, i.e., Shanghai, Hubei, Tianjin, Jiangsu, or Jilin; 0 when located in another area); (6) distance between an assembler and a supplier (representing transaction costs); (7) number of years since assembler's operation started (experience effect).

[15] In the case of non-Chinese, nationality refers to the origin the of capital employed to establish a joint venture with a Chinese counterpart

INSERT Table 8

4.1.2 Major results

Before presenting the results of the probit estimation, we briefly examine the data pertaining to the relationship between the number of transactions and supplier productivity, the distance between assembler and supplier, and the nationalities of assembler and supplier.

First, we compared suppliers which have transactions with an assembler and those which do not, in order to see if there was a significant difference between these two groups in productivity or distance to an assembler (Table 9). Although there was no difference in productivity between these two groups, with respect to distance, it appears that assemblers from Japan, Germany and the United States all purchased from suppliers that were located relatively close to them.

INSERT Table 9

Next, we were interested in the average number of suppliers that Japanese, German, and U.S. auto assembler did business with and divided these suppliers into those with relatively high and relatively low productivity (Table 10). Overall, the comparison of the procurement behavior of Japanese, American, and German assemblers revealed the following patterns: (1) The number of transactions of Japanese assemblers' with indigenous Chinese suppliers was small. (2) With respect to transactions with same-country suppliers, the Japanese assemblers stood out somewhat in their practice of purchasing from low-productivity parts makers. In relation to the latter finding, the indicator of relationship with same-country suppliers was obtained by dividing the average number of transactions with low-productivity suppliers by the average number of transactions with high-productivity suppliers. This ratio was 9 (=1.8/0.2) for Japanese assemblers, 4.8 (=4.8/1) for German assemblers and 4.7 (=2.8/0.6) for U.S. assemblers.

INSERT Table 10

Finally, we looked at the number of assemblers that each supplier did business with, distinguishing also between customers of the same and of a different nationality. The results, displayed in Table 11, suggest that Japanese suppliers tend to supply only a small number of assemblers and these tend to be predominantly Japanese. Table 11 also shows the average productivity of Japanese, German, U.S., and Chinese suppliers. As can be seen, the average productivity of Chinese suppliers makers is by far the lowest. The average productivity of Japanese suppliers is lower than that of German firms, but is comparable to that of U.S. firms.

INSERT Table 11

Using the above-mentioned cross section data, we estimate a probit model designed to elicit the factors determining transactional relationships between assemblers and suppliers. The key point is to determine to what extent differences in nationalities between assemblers and suppliers affect business relationships. We therefore prepared five nationality dummy variables: (1) a dummy taking 1 when both the assembler and the supplier are Japanese (same nationality, Japanese; SN_J); (2) a dummy taking 1 if both the assembler and the supplier are of the same non-Japanese nationality (SN_NJ); (3) a dummy taking 1 if the assembler is Japanese and the supplier is non-Japanese and also non-Chinese (JNJ); (4) a dummy taking 1 if the assembler is non-Japanese and the supplier is not Japanese but also not Chinese (NJNJ); 5) a dummy taking 1 if the assembler is Japanese and the supplier is Chinese (JC). The coefficient on each dummy can be interpreted as the effect of each type of relationship relative to the omitted case, which is transactional relationships between non-Japanese assemblers and Chinese suppliers.

Table 12 presents the results of the estimation. Columns (1), (2), and (3) are the results using 9,688 observations[16] as mentioned above and (4) is the result for the specification taking the simultaneity bias into account. Specifications (1)-(3) assume that the level of productivity affects the probability of a transactional relationship. It is, however, possible that the causality is in the opposite direction (a transactional relationship with assemblers enables suppliers to enjoy high productivity) in the cross-sectional data for 2004.

INSERT Table 12, Table 13

Because only statistical data for 2002 and 2004 were available this time, transaction records for 2002 and 2004 were compared in order to choose observations which initiated transactions between 2002 and 2004 and to make the same estimation as (1)-(3) with independent variables in 2002.[17] The major conclusions are as follows.

1) Even when various variables, including productivity, are controlled for, it is found that Japanese suppliers' transactional relationships are more restricted than those of other suppliers (as indicated by the coefficient on the dummies JNJ, NJNJ, and JC) , which is a reflection of their weak ties with assemblers of other nationalities. Note, however, that the extent of the

[16] Descriptive statistics (means and standard deviations) for the 9,688 observations are shown in Table 13.

[17] The number of observations on transactional relationships in 2002 is 5,124. Even in this case, companies could have initiated transactions in 2003 or 2004, and hence the duration of their transactions could be different.

contribution to the transaction probabilities same nationality condition has is almost the same between Japanese and non-Japanese cases (SN_J, SN_NJ).[18]

2) With respect to non-Japanese assemblers, high-productivity suppliers are engaged in significantly more transactional relationships. By contrast, the same was not found for Japanese assemblers (productivity and its cross effects with nationality dummies for Japan, Germany and USA).
3) Generally speaking, joint venture assemblers are more likely to deal with suppliers that are also joint ventures than with local Chinese suppliers.
4) The distance between assemblers and suppliers is assumed to have a nonlinear effect on the transaction probability and the squared distance term is also included. When the magnitude of the impact of distance on assemblers' procurement behavior is viewed in terms of the marginal effect (elasticity), the value is -3.5 percent, confirming the negative impact of distance.[19]
5) We did not find any significant effects of the amount of suppliers' capital used as a measure of scale economies on transactions. These results are in line with results obtained by Marukawa (2003), who used the amount of assets, the number of employees, etc., although he used these to proxy suppliers' technological capabilities.
6) The results for the dummies relating to suppliers' location (agglomeration effect) show that the coefficients for Hubei and Tianjin were significantly negative. These results are the same as those obtained by Marukawa (2003). Marukawa's interpretation of the negative coefficients was that in comparison with Shanghai, where the quality requirements of foreign firms are rigorous, transactions in other regions were primarily with Chinese assemblers and product quality was lower.
7) The results of specification (4) are the same as those of (1), (2) and (3), in that the transactional relationships of Japanese suppliers' are more limited than those of other suppliers (JNJ, JC).

4.2 Analysis of the Impact of Business Relationship on Productivity

In the preceding section, we examined whether suppliers' level of productivity influences the existence or non-existence of business relationships with assemblers. In this section, we examine the reverse relationship, that is, whether business relationships with JV assemblers subsequently improve suppliers' productivity (i.e., whether technology transfer takes place). If the concentration of business relationships between Japanese assemblers and suppliers reflects Japanese business practices, there remains the question of how to interpret the result of the analysis above, namely that suppliers' productivity level does not positively affect whether or not there will be a business

[18] The null hypothesis that the coefficient on SN_J and SN_NJ are the same cannot be rejected using the Wald test.
[19] In contrast with productivity, the cross effects of distance and nationality are not included since there are no significant influences.

relationship with a Japanese assembler.

In the Japanese automotive industry, suppliers enter into long-term business relationships with assemblers and are expected to actively participate in product development rather than merely act as subcontractors. In this sense, parts makers may be expected to have a latent potential for long-term improvements of their technological level rather than a high level of technology at the beginning. In order to test this hypothesis, albeit indirectly, we examine whether a business relationship with a Japanese assembler subsequently improves a supplier's productivity.

4.2.1 Data and methodology of estimation

As in the preceding analysis, data from the 2002 and 2004 editions of the "China Automotive Industry Yearbook" and the "China Auto Parts Supplier Directory" are used. This analysis covers 183 parts makers, for which data were available for both 2002 and 2004. The regression is conducted using OLS. The dependent variable is suppliers' productivity growth rate (2004/2002) and the independent variables are: (1) suppliers' productivity level in 2002 (convergence effect, the predicted sign is negative); (2) the growth rate of suppliers' capital-labor ratio; (3) dummies for the nationality of assemblers which suppliers deal with (Japan, Germany, U.S.A); (4) a same-nationality dummy (a dummy variable that takes 1 if the supplier sells parts to an assembler of the same nationality, and 0 otherwise); (5) suppliers' location (agglomeration effect; 1 when the supplier is located in Shanghai, Hubei, Tianjin, Jiangsu, or Jilin, and 0 otherwise). As for the two kinds of nationality dummies, if, in addition to the Japanese-nationality dummy for assemblers, the coefficient on the same-nationality (Japanese) dummy were significantly positive, this would mean that spillover effects are greater if a supplier is Japanese than if it were not. By contrast, if the Japanese-nationality dummy of an assembler is significantly positive but the same-nationality (Japanese) dummy for suppliers is not, this would lead to the conclusion that Japanese assemblers practice technology transfer regardless of the nationality of their business partners.

4.2.2 Results

The results of the estimation are presented in Table 14. Column (1) shows the result based on the rate of change in labor productivity, a dependent variable obtained by dividing the amount of output by the number of workers. Column (2) shows the result based on figures obtained by dividing value added by the number of workers.

Looking at columns (1) and (2), we find that the level of productivity in 2002 and the rate of increase in the capital-labor ratio both show the predicted signs. With respect to the nationality dummies and the same-nationality dummies, the dummy for the Japanese nationality of an assembler is significantly positive, but the effect of the other dummies on the increase in productivity was not significant. This means that an increase in productivity is achieved only when a supplier has a

business relationship with a Japanese assembler and that this effect is not influenced by the nationality of the suppliers.

The information on the nationalities of enterprises used in this analysis relates to assemblers, which had dealings with parts makers in 2002. These observations were not limited to enterprises that began transactions with suppliers in 2002 and the duration of their business relationships might vary from company to company. If suppliers have been dealing with assemblers for different periods of time, the extent of their productivity change might well vary. Hence, in a strict sense, it is not appropriate to compare the impact on productivity based exclusively on the nationality dummies.

The results of the estimation which was designed to solve this problem are shown in column (3). As in the factor analysis of the supplier system, we select observations of companies which initiated transactions between 2002 and 2004 and make the same estimation as in the above-mentioned analysis. Even in this case, companies may have initiated transactions in 2003 or 2004, and hence the duration of their transactions could be different. The results in column (3) are the same as those in specifications (1) and (2), in that the Japanese-nationality dummy of assemblers alone had an impact on changes in productivity.

INSERT Table 14

4.2.3 Implications

The above results indicate that Japanese assemblers may well be choosing business partners which they expect to realize sustainable productivity increases in the future rather than focusing on present productivity levels. This finding provides evidence of business practices based on a long-term perspective, which is considered to be a defining characteristic of Japanese enterprises. Given the trend of convergence in productivity levels, it is safe to say that this is consistent with the findings in the preceding section, namely, that a supplier's (present) level of productivity does negatively affect the probability of doing business with a Japanese assembler.

Another important point of argument is that once a supplier has a business relationship with a Japanese assembler, technology transfer to the supplier takes place without regard to its nationality. This finding shows that the reason why Japanese assemblers buy parts primarily from their compatriots is not their irrational "closed nature," as is often claimed. Transactions between Japanese assemblers and suppliers may simply mean that Japanese suppliers have latent potential and can be expected to increase their productivity.

5. Conclusions

This paper has analyzed the degree and the current status of localization of Japanese affiliates

in China. For this purpose, we (1) compared the localization (measured in terms of the number of expatriates, local sales, local procurement, and local management) of Japanese and US affiliates in China and other major regions; (2) analyzed the impact of localization on the profitability of Japanese affiliates in China and in other major regions; and (3) conducted a detailed investigation of inter-firm transactional relationships in China between automobile manufacturers and parts suppliers.

The first half of this paper looked closely at the degree of localization of the overseas affiliates of Japanese firms. We found that compared with U.S. affiliates, Japanese affiliates tended to be less localized: Particularly in China, Japanese affiliates were less local market-oriented than U.S. affiliates, and the share of expatriates in the total number of employees was much higher for Japanese than for U.S. affiliates in almost all regions and countries. The quantitative analysis based on comprehensive affiliate-level panel data of Japanese multinational firms for the period from 1989 to 2002 confirmed that in China, Japanese affiliates with higher local procurement ratios enjoyed higher profits. Similarly, Japanese affiliates with local CEOs and/or local procurement managers also registered higher profits. Although affiliates in China oriented toward the local market were less profitable before the country's WTO accession, they became more profitable than other affiliates after the accession when other factors are controlled for. Thus, our results suggest that localization may contribute to higher profitability, and particularly in the post-WTO accession period (when restrictions on the distribution of products made by foreign-owned firms were relaxed), Japanese firms were able to increase profits by increasing local sales ratios.

The second half of this paper was concerned with supplier relationships in the automobile industry in China. In addition to presenting some stylized facts based on interviews, we statistically examined the determinants of assembler-supplier transactions and of parts suppliers' productivity using firm-level data taken from a directory of auto parts suppliers in China. We found that in the automobile industry in China, Japanese-owned suppliers tend to supply only a small number of assemblers and these tend to be predominantly Japanese, which differs conspicuously from the behavior of other foreign-owned suppliers, such as suppliers from Germany or the U.S. Moreover, Japanese automobile assemblers did not choose suppliers based on their current labor productivity level and transactional relationships between assemblers and suppliers were more closed in the case of Japanese firms than in the case of firms of other nationalities. On the other hand, we found that auto parts suppliers dealing with Japanese assemblers saw their productivity grow faster regardless of the supplier's nationality, which suggests the presence of technology transfers to suppliers once a supplier has a business relationship with a Japanese assembler – regardless of the supplier's nationality. Put differently, the results of this paper suggest that although the assembler-supplier relationships of Japanese firms in China tend to be closed, this "closed" nature of transactional relationships has a positive aspect in that it promotes technology transfer from assemblers to

suppliers. But another interpretation is also possible, namely that “closed” transactional relationships enable Japanese assemblers to transfer technology to their suppliers, because the smaller the number of suppliers the easier it is for the assembler to prevent opportunistic behavior.

Therefore, based on the evidence obtained here, it is difficult to provide a clear answer as to whether Japanese assemblers should engage in more open transactional relationships with other foreign-owned or local suppliers. For assemblers, choosing suppliers involves a tradeoff between quality and costs. Managers of Japanese-owned automotive firms in China that we visited told us that Japanese automobile manufacturers give product quality top priority. Thus, even though they were aware that increasing local procurement was important to achieve cost reductions, they found it difficult to increase purchases from indigenous firms. Taking such comments into account, the question arises whether it would not be possible to design an incentive system involving Japanese assemblers and other foreign- or locally-owned suppliers in China that aims to combine both cost and quality considerations. What such an incentive scheme could look like and how it could be incorporated in transactional relationships between Japanese firms and firms of other nationality are issues worthy of further investigation.

In addition, although this paper investigated assembler-supplier transactions in detail, due to data availability, the investigation was limited to the automobile industry. Local procurement is a crucial issue in the automobile industry because many of the parts automobile assemblers purchase are costly to transport. However, in the electrical machinery industry, for example, parts and components are less costly to transport and therefore, assembler-supplier relations in such an industry may have totally different implication for the issue of localization. Further studies on other industries are required in order to judge whether Japanese affiliates in China should attempt to achieve greater localization of sales, procurement, and management.

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Table 1: Return on sales for manufacturing foreign affiliates of nonbank Japanese parents and nonbank U.S. parents

Manufacturing Total	Affiliates of Japanese Firms				Affiliates of U.S. Firms			
	1989	1994	1999	2002	1989	1994	1999	2002
All countries	2.20	2.90	3.20	4.10	6.20	4.83	4.68	4.13
North America	0.40	1.90	3.30	3.70	—	—	—	—
USA	0.10	2.00	3.20	3.80	—	—	—	—
Canada	—	—	—	—	4.86	3.66	4.98	3.09
Europe	1.20	1.20	2.20	1.60	6.48	4.39	4.98	4.84
European Union †	1.10	1.20	2.70	1.60	6.42	4.31	5.02	4.79
Latin America ††	5.70	7.60	-1.80	4.70	8.70	8.38	3.59	2.63
Asia	4.00	4.10	4.00	5.60	4.97	4.29	4.37	3.64
China	n.a.	3.80	4.60	5.10	8.79	8.36	6.57	6.95
Hong Kong	n.a.	2.70	6.70	3.30	11.06	10.61	3.91	2.19
NIEs3	2.40	3.60	4.90	5.60	8.01	7.96	7.10	4.71
ASEAN4	3.20	4.90	3.00	5.80	7.86	7.32	4.67	5.71
Japan	—	—	—	—	3.03	1.48	2.56	1.84

General Machinery	Affiliates of Japanese Firms				Affiliates of U.S. Firms			
	1989	1994	1999	2002	1989	1994	1999	2002
All countries	1.80	2.00	3.90	3.00	6.61	3.24	3.65	4.29
North America	-0.90	2.10	4.70	0.10	—	—	—	—
USA	-1.10	2.00	5.10	0.10	—	—	—	—
Canada	—	—	—	—	4.81	(D)	(D)	6.62
Europe	-0.30	-0.90	1.50	2.60	6.33	1.91	4.72	4.45
European Union †	-0.20	-0.90	1.50	2.60	(D)	1.85	4.73	4.56
Latin America ††	24.50	8.20	3.10	5.70	7.59	5.01	0.98	2.50
Asia	10.20	4.80	5.30	5.70	7.89	5.48	1.89	3.71
China	n.a.	0.40	3.30	5.40	22.81	(D)	0.47	6.95
Hong Kong	n.a.	2.60	1.90	3.20	17.26	9.06	13.33	20.43
NIEs3	9.60	5.10	8.50	7.80	(D)	(D)	7.67	(D)
ASEAN4	12.50	4.90	5.50	4.80	(D)	(D)	(D)	(D)
Japan	—	—	—	—	6.39	1.83	1.29	1.93

Electrical Machinery	Affiliates of Japanese Firms				Affiliates of U.S. Firms			
	1989	1994	1999	2002	1989	1994	1999	2002
All countries	1.00	2.90	2.70	3.00	5.72	5.71	4.41	2.25
North America	-0.10	2.90	0.80	-3.80	—	—	—	—
USA	-0.10	2.90	0.80	-3.90	—	—	—	—
Canada	—	—	—	—	5.62	(D)	(D)	(D)
Europe	2.20	1.70	2.60	2.50	4.54	4.53	4.13	1.72
European Union †	2.10	1.70	3.60	2.70	(D)	4.16	4.08	2.04
Latin America ††	0.40	5.20	-4.10	-3.00	12.16	8.15	(D)	(D)
Asia	2.40	3.40	4.10	5.20	6.02	6.33	6.23	3.66
China	n.a.	3.50	6.30	5.50	(D)	13.94	8.60	5.44
Hong Kong	n.a.	3.30	9.90	7.30	(D)	(D)	(D)	(D)
NIEs3	2.40	3.30	3.30	5.50	(D)	(D)	(D)	(D)
ASEAN4	2.70	3.60	3.50	4.90	(D)	(D)	(D)	(D)
Japan	—	—	—	—	5.73	3.67	2.12	-0.18

Transportation Equipment	Affiliates of Japanese Firms				Affiliates of U.S. Firms			
	1989	1994	1999	2002	1989	1994	1999	2002
All countries	0.50	2.50	2.60	4.20	4.04	2.84	2.44	0.52
North America	-0.70	2.10	3.30	3.60	—	—	—	—
USA	-0.70	2.30	3.10	3.60	—	—	—	—
Canada	—	—	—	—	(D)	(D)	(D)	(D)
Europe	0.30	0.10	0.20	-0.10	6.15	2.43	1.96	-0.58
European Union †	0.00	0.30	0.60	-0.10	6.06	2.18	1.84	-0.90
Latin America ††	2.70	-0.70	2.90	7.90	8.09	8.34	1.08	(D)
Asia	2.30	4.60	3.40	8.50	1.62	0.42	(D)	1.48
China	n.a.	3.20	4.30	11.50	(D)	(D)	5.24	14.60
Hong Kong	n.a.	10.30	11.60	-11.40	(D)	(D)	10.61	21.05
NIEs3	2.90	4.40	6.20	9.10	(D)	(D)	(D)	(D)
ASEAN4	1.10	4.70	0.90	7.70	n.a.	(D)	(D)	(D)
Japan	—	—	—	—	0.63	(D)	(D)	(D)

† European Community in the case of the 1989 data.

†† Latin America and other Western hemisphere in the case of the data for U.S. affiliates.

Return on sales is defined as net income divided by total sales for the data on U.S. affiliates and as ordinary profit divided by total sales for the data on Japanese affiliates.

n.a. = not available

A "(D)" in a cell indicates that the data were suppressed to avoid the disclosure of information on an individual company.

Sources: METI (various years); U.S. Bureau of Economic Analysis (1992, 1998, 2004, 2005).

Table 2: Share of expatriate employees

(a) Majority-Owned Foreign Affiliates of Nonbank U.S. Parents

All industries	Share of Expatriates		
	1989	1994	1999
All countries	0.39%	0.38%	0.26%
Canada	0.15%	0.15%	0.64%
Europe	0.33%	0.26%	0.17%
European Union †	0.32%	0.25%	0.16%
Latin America ††	0.28%	0.15%	0.20%
Asia and Pacific	0.42%	n.a.	0.22%
Japan	0.76%	0.43%	0.29%
China	n.a.	0.32%	0.12%
Hong Kong	0.69%	0.44%	0.64%
Korea, Republic of	0.38%	n.a.	n.a.
Singapore	0.28%	0.32%	0.35%
Taiwan	0.19%	n.a.	n.a.
Indonesia	1.94%	1.15%	0.97%
Malaysia	n.a.	n.a.	n.a.
Philippines	0.16%	n.a.	n.a.
Thailand	0.27%	0.14%	0.10%

(b) All Foreign Affiliates of Nonbank Japanese Parents

All industries	Share of Expatriates			
	1989	1995	1998	2001
All countries	2.80%	2.00%	2.20%	2.30%
North America	5.10%	3.00%	2.90%	3.90%
USA	4.90%	2.90%	2.80%	4.00%
Europe	4.00%	3.20%	2.90%	3.20%
European Union †	4.60%	3.10%	2.80%	3.30%
Latin America	1.30%	1.40%	2.20%	1.90%
Asia	1.20%	1.60%	1.90%	1.80%
China	n.a.	1.30%	2.10%	1.80%
Hong Kong	n.a.	n.a.	4.30%	3.70%
NIEs3	1.40%	2.90%	3.50%	3.20%
ASEAN4	1.40%	1.30%	1.60%	1.60%

† European Community in the case of the 1989 data.

†† Latin America and other Western hemisphere in the case of the data for U.S. affiliates.

n.a. = not available

Sources: METI (various years); U.S. Bureau of Economic Analysis (1992, 1998, 2004).

Table 3: Local sales ratio for majority-owned manufacturing foreign affiliates of nonbank U.S. parents

Manufacturing Total	Local Sales Ratio (%)				
	1989	1994	1999	2002	Japan 2002*
All countries	62.17	59.33	58.88	57.23	66.13
North America	—	—	—	—	87.23
Canada	61.47	53.06	54.79	57.49	n.a.
Europe	59.01	56.52	58.57	53.49	48.83
European Union †	58.90	56.24	1.89	53.78	50.56
Latin America ††	78.00	75.50	65.18	61.27	53.28
Asia and Pacific	65.19	63.82	58.89	65.07	49.53
Japan	83.07	85.49	90.24	90.07	—
China	87.60	75.44	63.07	66.12	48.07
Hong Kong	31.36	56.15	31.82	50.90	31.94
NIEs3	32.33	33.64	(D)	52.05	57.06
ASEAN4	(D)	48.68	31.64	(D)	43.63

General Machinery	Local Sales Ratio (%)				
	1989	1994	1999	2002	Japan 2002*
All countries	55.05	44.59	60.06	46.01	57.45
North America	—	—	—	—	83.35
Canada	69.01	50.80	62.94	63.90	n.a.
Europe	52.05	45.70	54.31	38.29	44.80
European Union †	52.19	45.70	(D)	37.94	44.80
Latin America ††	71.79	65.21	67.80	54.38	65.02
Asia and Pacific	53.59	38.30	79.95	56.23	41.47
Japan	(D)	(D)	93.75	63.45	—
China	82.35	(D)	87.17	56.45	29.92
Hong Kong	23.28	(D)	65.19	(D)	7.58
NIEs3	(D)	(D)	(D)	(D)	63.05
ASEAN4	(D)	(D)	71.20	(D)	51.12

Electrical Machinery	Local Sales Ratio (%)				
	1989	1994	1999	2002	Japan 2002*
All countries	55.04	59.45	41.33	47.32	56.13
North America	—	—	—	—	90.01
Canada	80.24	74.97	62.17	(D)	n.a.
Europe	59.42	60.41	46.52	49.15	57.02
European Union †	59.41	61.03	0.47	50.77	58.06
Latin America ††	56.78	46.60	48.33	54.11	89.24
Asia and Pacific	38.94	57.74	(D)	43.23	34.53
Japan	78.48	84.99	74.16	75.26	—
China	(D)	55.86	43.51	56.47	36.02
Hong Kong	33.07	(D)	(D)	(D)	30.75
NIEs3	25.35	49.89	(D)	(D)	45.08
ASEAN4	(D)	(D)	(D)	(D)	26.26

Transportation Equipment	Local Sales Ratio (%)				
	1989	1994	1999	2002	Japan 2002*
All countries	53.15	47.22	47.63	46.16	72.78
North America	—	—	—	—	87.01
Canada	41.11	35.03	34.32	36.69	n.a.
Europe	55.16	48.94	51.47	48.42	39.12
European Union †	55.45	49.48	2.01	48.97	42.58
Latin America ††	67.10	61.80	51.87	42.05	52.59
Asia and Pacific	93.35	90.25	(D)	79.30	63.85
Japan	97.26	96.12	(D)	95.73	—
China	n.a.	n.a.	74.32	(D)	75.93
Hong Kong	(D)	(D)	18.18	36.84	7.28
NIEs3	(D)	(D)	(D)	(D)	80.72
ASEAN4	n.a.	(D)	(D)	(D)	51.50

† European Community in the case of the 1989 data.

†† Latin America and other Western hemisphere in the case of the data for U.S. affiliates.

* For the Japan data, local sales ratios are calculated using data on all foreign affiliates of Nonbank Japanese parents.

n.a. = not available

A "(D)" in a cell indicates that the data were suppressed to avoid the disclosure of information on an individual company.

Sources: METI (various years); U.S. Bureau of Economic Analysis (1992, 1998, 2004, 2005).

Table 4: Description of variables and their predicted signs

Variable name	Definition	Predicted sign
ROS	Ordinary profit / total sales	Dependent variable
LnSALE	Logarithm of total sales in million yen	+
AGE	Years in operation: Number of years passed since the establishment of an affiliate.	+
L_PRC	Local procurement ratio: Procurement from within the host country / total procurement.	+/-
L_SALE	Local sales ratio: Sales within the host country / total sales.	+/-
J_OWN	Japanese equity ownership ratio.	+/-
COAST	A dummy variable that takes 1 if the affiliate is located in the coastal provinces of China, otherwise 0.	+/-
WTO	A dummy variable that takes 1 if the host country of the affiliate is a WTO member, otherwise 0. (1 for all years for original WTO members)	+
L_CEO	Local CEO: A dummy variable that takes 1 if the CEO is a local, otherwise 0.	+
L_SLS_MNG	Local sales manager: A dummy variable that takes 1 if the sales manager is a local, otherwise 0.	+
L_PRC_MNG	Local procurement manager: A dummy variable that takes 1 if the procurement manager is a local, otherwise 0.	+
JV	Established through a joint venture: A dummy variable that takes 1 if the affiliate was established through a joint-venture, otherwise 0.	+/-
WHOLLY	Established as a wholly-owned affiliate: A dummy variable that takes 1 if the affiliate was established as a wholly-owned affiliate.	+/-
ACQUIRE	Established by acquisition: A dummy variable that takes 1 if the affiliate was established by acquisition.	+/-
EQUITY	Established by taking an equity stake: A dummy variable that takes 1 if the affiliate was established by taking an equity stake. --> This is used as the standard case in the regression analyses.	standard case
LnGDPPC	Logarithm of GDP per capita in 1995 constant US dollars. Data are taken from World Bank (2004) and ICSEAD (2005) for Taiwan.	+/-
LnGDP	Logarithm of GDP in 1995 constant US dollars. Data are taken from World Bank (2004) and ICSEAD (2005) for Taiwan.	+/-

Source: Ito and Fukao (2006), Table 5.

Table 5: Determinants of affiliate's profitability: Pooled OLS, by region

	ROS					ROS				
	China	USA	EU15	NIEs4	ASEAN4	China	USA	EU15	NIEs4	ASEAN4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
LnSALE	0.0126 ***	0.0114 ***	0.0028	0.0080 ***	0.0047 **	0.0249 ***	0.0187 ***	0.0100 ***	0.0117 ***	0.0125 ***
	(3.93)	(5.78)	(1.09)	(4.45)	(2.13)	(9.73)	(10.18)	(4.08)	(7.91)	(7.61)
AGE	0.0030 *	0.0012 ***	0.0010 ***	0.0003	0.0015 ***	0.0022 *	0.0006 **	0.0007 ***	0.0002	0.0012 ***
	(1.87)	(2.85)	(2.66)	(0.94)	(4.49)	(1.80)	(2.38)	(2.85)	(0.97)	(5.52)
L_PRC	0.0199 *	0.0076	-0.0213 **	-0.0019	-0.0162 **	0.0154 **	-0.0011	-0.0140 **	-0.0019	0.0004
	(1.77)	(0.86)	(-1.99)	(-0.27)	(-2.00)	(2.07)	(-0.18)	(-2.33)	(-0.45)	(0.08)
L_SALE	-0.0194 *	0.0310 **	-0.0078	0.0114 *	0.0232 ***	-0.0184 **	0.0278 ***	0.0118 **	0.0081 *	0.0228 ***
	(-1.74)	(2.15)	(-0.87)	(1.79)	(2.84)	(-2.20)	(2.92)	(2.13)	(1.95)	(4.23)
J_OWN	-0.0496 **	-0.0227	-0.0555 ***	-0.0155	-0.0275 *	-0.0358 ***	-0.0198 **	-0.0093	-0.0106	-0.0185 **
	(-2.40)	(-1.57)	(-2.87)	(-1.20)	(-1.91)	(-3.04)	(-2.40)	(-0.95)	(-1.52)	(-2.57)
COAST	0.0070					-0.0056				
	(0.44)					(-0.48)				
L_CEO	0.0241 **	0.0001	0.0102	0.0069	0.0014					
	(2.45)	(0.01)	(1.20)	(1.04)	(0.18)					
L_SLS_MNG	-0.0019	0.0088	-0.0004	0.0061	-0.0006					
	(-0.18)	(1.36)	(-0.05)	(1.01)	(-0.09)					
L_PRC_MNG	0.0225 **	-0.0156 **	-0.0030	0.0079	0.0127 **					
	(2.19)	(-2.35)	(-0.35)	(1.34)	(2.12)					
JV	0.0363 **	0.0076	0.0261 *	0.0088	0.0022					
	(2.13)	(0.60)	(1.79)	(1.22)	(0.22)					
WHOLLY	0.0469 **	-0.0058	0.0357 **	0.0136	0.0195					
	(2.39)	(-0.45)	(2.30)	(1.58)	(1.59)					
ACQUIRE	-0.025	-0.009	0.024	0.008	0.010					
	(-0.70)	(-0.66)	(1.41)	(0.67)	(0.58)					
_cons	-0.0811 *	-0.1290 ***	0.0193	-0.0289	0.0020	-0.2582 ***	-0.2422 ***	-0.0227	0.1225 ***	0.0365
	(-1.68)	(-4.39)	(0.70)	(-1.31)	(0.08)	(-2.84)	(-8.92)	(-0.52)	(5.42)	(1.56)
2-digit industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country dummies	no	no	yes	yes	yes	no	no	yes	yes	yes
Parent firm dummies	no	no	no	no	no	yes	yes	yes	yes	yes
Number of observations	910	1498	771	1614	1679	3932	6532	3896	7206	7366
R-squared	0.1127	0.0737	0.1498	0.0472	0.0739	0.4268	0.3889	0.3862	0.3951	0.3611
Root MSE	0.1147	0.1036	0.0880	0.0868	0.1056	0.0968	0.0886	0.0776	0.0723	0.0932

Notes: The figures in parentheses are t-statistics based on White's robust standard errors (White 1980).
* significant at 10% level, ** significant at 5% level, *** significant at 1% level (two-tailed test).
Source: Ito and Fukao (2006), Tables 6 and 7.

Table 6: Determinants of affiliate's profitability:
Japanese affiliates in China and in the rest of the world

	China	World	
	ROS	ROS	ROS
	(1)	(2)	(3)
LnSALE	0.0247 ***	0.0078 ***	0.0078 ***
	(9.67)	(17.20)	(17.23)
AGE	0.0023 *	0.0009 ***	0.0009 ***
	(1.93)	(12.22)	(11.92)
L_PRC	0.0175 **	-0.0573 **	-0.0600 **
	(2.09)	(-2.06)	(-2.16)
L_PRC*LnGDPPC		-0.0035 **	-0.0037 **
		(-2.70)	(-2.64)
L_PRC*LnGDP		0.0030 **	0.0031 **
		(2.71)	(2.87)
L_PRC*WTO	-0.0045		-0.0012
	(-0.41)		(-0.23)
L_SALE	-0.0271 ***	0.1021 **	0.0773 **
	(-3.03)	(2.91)	(2.19)
L_SALE*LnGDPPC		0.0051 ***	0.0026 **
		(4.11)	(2.00)
L_SALE*LnGDP		-0.0051 ***	-0.0040 **
		(-3.87)	(-3.03)
L_SALE*WTO	0.0314 ***		0.0220 ***
	(3.26)		(5.01)
J_OWN	-0.0355 ***	-0.0240 ***	-0.0242 ***
	(-3.02)	(-9.29)	(-9.38)
COAST	-0.0058		
	(-0.49)		
LnGDP		-0.0852 ***	-0.0820 ***
		(-4.23)	(-4.04)
LnGDPPC		0.0614 **	0.0562 **
		(2.87)	(2.53)
WTO	0.0070		-0.0072
	(0.16)		(-1.50)
_cons	-0.2517 ***	1.8421 ***	1.8025 ***
	(-2.69)	(4.64)	(4.53)
2-digit industry dummies	yes	yes	yes
Year dummies	yes	yes	yes
Country dummies	no	yes	yes
Parent firm dummies	yes	no	no
Number of observations	3932	31169	31169
R-squared	0.4286	0.0594	0.0602
Root MSE	0.0967	0.1006	0.1006

Notes: The figures in parentheses are t-statistics based on White's robust standard errors (White 1980).
* significant at 10% level, ** significant at 5% level, *** significant at 1% level. (two-tailed test)
Source: Ito and Fukao (2006), Table 10.

Table 7: Business performance and localization of Japanese affiliates in the automobile industry

(a) China

	Affiliates of assemblers				Affiliates of non-assemblers			
	1996	1998	2000	2002	1996	1998	2000	2002
Profit on sales								
Mean	-0.057	-0.033	0.027	0.039	0.017	-0.001	0.030	0.026
Std. Dev.	0.139	0.176	0.081	0.133	0.093	0.128	0.134	0.134
No. of obs.	11	12	15	22	14	40	50	57
Sales per employee (mil. yen)								
Mean	11.4	12.5	23.6	14.7	4.7	6.1	5.7	6.3
Std. Dev.	11.4	8.4	32.7	13.5	4.1	9.2	7.2	7.5
No. of obs.	11	12	15	22	14	40	50	57
Local sales ratio								
Mean	1.00	0.92	1.00	0.89	0.59	0.79	0.78	0.71
Std. Dev.	0.00	0.29	0.01	0.30	0.49	0.37	0.36	0.37
No. of obs.	11	12	10	11	10	39	42	47
Local procurement ratio								
Mean	0.42	0.63	0.68	0.91	0.51	0.56	0.49	0.58
Std. Dev.	0.27	0.27	0.34	0.20	0.48	0.40	0.37	0.32
No. of obs.	6	8	9	8	8	35	35	45

(b) ASEAN

	Affiliates of assemblers				Affiliates of non-assemblers			
	1996	1998	2000	2002	1996	1998	2000	2002
Profit on sales								
Mean	0.070	-0.036	0.027	0.083	0.088	-0.001	0.061	0.087
Std. Dev.	0.078	0.113	0.097	0.076	0.096	0.129	0.110	0.092
No. of obs.	45	27	38	44	86	100	149	177
Sales per employee (mil. yen)								
Mean	30.7	14.4	18.4	25.7	11.5	5.8	11.6	8.8
Std. Dev.	26.8	10.3	12.7	18.2	17.8	4.7	35.1	14.1
No. of obs.	45	27	38	44	86	100	149	177
Local sales ratio								
Mean	0.99	0.92	0.83	0.60	0.74	0.69	0.70	0.73
Std. Dev.	0.04	0.21	0.27	0.44	0.36	0.36	0.34	0.32
No. of obs.	35	25	21	28	73	93	144	165
Local procurement ratio								
Mean	0.41	0.45	0.41	0.45	0.45	0.46	0.46	0.56
Std. Dev.	0.25	0.27	0.26	0.29	0.31	0.33	0.34	0.33
No. of obs.	22	12	21	21	61	83	122	146

Notes: Profit on sales = ordinary profit divided by total sales.
Sales per employee = total sales divided by number of employees.
Local sales ratio = sales to the host country divided by total sales.
Local procurement ratio = purchases from the host country divided by total purchases.
Affiliates of assemblers are affiliates of the major Japanese automobile manufacturers Toyota, Nissan, Honda, Isuzu, Mazda, Subaru, Mitsubishi, Daihatsu, Suzuki, Hino, and Nissan Diesel.
Affiliates of non-assemblers are affiliates which are classified into the automobile industry but are not affiliates of the major Japanese automobile manufacturers listed above.
Source: Authors' calculation based on the affiliate-level data underlying METI (various years).

Table 8: Observations on suppliers and assemblers

1 Number of Suppliers

Joint Ventures	81
Japan	22
Germany	15
France	1
Italy	1
USA	20
Korea	1
Other	21
Chinese	265
Total	346

2 Location of Suppliers

Shanghai	42
Jilin	39
Tianjin	27
Jiangsu	28
Hubei	26
Shandong	21
Beijing	20
Liaoning	18
Zhejiang	19
Sichuan	13
Hunan	12
Anhui	9
Chongqing	7
Guizhou	10
Shaanxi	8
Hebei	6
Henan	7
Guangdong	6
Shanxi	6
Guangxi	6
Jiangxi	5
Fujian	4
Heilongjiang	3
Inner Mongolia	1
Yunnan	1
Gansu	1
Qinghai	1
Total	346

3 Assemblers and Number of Transactional Relationships

Japan (12)	Tianjin FAW Toyota Motor Co. Ltd.(TFTM)	10
	Sichuan FAW Toyota Motor Co. Ltd.	8
	Dongfeng Honda Automobile Co. Ltd.	0
	Guangzhou Honda Automobile Co. Ltd.	14
	Dongfeng Motor Corporation	9
	Zhengzhou Nissan Automobile Co., Ltd	8
	Hunan Changfeng Motor Co. Ltd.	2
	Chongqing Changan Suzuki Automobile Co. Ltd.	16
	Jiangxi Changhe Suzuki Automobile Co. Ltd.	5
	Qingling Motors Co. Ltd.	7
	Jiangling-Isuzu Motors	4
	Shenyang Shenfe Hino Automobile Manufacturing Co. Ltd.	1
Germany (4)	Yaxing-Benz	4
	Beijing Jeep Corporation Limited	62
	Faw-Volkswagen	85
	Shanghai Volkswagen	85
France (3)	Dongfeng Peugeot Citroen Automobile Company Ltd.	1
	Dongfeng Citroen	56
	Sanjiang Renault	2
Italy (2)	Nanjing Iveco	49
	Nanjing Fiat Inc.	9
USA (5)	Shanghai General Motors Co. Ltd.	52
	SAIC-GM-Wuling Automobile Co. Ltd.	33
	Shanghai GM (Shenyang) Norsom Motors Co. Ltd.	15
	Changan Ford Automobile Co. Ltd.	10
	JMC Motors	5
Korea (2)	Beijing Hyundai Motor Company	2
	Dongfeng Yueda KIA Motors Co. Ltd.	12
	Total	566

Table 9: Supplier's average productivity and distance to assemblers in transaction group and no transaction group

(a) Average productivity of supplier

	Average productivity (10,000 Yuan/pers		t-test (p value)
	Transaction	No transaction	Ho : difference of mean value = 0
Japanese assembler	12.3	11.4	0.785
German assembler	13.1	11.7	0.447
U.S. assembler	14.1	12.2	0.546

(b) Average distance of supplier to assembler

	Average distance (km)		t-test (p value)
	Transaction	No transaction	Ho : difference of mean value = 0
Japanese assembler	1180.1	1488.1	0.001
German assembler	1096.2	1357.5	0.000
U.S. assembler	908.6	1652.2	0.000

Table 10: Assembler's average number of transactions with supplier

(a) Japanese assemblers

	Supplier's nationality assemblers deal with			No transaction	Total
	Japanese	U.S./German	Chinese		
Productivity of suppliers					
high	0.2	1.0	0.5	75.8	77.5
low	1.8	3.7	2.9	263.2	271.6
total	2.0	4.7	3.4	339.0	349.1

(b) German assemblers

	Supplier's nationality assemblers deal with			No transaction	Total
	German	Japanese/U.S.	Chinese		
Productivity of suppliers					
high	1.0	1.0	10.5	63.5	76.0
low	4.8	7.3	28.5	223.5	264.0
total	5.8	8.3	39.0	287.0	340.0

(c) U.S. assembler

	Supplier's nationality assemblers deal with			No transaction	Total
	U.S.	Japanese/German	Chinese		
productivity of suppliers					
high	0.6	1.2	2.8	72.0	76.6
low	2.8	2.0	10.4	251.0	266.2
total	3.4	3.2	13.2	323.0	342.8

Note: High and low productivity suppliers are distinguished based on the average productivity level of all the

Table 11: Average number of assemblers each supplier does business with and suppliers' average productivity

	Number of assemblers supplier does business with			Average productivity
	Same nationality	Different nationality	Total	(10,000 Yuan/person)
Japanese suppliers (22)	1.1	0.5	1.5	29.3
German suppliers (15)	1.4	1.8	3.3	43.8
U.S. suppliers (20)	0.9	2.3	3.2	29.7
Chinese suppliers (265)	—	1.4	1.4	9.2

Note: Figures in parentheses represent the number of enterprises.

Table 12: Determinants of the supplier system in the Chinese auto industry

	(1)		(2)		(3)		(4)	
PRODUCTIVITY	0.0228		0.2085		0.0505	*	0.4004	
	(0.22)		(1.57)		(1.76)		(1.46)	
PRODUCTIVITY*Japan_dummy			-0.7292	**	-0.1640	**		
			(-2.53)		(-2.47)			
PRODUCTIVITY*Germany_dummy			-0.0824		-0.0213			
			(-0.40)		(-0.50)			
PRODUCTIVITY*U.S._dummy			-0.1874		-0.0336			
			(-0.79)		(-0.64)			
CAPITAL	1.2492		1.8475		2.0882		21.1485	***
	(0.50)		(0.76)		(0.87)		(3.11)	
DISTANCE	-1.0716	***	-1.0765	***	-1.0741	***	-0.1124	**
	(-13.18)		(-13.22)		(-13.21)		(1.99)	
DISTANCE^2	0.3066	***	0.3083	***	0.3075	***		
	(11.30)		(11.34)		(11.32)			
LOCATION								
Shanghai	0.4132	***	0.3972	***	0.4183	***	0.4003	***
	(5.94)		(5.65)		(6.03)		(3.06)	
Hubei	-0.2159	**	-0.2266	**	-0.2214	**	0.1411	
	(-2.16)		(-2.26)		(-2.20)		(0.78)	
Tianjin	-0.2173	**	-0.2095	**	-0.2410	**	-0.2727	
	(-2.14)		(-2.05)		(-2.28)		(-1.57)	
Jiangsu	-0.0316		-0.0446		-0.0336		-0.1449	
	(-0.35)		(-0.50)		(-0.38)		(-0.87)	
Jilin	-0.1304		-0.1367		-0.1588	*	-0.2412	
	(-1.52)		(-1.57)		(-1.84)		(-1.13)	
OPERATION YEARS (Assembler)	3.9753	***	3.9906	***	4.0266	***	-1.3615	*
	(10.41)		(10.43)		(10.54)		(-1.94)	
NATIONALITY (Assembler / Supplier)								
SN_J（Both Japanese）	0.4108	***	0.5601	***	0.5654	***	0.2097	
	(3.40)		(4.18)		(4.21)		(1.08)	
SN_NJ（Both Non-Japanese）	0.6685	***	0.6600	***	0.6099	***	0.0976	
	(5.35)		(4.99)		(4.69)		(0.41)	
JNJ（Japanese / Non-Japanese and Non-Chinese）	-0.4693	***	-0.4839	***	-0.5137	***	-0.4744	**
	(-4.02)		(-4.02)		(-4.32)		(-2.45)	
NJNJ（Non-Japanese / Different Non-Japanese and Non-Chinese）	0.1662	**	0.1521	*	0.1190		-0.0132	
	(2.21)		(1.93)		(1.53)		(-0.08)	
JC（Japanese / Chinese）	-0.6009	***	-0.6109	***	-0.6178	***	-0.5322	***
	(-8.61)		(-8.74)		(-8.78)		(-4.51)	
_cons	-1.2419	***	-1.2465	***	-1.2558	***	-1.7712	***
	(-16.63)		(-16.57)		(-16.70)		(-14.58)	
Number of observations	9688		9688		9688		5124	
Log-likelihood	-1769.20		-1765.22		-1767.8		-518.39	
McFadden R^R	0.16		0.17		0.17		0.08	

Note: The figures in parentheses are z-statistics.
Productivity levels in (1), (2) and (4) are calculated as value-added/number of workers while that in (3) is calculated as output / number of workers
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 13: Means and standard deviations of variables used for the regression analysis in equations (1) - (3) in Table 12

	Mean	S.D.
Transaction	0.06	0.23
PRODUCTIVITY (value added)	12.34	23.81
PRODUCTIVITY (value added)*Japan_dummy	1.90	12.28
PRODUCTIVITY (value added)*Germany_dummy	1.80	11.73
PRODUCTIVITY (value added)*U.S._dummy	1.74	11.31
PRODUCTIVITY (output)	52.20	107.52
PRODUCTIVITY (output)*Japan_dummy	7.67	49.31
PRODUCTIVITY (output)*Germany_dummy	8.92	59.20
PRODUCTIVITY (output)*U.S._dummy	7.06	48.24
CAPITAL	42445.57	98955.02
DISTANCE	1384.85	811.72
DISTANCE^2	2576637.00	2553860.00
LOCATION_dummy		
Shanghai	0.12	0.33
Hubei	0.08	0.26
Tianjin	0.07	0.26
Jiangsu	0.08	0.27
Jilin	0.11	0.32
OPERATION YEARS (Assembler)	7.89	5.96
NATIONALITY_dummy (Assembler / Supplier)		
Both Japanese	0.03	0.16
Both Non-Japanese	0.02	0.13
Japanese / Non-Japanese and Non-Chinese	0.07	0.26
Non-Japanese / Different Non-Japanese and Non-Chinese	0.08	0.27
Japanese / Chinese	0.33	0.47

Table 14: Determinants of the productivity of auto suppliers in China
(Dependent variable is the productivity growth between 2002 and 2004)

	(1)		(2)		(3)	
LnPRODUCTIVITY_2002	-0.7547	***	-0.3577	**	-0.3345	**
	(-3.64)		(-2.60)		(-2.38)	
Ln(CAPITAL/LABOR)_2004	1.3617	***	1.9169	***	0.9040	**
-Ln(CAPITAL/LABOR)_2002	(4.60)		(14.10)		(2.22)	
Nationality of assembler supplied						
Japanese	1.4183	**	0.5847	*	0.6791	*
	(2.02)		(1.86)		(1.98)	
German	-0.6447		-0.0229		-0.0936	
	(-1.19)		(-0.09)		(-0.22)	
American	0.2650		-0.1486		0.2642	
	(0.40)		(-0.49)		(0.79)	
Nationality of supplier and assembler when these are the same						
Japanese	-0.4160		-0.0383		0.2391	
	(-0.24)		(-0.05)		(0.35)	
German	1.6244		0.7629		0.9527	
	(1.21)		(1.27)		(1.14)	
American	0.8586		0.9185		0.6024	
	(0.40)		(0.99)		(0.70)	
Location						
Shanghai	0.0890		-0.0707			
	(0.08)		(-0.15)			
Hubei	-0.2896		-0.1362			
	(-0.25)		(-0.26)			
Tianjin	0.5199		0.4010			
	(0.53)		(0.90)			
Jiangsu	-0.6568		-0.2872			
	(-0.74)		(-0.73)			
Jilin	0.0484		0.0517			
	(0.04)		(0.11)			
_cons	3.9496	***	2.5705	***	2.169	***
	(6.76)		(10.90)		(4.14)	
Number of observations	179		172		63	
Adj RˆR	0.1753		0.6060		0.1352	
F stat	3.91	***	21.23	***	2.21	**
	(0.00)		(0.00)		(0.04)	

Notes: The figures in parenthesis are t values.
The dependent variable (productivity) is calculated as output / number of workers for (1)(3) and value added / number of workers for (2).
Observations with negative value-added figures are omitted in specification (2).
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.