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# Foreign-owned versus Domestically-owned Firms: Economic Performance in Japan

**Fukunari Kimura**

Keio University

**Kozo Kiyota**

Yokohama National University
and
University of Michigan

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# Foreign-owned versus Domestically-owned Firms: Economic Performance in Japan[*]

Fukunari Kimura[†]  and Kozo Kiyota[‡]

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## Abstract

This paper utilizes micro-panel data for firms located in Japan and examines differences in static and dynamic corporate performance between foreign-owned and domestically-owned firms in the 1990s. We find that foreign-owned firms not only reflect superior static characteristics but also achieve faster growth. In addition, foreign investors appear to invest in firms that may not be immediately profitable now but those that are potentially the most profitable in the future. The results imply that foreign investors bring useful firm-specific assets into the Japanese market, which may work as an effective catalyst for necessary structural reform. (95 words)

# 1. Introduction

Although the pros and cons of globalization can be discussed in various contexts, researchers in international trade have accumulated empirical evidence suggesting that global commitment is beneficial to enhancing the performance of corporate firms, industries, and macro economies.[1] Inward foreign direct investment (FDI) is one of the important modes for such global commitment. Since Japan is a salient outlier and does not rely on the global commitment mode for inward FDI, and stimulating inward FDI has become a contentious topic of harsh debate in Japan.

Inward FDI benefits host countries through several channels. In addition to the gain from the simple movement of capital, FDI is accompanied with the movement of firm-specific assets such as technology, managerial ability, corporate governance, and access to the network connecting foreign markets. Once foreign firms set up a certain level of ownership in the equities of a firm, they acquire the power of control over the management of the firm and then are more receptive in transferring their firm-specific assets. The utilization of firm-specific assets may generate superior performance in static and dynamic corporate activities. It should be noted that the movement of firm-specific assets could occur no matter whether the investment is greenfield or involving merger and acquisition (M&A). Inward FDI brings more competition and higher efficiency into an

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[1] See Lewis and Richardson (2001) for an extensive survey of the related literature as well as an heuristic explanation of the supporting argument for globalization.

industry.    Thus, the standard economic argument claims that inward FDI is largely beneficial unless

anti-competitive biases are too large or infant industry protection can be justified.    If we assume positive

externalities in hosting FDI and the existence of sunk cost for such FDI, even a certain level of inward FDI

promotion policies may be justified.

Public opinion is not always favorable to expanding inward FDI, however.    That is, the entry of strong

foreign firms may force less competitive local indigenous firms to close down.    The public may thus be fearful of

control by foreign firms.    Foreign firms are also occasionally criticized as being too aggressive, insincere,

cream-skimming, foot-loose, and exploitative.

Japan is special in the sense that it has received rather small amounts of inward FDI since WWII.    In the

past, the Japanese Government has followed explicit and implicit policies that deterred foreign entry.    Although

most explicit anti-FDI policies were removed by the 1980s, inward FDI did not increase significantly, thereafter.

During Japan's period of rapid growth, there was little concern about the need for inward FDI.    Small inflows of

FDI were regarded as the result of the strong yen, highly competitive Japanese firms, and the absence of deliberate

strategies for foreign firms to enter the Japanese market.

The long-lasting slump of the Japanese economy beginning in the 1990s has gradually changed attitudes

towards FDI.    As the economic situation worsened over time (Figure 1), there was a realization that domestic

slump was not a simple cyclical phenomenon but reflected serious structural problems, and attitudes towards

inward FDI began to change.    The Ministry of International Trade and Industry (MITI), Japan External Trade

Organization (JETRO), Industrial Bank of Japan (IBJ), and other government agencies thus introduced various

preferential schemes for promoting inward FDI, and the policy environment as a whole became neutral or even

favorable for incoming foreign investors.    Nonetheless, inward FDI did not increase significantly in the 1990s

(Figure 2).

=== Figures 1 and 2 ===

It was also the case that exchange rate movements were not important in attracting inward FDI.    This is

evident in Figure 2 in which there is no clear relationship between the nominal exchange rate (yen/dollar) and

inward FDI despite the yen depreciation in the late 1980s and the late 1990s.    The simple correlation is –0.23,

indicating a negative but not statistically significant effect of the exchange rate on inward FDI.    Since previous

studies have confirmed that currency depreciation attracts inward FDI,[2] the continuous low level of inward FDI in

Japan is eventually noteworthy.    Figure 3 presents the share of inward FDI stock positions compared to GDP in

1999 for the OECD countries.    Indeed, compared with the size of the Japanese economy, the amount of inward

FDI in Japan is still extremely small compared with other OECD countries.[3]

=== Figures 3 ===

Table 1 indicates the sectoral pattern of inward FDI based on the MITI database we will use in our analysis.

The presence of foreign-owned firms is evidently concentrated in a small number of industries.    This is partially

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[2] See, for instance, Froot and Stein (1991) and Klein and Rosengren (1994).

[3] For more detail, see OECD (2002) Figure VI.3.

due to the nature of location advantages/disadvantages, but also suggests that large entry costs generated by government regulations and private business practices may still remain. There is a reason to believe that national sentiment towards foreign entry is still not very favorable. In particular, hostile takeovers or M&As in general are often viewed as undesirable.

=== Table 1 ===

To shed light on the nature and consequences of Japan's inward FDI, this paper utilizes micro-panel data for firms located in Japan and examines differences in static/dynamic corporate performance between foreign-owned firms and domestically-owned firms in the 1990s. Our results show clearly that foreign-owned firms have better performance than domestically-owned firms in both the static and dynamic senses. Foreign investment flows are directed towards potentially profitable firms and do not necessarily involve buying out currently profitable firms. Finally, there is no statistically significant difference in the probability of exit between foreign-owned and domestically-owned firms.

The organization of the paper is as follows. Section 2 reviews the existing literature on the relationship between foreign exposure and corporate performance as well as the arguments relating to inward FDI in Japan. Section 3 discusses the data and describes static differences between foreign-owned and Japanese domestic firms. The determinants and dynamic effects of foreign ownership are examined in Section 4. Section 5 summarizes the major findings and discusses the potential policy implications.

## 2. Literature review

### 2.1. Foreign exposure and corporate performance

A number of studies have examined the relationship between foreign exposure and growth.[4] Following the pioneering work by Aw and Hwang (1995), recent empirical studies have extensively examined the relationship between foreign exposure and growth at the firm- or establishment-level, confirming mostly that exporters perform better than non-exporters in the static sense.[5] Some of these studies find that the best performing firms tend to be exporters, although the impacts of foreign exposure are not altogether clear. For instance, Bernard and Jensen (1999) conclude that exports do not always provide positive impacts on corporate performance in the United States. But, in the case of Japanese firms, Kimura and Kiyota (2003) find that exports and FDI accelerate corporate performance.

Previous studies have used micro data, focusing especially on the role of foreign ownership. Globerman, Ries and Vertinsky (1994) investigated the relationship between foreign ownership and labor productivity using plant-level data in 1986, and concluded that foreign affiliates had significantly higher labor productivity and paid

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[4] For country-level analysis, see Harrison (1996).

[5] See, for example: Aw and Hwang (1995) for Taiwan; Roberts and Tybout (1997) for Colombia; Clerides, Lach and Tybout (1998) for Colombia, Mexico and Morocco; Bernard and Jensen (1999) for the United States; and Kimura and Kiyota (2003) for Japan.

higher wages than Canadian establishments.   However, these differences did not hold if firm characteristics such as size and capital intensity were controlled.   Also, there were no significant differences in the performance of Canadian establishments owned by Japanese, European or U.S. companies.

On the other hand, Doms and Jensen (1998) found significant contrasts in performance between foreign-owned and domestically-owned plants.   Using U.S. manufacturing plant-level data for 1987, they examined differences in such plant characteristics as total factor productivity and labor productivity between foreign-owned and domestically-owned plants.   Their results indicated that foreign-owned plants are more productive, more capital intensive and pay higher wages than domestically-owned firms even after controlling for industry, size, location and plant age.   They also examined differences in characteristics among foreign-owned plants, plants of U.S. multinationals, plants of large domestically-oriented firms and plants of small domestically-oriented firms, finding that the plants of U.S. multinationals are the most productive, largest, most capital intensive and pay the highest wages.   From these results, they concluded that the important issue is not whether foreign investors own the plants concerned but whether multinationals own them.

Hallward-Driemeier, Iarossi and Sokoloff (2002) confirmed that firms with foreign ownership in East Asian countries are significantly more productive than those without foreign ownership.   They used a questionnaire survey that was administered from 1996 to 1998 in five East Asian countries: Indonesia, Korea, Malaysia, the Philippines and Thailand.   Approximately 2,700 manufacturing establishments were covered in the survey. Their regression analysis revealed that, even after controlling for sector, size and export orientation, firms in which

foreigners have substantial ownership have markedly higher productivity compared to domestically-owned firms in all countries except Korea. Moreover, comparison of the coefficients on the variables reflecting the different extent of foreign ownership implied that firms with foreign ownership shares of over 50% stood out especially in terms of productivity.

## 2.2. Foreign direct investment (FDI) in Japan

Inward FDI in Japan has remained at an extremely low level vis-à-vis other OECD countries. Urata (1996) examined the determinants of FDI in OECD countries and estimated the deviation between expected and actual FDI levels. His results indicated that Japan's actual FDI was only 18% of the expected level, which was the lowest in the sample countries.

Several factors have been cited as potential barriers for foreign investors entering the Japanese market. These include Japan's special labor market conditions (Urata, 1996 and Weinstein, 1996) and government regulations (Urata, 1996 and Wakasugi, 1996). Japan-specific business practices are also regarded as a very important, in particular the role of *keiretsu*. Lawrence (1993) pointed out that most foreign entry occurs through greenfield investment rather than M&A, thus emphasizing that cross-shareholding among *keiretsu* is an explicit device to prevent foreign investors from buying Japanese firms. On the other hand, Nakamura, Fukao and Shibuya (1997) have claimed that *keiretsu* did not play an important role in deterring inward FDI in Japan.

Recent studies of inward FDI in Japan have also utilized micro data. Ito and Fukao (2001) investigated the determinants of inward FDI using establishment-level data for 1996, and found differences in determinants between the manufacturing and non-manufacturing sectors. Factor intensity and managerial resources had significantly positive impacts on FDI in the manufacturing sector while negative and significant effects of government regulations on FDI were observed in the non-manufacturing sector. They also found that the effects of *keiretsu* on inward FDI were not significant.

With regard to Japanese micro data, there may be problems insofar as these data rely on a questionnaire survey with a low response or on notifications. Fukao and Ito (2003) have in particular expressed doubts on the accuracy of Japanese data. Using establishment- and firm-level data, they re-estimated the sales and employment of Japanese affiliates of foreign firms (JAFF) as well as foreign affiliates of Japanese firms (FAJF). Their estimates showed that the actual foreign activities in Japan are much greater than those reported by MITI, particularly in the services sectors.

In sum, previous research suggests that foreign exposure is an important source of productivity gaps among firms although the difference in performance between foreign-owned and domestically-owned firms are not always clear. As for Japan's inward FDI, most previous studies have examined the determinants of entry and have emphasized high entry barriers for foreign investors in the Japanese market.

Our contribution in what follows is to utilize firm-level longitudinal panel data and seek to identify the determinants and impacts of foreign-ownership, whether potentially firms become foreign-owned, whether

foreign-owned firms grow faster than Japanese domestic firms, and whether foreign-owned firms are likely to

survive more effectively in the Japanese market compared to domestically-owned firms.

## 3.  Foreign-owned versus domestically-owned firms: static aspects

## 3.1.  Data

We use the micro database of *Kigyou Katsudou Kihon Chousa Houkokusho* (*The Results of the Basic

Survey of Japanese Business Structure and Activities*) prepared by the Research and Statistics Department,

Minister's Secretariat, Ministry of International Trade and Industry (MITI) (1996, 1997, 1998, 1999 and 2000).

This survey was first conducted in the 1991 F/Y, then in the 1994 F/Y and annually afterwards.   The main

purpose of the survey is to capture statistically the overall picture of Japanese corporate firms in light of their

activity diversification, globalization, and strategies on R&D and information technology.   The strength of the

survey is its census coverage of samples and the reliability of information.   The survey is comprised of all firms

with more than 50 employees and with capital of more than 30 million yen, covering both manufacturing and

non-manufacturing firms, although some industries such as finance, insurance and software services are not

included.   The limitation of the survey is the lack of information on M&A and some financial information.

From these surveys, we have developed a longitudinal (panel) data set for the years from 1994 to 1998. A

foreign-owned firm is defined as a firm where more than 10 percent of the equity is foreign-owned.   We drop the

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firms from our sample set for which the age data (questionnaire-level year minus establishment year), total wages,

tangible assets, value-added (sales minus purchases) or the number of regular workers (including temporary

workers) are not positive and in cases with incomplete replies.[6]    The number of firms exceeds 22,000 for each

year.

## 3.2. Static differences in characteristics between foreign-owned and domestically-owned

## firms

We start by checking static differences in corporate characteristics between foreign-owned and

domestically-owned firms in Japan.[7]    Table 2 presents the basic indicators of foreign-owned firms and Japanese

firms in 1994 and 1998.    Basic indicators include profitability (returns on assets, ROA, and returns on equity,

ROE), productivity (value-added productivity[8]  and TFP), and other characteristics such as the size of firm.[9]

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[6] Re-entry firms reappear in the survey after they exit and disappear from the survey.   Although we drop these firms from our

sample, some firms may conduct their business activities around the cut-off lines of the survey, such as around 50 employees or

capital of 30 million yen.

[7] FDI and portfolio investment cannot be distinguished in our data set.   The type of FDI, namely, greenfield or M&As, is not

specified, either.

[8] Value-added productivity is defined as per-capita value-added.   For the definition of variables, see Appendix.

[9] We construct the TFP index for each survey through 1994 to 1998 to compare performance across firms in the same year and

across different years.   We employ the multilateral TFP index number formula developed by Caves, Christensen and Diewert

(1982).   We follow Nishimura, Nakajima and Kiyota (2003) for the data manipulation.   For further discussion on this point, see

Foreign-owned firms have greater R&D expenditure; are larger in terms of value-added productivity (per-capita value-added), the number of domestic regular workers, domestic affiliates and domestic establishments, and more capital-intensive; and pay higher wages and perform better on returns on assets (ROA) and total factor productivity (TFP) than domestically-owned firms.

=== Table 2 ===

# 4. Dynamic aspects of foreign ownership: causes and effects

## 4.1. Determinants of foreign ownership

We now examine whether potentially profitable firms become foreign-owned firms or not since one can think that foreign investors acquire firms with good performance in Japan.  As described in section 2.2, previous empirical studies on FDI in Japan suggest that there are large sunk costs for foreign investors in entering the Japanese market.  To examine this, we employ the dynamic analytical framework developed by Roberts and Tybout (1997) and Bernard and Jensen (1999).  The theoretical background can be summarized as follows.

Suppose that firm $i$ located in Japan can always adjust its output at the profit-maximizing level.  Let the profit of firm $i$ at period $t$ be $\pi_{it}$.  Assume that the profit of firm $i$ depends only on firm $i$'s

characteristics, $Z_{it}$: $\pi_{it}(Z_{it})$. Denote the foreign-ownership status at period $t$ as $\text{Fown}_{it}$, which takes

value one if firm $i$ is owned by foreign investors and zero otherwise. Foreign investors face sunk cost $C$ if

they did not enter the Japanese market in the previous period, $t-1$.[10] Sunk cost is assumed to be the same

across firms and periods. In this setting, the profit of firm $i$ observed by foreign firm, $\widetilde{\pi}_{it}$, is expressed as

follows:

$$\widetilde{\pi}_{it}(Z_{it}, \text{Fown}_{it}) = \pi_{it}(Z_{it}) - C(1 - \text{Fown}_{it-1}).\tag{1}$$

In the dynamic framework, the foreign investors choose the sequence of their status $\{\text{Fown}_{is}\}_{s=t}^{\infty}$ to maximize

the current and discounted value of future profits with discount rate $\delta$:

$$\text{Fown}_{it} = \begin{cases} 1 & \text{if } \widetilde{\pi}_{it}^{*} > C(1 - \text{Fown}_{it-1}) \\ 0 & \text{otherwise} \end{cases}\tag{2}$$

where $\widetilde{\pi}_{it}^{*} = \widetilde{\pi}_{it} + \delta\left(E[V_{it+1}(\bullet)\,|\,\text{Fown}_{it} = 1] - E[V_{it+1}(\bullet)\,|\,\text{Fown}_{it} = 0]\right)$. Incorporating a disturbance term

$\varepsilon_{it}$, empirical analysis using equation (2) is:

$$\text{Fown}_{it} = \begin{cases} 1 & \text{if } \gamma Z_{it} - C(1 - \text{Fown}_{it-1}) + \varepsilon_{it} > 0 \\ 0 & \text{otherwise} \end{cases}\tag{3}$$

There are several estimation strategies for this dynamic binary-choice model with unobserved heterogeneity.

For instance, Roberts and Tybout (1997) and Bernard and Wagener (2001) employ a probit model with random

effects while Bernard and Jensen (1999) use a linear probability model with fixed effects. However, a linear

probability model requires instruments (two lags of the levels of right-hand side variables), and our sample period

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[10] Because of data availability, we assume that the length of absence from the market is one period. However, the length of
absence can be longer. See Roberts and Tybout (1997) for more details.

is not long enough to use such instruments. Therefore, following Roberts and Tybout (1997) and Bernard and

Wagner (2001), we employ the probit model with random-effects of the form:

$$\text{Fown}_{it} = \alpha + \beta \text{Fown}_{it-1} + \gamma Z_{it-1} + \eta_i + \mu_{it},$$ (4)

where $\eta_i$ is firm-specific random effects and $\mu_{it}$ is a disturbance term. To avoid possible simultaneity

problems, we lag all plant characteristics and other exogenous variables one year.

Additional firm characteristics $Z_{it-1}$ include profitability (ROA and ROE), productivity (value-added

productivity and TFP), and other characteristics such as the capital-labor ratio, age, the number of domestic regular

workers, domestic establishments, domestic affiliates, R&D expenditure-sales ratio and average wages. If

profitability is an important factor for foreign ownership, the coefficient of profitability variables will have positive

and significant signs. As noted in Table 1, there are sectoral differences in inward FDI. In order to control for

this, we include industry dummies. Year dummies are also used to control for exogenous macroeconomic

shocks.[11]

Table 3 presents the summary statistics and correlation matrix of variables. There is a high correlation

between value-added productivity and TFP, indicating that there is a possibility of multicollinearity if we use both

value-added productivity and TFP as independent variables. Therefore, we use these variables separately in the

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[11] Since the information on investing firms (parent firms in foreign country) is not available, we control for the characteristics of firms in Japan. This is valid if each foreign firm maximizes its profit at each affiliate level. Similar treatments are employed in location choice studies such as Head, Ries and Swenson (1995).

regression analysis.

=== Table 3 ===

Table 4 presents the regression results of equation (4) with random-effects probit estimation. Three main features stand out in this table. First, the coefficients of prior profitability (ROA and ROE) are not statistically significant, but those of productivity (value-added productivity and TFP) are positive and significant. Second, sunk cost has strong effects on foreign ownership, as lagged foreign-ownership dummies indicate positive and significant coefficients. Finally, potential foreign-firms are larger, younger and more R&D-intensive than other firms, as we confirm positive and significant coefficients on the number of domestic workers, establishments and affiliates, age and the R&D expenditure-sales ratio. These results are fairly robust whether or not we include industry- and year-dummies, and imply that the entry decision by foreign investors does not depend on current profitability represented by ROA and ROE. Rather, potential profitability such as TFP and value added productivity appear to strongly affect foreign ownership.

=== Table 4 ===

Our results do not support therefore views that foreign firms buy currently profitable Japanese firms. Instead, foreign investors select firms that are potentially the most profitable. In addition, foreign investors tend to invest in large-scale firms, which suggests that sunk cost has strongly negative effects on foreign ownership, a finding that is consistent with previous studies.

## 4.2. Effects of foreign ownership on dynamic corporate performance

To test the effects of foreign-ownership on dynamic corporate performance following Bernard and Jensen (1999), we ran a simple regression of changes in performance measures, $Z_{it}$, on initial foreign-ownership status and other firm characteristics as follows:

$$\%\Delta Z_{it} = \ln Z_{it} - \ln Z_{it-1}$$
$$= \alpha + \beta \text{Fown}_{it-1} + \gamma \text{Char.s}_{it-1} + \varepsilon_{it}. \tag{5}$$

The coefficient, $\beta$, represents the gaps in the annual average growth rate of the performance between foreign-owned and domestically-owned firms in the same industry. Additional firm characteristics for the initial year are the same as those used in section 4.1.

Tables 5a and 5b present regression results of equation (5) with the random-effects model. The regression results clearly indicate the positive impacts of foreign-ownership on corporate performance. Positive and statistically significant coefficients of foreign-owned dummies are observed in profitability (ROA and ROE), productivity (value-added productivity and TFP) and average wages. These results imply that foreign-owned firms grow faster than domestically-owned firms in terms of profitability and productivity. Thus, from Table 5a, the gaps of annual average growth rates between foreign-owned and Japanese firms are, on average, 6.0% for value-added productivity, 6.4% for TFP, 7.3% for ROA and 6.8% for ROE.

=== Tables 5a and 5b ===

We also confirm a negative and significant coefficient for the number of domestic regular workers,

indicating that employment in foreign-owned firms is decreasing faster than domestically-owned firms.[12]

However, the absolute value of the coefficient for domestic regular workers is relatively small (-0.8% to -0.9%)

compared to the coefficients for value-added productivity, TFP, ROA, ROE and average wages.   This implies that

foreign-owned firms are more effectively restructuring their redundant workers as compared to Japanese firms.

On the other hand, the statistically significant differences are not observed in the capital-labor ratio, the number of

domestic establishments, the number of domestic affiliates and R&D expenditure-sales ratio.

There are two additional points to be noted.   First, for most of the variables, the initial level on the

right-hand side seems to negatively affect the growth rate on the left-hand side.   This may indicate a "convergence

effect" such that firms with lower performance grow faster than firms with higher performance.   Otherwise, poor

performers must exit from the market.   Second, the coefficients of the capital-labor ratio have statistically

significant and positive signs on the growth of TFP, ROA, ROE and average wages.   The R&D-expenditure ratio

indicates significantly positive signs on the growth of per-capita real value-added, TFP, ROA and average wages.

The coefficients of age are negative and mostly significant with respect to the growth of per-capita real value added,

TFP, ROA, ROE and average wages.   These results imply that younger, more capital- and R&D-intensive firms

improve their corporate performance more than older, less labor-intensive and less R&D-intensive firms.

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[12] Odagiri (2000, p.114) points out that Japanese firms tend to maximize firm growth rather than profits, which makes Japanese

firms keep employment constant even in a recession period.   Foreign-owned firms are likely to act differently.   For further

discussion on this point, see Marris (1998, p.112).

## 4.3. Effects of foreign ownership on firm survival

Concerning the impacts of foreign ownership, another important question to be examined is whether foreign ownership is related to the likelihood of firm exit. It is often pointed out that foreign-owned firms offer good performance but may be more likely to exit from the Japanese market compared to Japanese firms. But this claim is based on casual observations and has not been statistically verified yet. To examine the impact of foreign ownership on firm survival, we therefore ran the regression of the form:

$$S_{it} = \begin{cases} 1 & \text{if } \beta \text{Fown}_{it-1} + \gamma Z_{it-1} + \kappa_i + \varepsilon_{it} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{6}$$

where $S_{it}$ equals 1 if the firm survives from year $t-1$ to year $t$, $\text{Fown}_{it-1}$ represents the foreign-ownership dummies in year $t-1$ and $Z_{it}$ is a vector of corporate characteristics in year $t-1$. If foreign-owned firms are more likely to exit from the Japanese market than Japanese firms, the coefficient $\beta$ must have a negative and statistically significant coefficient.

Table 6 presents the regression results of equation (6) using the probit model with random effects. The foreign-owned dummy variables are not statistically significant after controlling for the various characteristics of firms. Therefore, this result does not support the hypothesis that firms with foreign ownership are more likely to exit from the Japanese market than Japanese firms. Surviving firms are older, larger in terms of the number of domestic regular workers, more R&D-intensive, pay higher wages and have higher ROA than exiting firms.

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Thus, firms with good performance are more likely to survive than firms with bad performance, but foreign ownership does not matter in the decision to exit.

=== Table 6 ===

## 5. Concluding remarks

This paper began by noting static differences between foreign-owned firms and domestically-owned firms and then considered the determinants and the dynamic effects of foreign ownership in Japan. Our results suggest that foreign-owned firms not only have superior characteristics in the static sense but also achieve faster growth in both profitability and productivity. In addition, the currently higher profitability is not a significant determinant of foreign ownership. Rather, firms with potentially higher profitability such as firms with higher productivity strongly affect foreign ownership. This suggests that foreign investors select firms that may not be immediately profitable, but will potentially have better performance in the future. Foreign investors are not necessarily looking for short-term profits. We have also examined the impact of foreign ownership on firm survival and found that there is no statistically significant difference in the probability of exit between foreign-owned and domestically-owned firms.

Although we define a firm with more than 10 percent foreign equity share as a foreign-owned firm, we have shown elsewhere that our results do not depend very much on the threshold of foreign equity share. Only a

few differences are observed in the impacts of foreign ownership on corporate performance.   For instance, the negative impacts on employment are observed only for 100 percent foreign-owned firms.   The positive impacts of foreign ownership tend to be strong for majority-owned foreign firms.   Otherwise, results are almost unchanged.

Our results thus suggest that foreign investors bring useful firm-specific assets such as technology, managerial ability, and effective corporate governance into Japan.   The protracted slump in the Japanese economy suggests that Japan now requires substantial structural reform in order to meet new challenges in the era of globalization.   The Japanese economic system, once praised as the epitome of success, must now be critically examined.   The external benefits from hosting FDI are potentially large.   Thus, for instance, Blomstrom, Konan and Lipsey (2001) have argued that inward FDI may contribute to the restructuring of a host country's economy, bringing in new firm specific skills and new industries to countries that lack them or preserve the rents on workers' skills in sectors where domestic firms have lost their firm specific advantages.   Japanese policy makers are cognizant of these kinds benefits.   For instance, the Council on Economic and Fiscal Policy (Keizai Zaisei Shimon Kaigi) has emphasized several potential benefits from inward FDI in overcoming Japan's current structural problems, including the enhancement of Japanese economic vitalization through the creation of employment and the introduction of new technology.[13] In our view, inward FDI is an essential element to introduce a new way of thinking, stimulate competition, and catalyze necessary reform.   Inward FDI may therefore help to move the

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[13]   For   more   detail,   see   the   website   of   Council   on   Economic   and   Fiscal   Policy (http://www.keizai-shimon.or.jp/2003/1001kh/07/index.html) (accessed date 03/19/2004)

Japanese economy towards more substantial reform.

Substantial sunk costs for foreign firms to enter the Japanese market still exist.    To attract foreign investors,

Japan must prove itself to be an attractive destination for FDI, compared with other competing investment

locations.    Policymakers must clearly demonstrate to foreign investors where and what types of location

advantages exist in Japan.

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## Data Appendix: Definition of Variables

Foreign-ownership dummy: foreign ownership dummy takes value one if the share of equity of foreign investors is

more than 10 percent and zero otherwise.

Capital-labor ratio (millions of yen, 1994 prices): real capital stock divided by the number of regular workers.

Age: questionnaire year minus establishment year.

R&D expenditure-sales ratio (%): R&D expenditure divided by total sales.

Value-added productivity (millions of yen, 1994 prices): value-added divided by the number of regular workers.

ROA (returns on asset, %): operating surplus divided by total assets.

ROE (returns on equity, %): current-year profit divided by own capital.

Average wage (millions of yen): total wage payments divided by the number of regular workers.

**Figure 1. Trends of Key Indicators of Japanese Economy, 1990-2000**

**Figure 2. Trends of Inward FDI in Japan and Exchange Rate, 1985-2000**

**Figure 3. Share of Inward FDI Positions in OECD Countries in 1999**
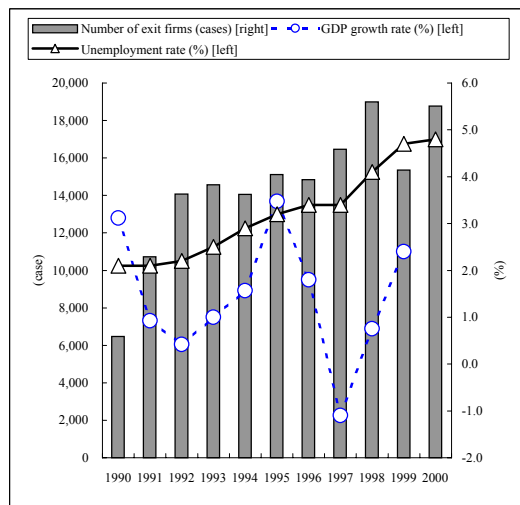


Notes: 1) GDP growth rate at year *t* is defined as: (GDPt+1-
GDPt)/GDPt.
2) GDP is real GDP at constant 1995 prices (US$).

Source: GDP growth rate and Unemployment: World Bank (2002)
Number of exit firms: Toyo Keizai (2002)
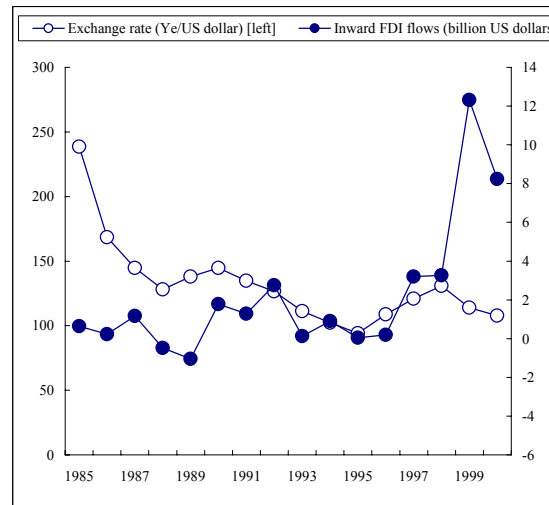
Note: 1) Exchange rate is defined as annual average exchange rate [line
rf].
2) Simple correlation between exchange rate and inward FDI flows
is -0.23.

Source: IMF (2002)
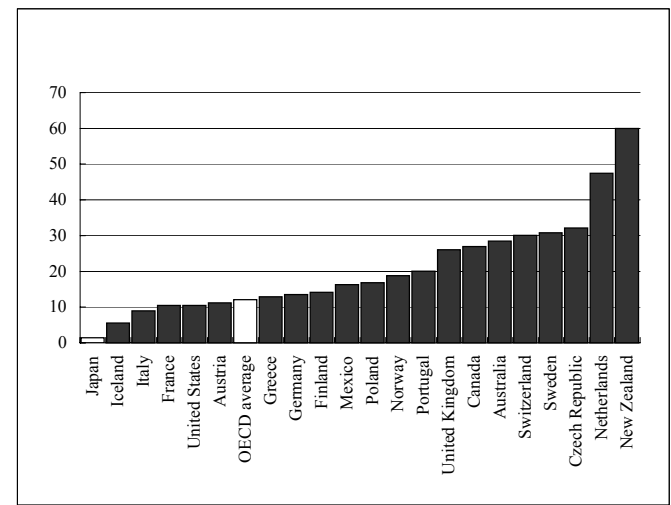
Notes: 1) Inward FDI positions are not available for Belgium-Luxembourg, Hungary,
Iceland, Korea, Spain and Turkey.
2) OECD average is defined as the sum of inward FDI positions devided by the
sum of GDP.

Source: Inward FDI positions: OECD (2001) Table 5. GDP: World Bank (2002).

| Industry | Number of firms 1994 F/Y Total | Domes- tically- owned | Foreign- owned | 1998 F/Y Total | Domes- tically- owned | Foreign- owned | Share (All firms = 100.0%) 1994 F/Y Total | Domes- tically- owned | Foreign- owned | 1998 F/Y Total | Domes- tically- owned | Foreign- owned | Share (All firms = 100.0%) 1994 F/Y Total | Domes- tically- owned | Foreign- owned | 1998 F/Y Total | Domes- tically- owned | Foreign- owned |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Agriculture, forestry and fishing | 13 | 13 | --- | 9 | 9 | --- | 0.1 | 0.1 | --- | 0.0 | 0.0 | --- | 100.0 | 100.0 | --- | 100.0 | 100.0 | --- |
| 2 Mining | 46 | 45 | 1 | 54 | 53 | 1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 100.0 | 97.8 | 2.2 | 100.0 | 98.1 | 1.9 |
| 3 Food products and beverages | 1,369 | 1,349 | 20 | 1,387 | 1,362 | 25 | 6.2 | 6.2 | 3.7 | 6.3 | 6.3 | 4.1 | 100.0 | 98.5 | 1.5 | 100.0 | 98.2 | 1.8 |
| 4 Textiles | 901 | 894 | 7 | 685 | 681 | 4 | 4.0 | 4.1 | 1.3 | 3.1 | 3.2 | 0.7 | 100.0 | 99.2 | 0.8 | 100.0 | 99.4 | 0.6 |
| 5 Pulp, paper and paper products | 412 | 405 | 7 | 386 | 381 | 5 | 1.9 | 1.9 | 1.3 | 1.7 | 1.8 | 0.8 | 100.0 | 98.3 | 1.7 | 100.0 | 98.7 | 1.3 |
| 6 Chemicals | 871 | 789 | 82 | 857 | 771 | 86 | 3.9 | 3.6 | 15.4 | 3.9 | 3.6 | 14.1 | 100.0 | 90.6 | 9.4 | 100.0 | 90.0 | 10.0 |
| 7 Petroleum and coal products | 629 | 611 | 18 | 626 | 607 | 19 | 2.8 | 2.8 | 3.4 | 2.8 | 2.8 | 3.1 | 100.0 | 97.1 | 2.9 | 100.0 | 97.0 | 3.0 |
| 8 Non-metallic mineral products | 563 | 554 | 9 | 514 | 506 | 8 | 2.5 | 2.6 | 1.7 | 2.3 | 2.3 | 1.3 | 100.0 | 98.4 | 1.6 | 100.0 | 98.4 | 1.6 |
| 9 Iron, steel and non-ferrous metals | 679 | 659 | 20 | 655 | 637 | 18 | 3.1 | 3.0 | 3.7 | 3.0 | 3.0 | 3.0 | 100.0 | 97.1 | 2.9 | 100.0 | 97.3 | 2.7 |
| 10 Fabricated metal products | 899 | 890 | 9 | 897 | 892 | 5 | 4.0 | 4.1 | 1.7 | 4.0 | 4.1 | 0.8 | 100.0 | 99.0 | 1.0 | 100.0 | 99.4 | 0.6 |
| 11 General machinery | 1,390 | 1,339 | 51 | 1,396 | 1,353 | 43 | 6.2 | 6.2 | 9.6 | 6.3 | 6.3 | 7.0 | 100.0 | 96.3 | 3.7 | 100.0 | 96.9 | 3.1 |
| 12 Electrical machinery | 1,758 | 1,706 | 52 | 1,772 | 1,708 | 64 | 7.9 | 7.9 | 9.7 | 8.0 | 7.9 | 10.5 | 100.0 | 97.0 | 3.0 | 100.0 | 96.4 | 3.6 |
| 13 Transportation machinery | 1,029 | 999 | 30 | 1,032 | 998 | 34 | 4.6 | 4.6 | 5.6 | 4.7 | 4.6 | 5.6 | 100.0 | 97.1 | 2.9 | 100.0 | 96.7 | 3.3 |
| 14 Precision machinery | 307 | 298 | 9 | 314 | 300 | 14 | 1.4 | 1.4 | 1.7 | 1.4 | 1.4 | 2.3 | 100.0 | 97.1 | 2.9 | 100.0 | 95.5 | 4.5 |
| 15 Other manufacturing | 1,426 | 1,403 | 23 | 1,418 | 1,395 | 23 | 6.4 | 6.5 | 4.3 | 6.4 | 6.5 | 3.8 | 100.0 | 98.4 | 1.6 | 100.0 | 98.4 | 1.6 |
| 16 Construction | 439 | 436 | 3 | 392 | 384 | 8 | 2.0 | 2.0 | 0.6 | 1.8 | 1.8 | 1.3 | 100.0 | 99.3 | 0.7 | 100.0 | 98.0 | 2.0 |
| 17 Electricity, gas and water supply | 23 | 23 | --- | 14 | 14 | --- | 0.1 | 0.1 | --- | 0.1 | 0.1 | --- | 100.0 | 100.0 | --- | 100.0 | 100.0 | --- |
| 18 Wholesale trade | 6,030 | 5,868 | 162 | 5,767 | 5,576 | 191 | 27.1 | 27.0 | 30.3 | 26.0 | 25.8 | 31.3 | 100.0 | 97.3 | 2.7 | 100.0 | 96.7 | 3.3 |
| 19 Retail trade | 2,852 | 2,832 | 20 | 3,081 | 3,035 | 46 | 12.8 | 13.0 | 3.7 | 13.9 | 14.1 | 7.5 | 100.0 | 99.3 | 0.7 | 100.0 | 98.5 | 1.5 |
| 20 Finance and insurance | 7 | 7 | --- | 2 | 1 | 1 | 0.0 | 0.0 | --- | 0.0 | 0.0 | 0.2 | 100.0 | 100.0 | --- | 100.0 | 50.0 | 50.0 |
| 21 Real estate | 24 | 24 | --- | 28 | 28 | --- | 0.1 | 0.1 | --- | 0.1 | 0.1 | --- | 100.0 | 100.0 | --- | 100.0 | 100.0 | --- |
| 22 Transport and communications | 70 | 70 | --- | 66 | 66 | --- | 0.3 | 0.3 | --- | 0.3 | 0.3 | --- | 100.0 | 100.0 | --- | 100.0 | 100.0 | --- |
| 23 Service activities | 513 | 502 | 11 | 830 | 815 | 15 | 2.3 | 2.3 | 2.1 | 3.7 | 3.8 | 2.5 | 100.0 | 97.9 | 2.1 | 100.0 | 98.2 | 1.8 |
| Total | 22,250 | 21,716 | 534 | 22,182 | 21,572 | 610 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 97.6 | 2.4 | 100.0 | 97.3 | 2.7 |

Notes:  1) Domestically-owned firms are defined as those with less than 10% equity share by foreigners while foreign-owned firms are defined as those with equal to or more than 10% equity share
by foreigners.
2) Industry classification is based on SNA with some modification.
Source: MITI database.

**Table 2. Difference between Domestically-owned and Foreign-owned Firms: Level**

| | All firms | | | Domestically-owned firm | | | Foreign-owned firm | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of firms | Mean | S.D. | No. of firms | Mean | S.D. | No. of firms | Mean | S.D. |
| Capital-labor ratio (millions of yen, 1994 prices) | | | | | | | | | |
| 1994 | 22,250 | 9.11 | (15.94) | 21,716 | 8.99 | (15.87) | 534 | 14.30 | (17.62) |
| 1998 | 22,182 | 9.92 | (16.88) | 21,572 | 9.81 | (16.81) | 610 | 13.87 | (18.69) |
| Number of domestic regular workers | | | | | | | | | |
| 1994 | 22,250 | 407 | (1,688) | 21,716 | 349 | (1,084) | 534 | 2,760 | (8,087) |
| 1998 | 22,182 | 401 | (1,697) | 21,572 | 343 | (1,139) | 610 | 2,447 | (7,385) |
| R&D expenditure-sales ratio (%) | | | | | | | | | |
| 1994 | 22,250 | 0.53 | (1.60) | 21,716 | 0.50 | (1.54) | 534 | 1.98 | (2.86) |
| 1998 | 22,182 | 0.58 | (2.35) | 21,572 | 0.53 | (2.00) | 610 | 2.42 | (7.47) |
| Value-added productivity (millions of yen, 1994 prices) | | | | | | | | | |
| 1994 | 22,250 | 1,415 | (1,546) | 21,716 | 1,384 | (1,490) | 534 | 2,643 | (2,796) |
| 1998 | 22,182 | 1,395 | (1,332) | 21,572 | 1,364 | (1,275) | 610 | 2,512 | (2,396) |
| ROA (Returns on asset, %) | | | | | | | | | |
| 1994 | 22,250 | 0.84 | (10.05) | 21,716 | 0.80 | (10.11) | 534 | 2.58 | (6.74) |
| 1998 | 22,182 | 0.04 | (27.19) | 21,572 | 0.01 | (27.52) | 610 | 1.19 | (9.39) |
| ROE (Returns on equity, %) | | | | | | | | | |
| 1994 | 22,248 | 9.06 | (825.58) | 21,714 | 7.73 | (801.85) | 534 | 63.08 | (1,501.12) |
| 1998 | 22,177 | 3.65 | (593.07) | 21,567 | 3.57 | (600.89) | 610 | 6.55 | (146.95) |
| TFP (Total factor productivity) | | | | | | | | | |
| 1994 | 22,250 | 1.11 | (1.13) | 21,716 | 1.10 | (1.10) | 534 | 1.84 | (1.69) |
| 1998 | 22,182 | 1.16 | (0.99) | 21,572 | 1.13 | (0.96) | 610 | 1.93 | (1.54) |
| Average wage (millions of yen) | | | | | | | | | |
| 1994 | 22,250 | 4.47 | (1.80) | 21,716 | 4.43 | (1.78) | 534 | 6.22 | (1.98) |
| 1998 | 22,182 | 4.80 | (1.68) | 21,572 | 4.76 | (1.65) | 610 | 6.40 | (2.01) |
| Number of domestic affiliates | | | | | | | | | |
| 1994 | 18,578 | 2.88 | (12.39) | 18,070 | 2.47 | (9.42) | 508 | 17.67 | (47.30) |
| 1998 | 22,182 | 2.32 | (11.75) | 21,572 | 2.00 | (8.91) | 610 | 13.46 | (45.74) |
| Number of domestic establishments | | | | | | | | | |
| 1994 | 22,250 | 9.27 | (32.26) | 21,716 | 8.97 | (31.90) | 534 | 21.35 | (42.83) |
| 1998 | 22,182 | 10.86 | (39.19) | 21,572 | 10.31 | (32.95) | 610 | 30.22 | (130.80) |

Notes:   For the definition of variables, see main text.

Source:   MITI database.

**Table 3. Summary Statistics and Correlation Matrix**

| Summary Statistics | | | |
|---|---|---|---|
| Variable | *N* | Mean | S.D. |
| Foreign equity share (FES) | 113,925 | 1.19 | 9.18 |
| Capital-labor ratio (millions of yen, 1994 prices) (KL) | 113,925 | 9.44 | 16.07 |
| Age | 113,925 | 35.13 | 14.64 |
| Number of domestic regular workers (Ld) | 113,925 | 398.9 | 1659.0 |
| Number of domestic establishments (NDE) | 113,925 | 11.03 | 40.17 |
| Number of domestic affiliates (NDA) | 93,468 | 2.90 | 12.80 |
| R&D expenditure-sales ratio (%) (RDS) | 113,925 | 0.53 | 1.78 |
| Value-added productivity (millions of yen, 1994 prices) (VAP) | 113,925 | 1436.8 | 1455.0 |
| TFP | 113,925 | 1.14 | 1.05 |
| ROA (Returns on asset, %) | 113,925 | 0.84 | 14.54 |
| ROE (Returns on equity, %) | 113,910 | 2.05 | 498.53 |
| Average wage (millions of yen) (w) | 113,925 | 4.78 | 1.81 |
| Foreign owned dummy (FOD) | 113,925 | 0.02 | 0.14 |
| Foreign owned dummy (+1) | 91,675 | 0.02 | 0.13 |
| Survive dummy (SURVIVE) | 125,624 | 0.95 | 0.23 |

**Correlation Matrix 1**

| (*N*=66267) | FES | KL | AGE | Ld | NDE | NDA | RDS | VAP | TFP | ROA | ROE | w | FOD | FOD(+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Foreign equity share (FES) | 1.000 | | | | | | | | | | | | | |
| Capital-labor ratio (millions of yen, 1994 prices) (KL) | 0.029 | 1.000 | | | | | | | | | | | | |
| Age | -0.029 | 0.082 | 1.000 | | | | | | | | | | | |
| Number of domestic regular workers (Ld) | 0.099 | 0.044 | 0.116 | 1.000 | | | | | | | | | | |
| Number of domestic establishments (NDE) | 0.036 | 0.004 | 0.050 | 0.376 | 1.000 | | | | | | | | | |
| Number of domestic affiliates (NDA) | 0.078 | 0.129 | 0.168 | 0.561 | 0.200 | 1.000 | | | | | | | | |
| R&D expenditure-sales ratio (%) (RDS) | 0.096 | 0.030 | 0.103 | 0.180 | 0.036 | 0.123 | 1.000 | | | | | | | |
| Value-added productivity (millions of yen, 1994 prices) (VAP) | 0.116 | 0.372 | 0.063 | 0.079 | 0.038 | 0.179 | 0.062 | 1.000 | | | | | | |
| TFP | 0.110 | 0.003 | -0.008 | 0.047 | 0.027 | 0.101 | 0.048 | 0.856 | 1.000 | | | | | |
| ROA (Returns on asset, %) | 0.034 | -0.007 | -0.012 | 0.009 | 0.008 | -0.002 | 0.019 | 0.050 | 0.056 | 1.000 | | | | |
| ROE (Returns on equity, %) | 0.003 | 0.003 | 0.007 | 0.014 | 0.001 | 0.018 | 0.013 | 0.004 | 0.002 | -0.014 | 1.000 | | | |
| Average wage (millions of yen) (w) | 0.132 | 0.180 | 0.147 | 0.088 | 0.014 | 0.175 | 0.147 | 0.341 | 0.302 | 0.020 | 0.004 | 1.000 | | |
| Foreign owned dummy (FOD) | 0.879 | 0.036 | -0.021 | 0.171 | 0.048 | 0.126 | 0.122 | 0.123 | 0.108 | 0.034 | 0.009 | 0.134 | 1.000 | |
| Foreign owned dummy (+1) (FOD+1) | 0.686 | 0.033 | -0.030 | 0.166 | 0.062 | 0.115 | 0.128 | 0.121 | 0.113 | 0.032 | 0.008 | 0.136 | 0.768 | 1.000 |

**Correlation Matrix 2**

| (*N*=71279) | FES | KL | AGE | Ld | NDE | NDA | RDS | VAP | TFP | ROA | ROE | w | FOD | SURVIVE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Foreign equity share (FES) | 1.000 | | | | | | | | | | | | | |
| Capital-labor ratio (millions of yen, 1994 prices) (KL) | 0.027 | 1.000 | | | | | | | | | | | | |
| Age | -0.029 | 0.082 | 1.000 | | | | | | | | | | | |
| Number of domestic regular workers (Ld) | 0.097 | 0.043 | 0.115 | 1.000 | | | | | | | | | | |
| Number of domestic establishments (NDE) | 0.034 | 0.003 | 0.048 | 0.375 | 1.000 | | | | | | | | | |
| Number of domestic affiliates (NDA) | 0.077 | 0.127 | 0.168 | 0.558 | 0.197 | 1.000 | | | | | | | | |
| R&D expenditure-sales ratio (%) (RDS) | 0.096 | 0.039 | 0.099 | 0.177 | 0.034 | 0.121 | 1.000 | | | | | | | |
| Value-added productivity (millions of yen, 1994 prices) (VAP) | 0.115 | 0.358 | 0.061 | 0.077 | 0.037 | 0.177 | 0.061 | 1.000 | | | | | | |
| TFP | 0.111 | 0.000 | -0.012 | 0.045 | 0.027 | 0.098 | 0.046 | 0.852 | 1.000 | | | | | |
| ROA (Returns on asset, %) | 0.034 | -0.006 | -0.005 | 0.011 | 0.008 | 0.001 | 0.020 | 0.050 | 0.056 | 1.000 | | | | |
| ROE (Returns on equity, %) | 0.002 | 0.003 | 0.006 | 0.014 | 0.001 | 0.017 | 0.013 | 0.003 | 0.001 | -0.017 | 1.000 | | | |
| Average wage (millions of yen) (w) | 0.132 | 0.169 | 0.140 | 0.084 | 0.013 | 0.168 | 0.141 | 0.335 | 0.302 | 0.022 | 0.003 | 1.000 | | |
| Foreign owned dummy (FOD) | 0.881 | 0.034 | -0.021 | 0.167 | 0.045 | 0.125 | 0.121 | 0.123 | 0.110 | 0.035 | 0.008 | 0.133 | 1.000 | |
| Survive dummy (SURVIVE) | 0.006 | 0.009 | 0.053 | 0.032 | 0.012 | 0.030 | 0.035 | 0.018 | 0.006 | 0.054 | 0.002 | 0.026 | 0.008 | 1.000 |

Notes: For the definition of variables, see main text.
Source: MITI database.

**Table 4.  Regression Results: Determinants of Foreign Ownership**

| Independent variables (year t) | Dependent variable: Foreign ownership dummy (year t+1) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Foreign-owned dummy | 3.20066*** | 3.17522*** | 3.83713*** | 3.80696*** | 3.19692*** | 3.17108*** | 3.83331*** | 3.80252*** |
| | [70.91] | [69.67] | [55.99] | [55.34] | [70.78] | [69.53] | [55.93] | [55.27] |
| Capital-labor ratio (millions of yen, 1994 prices) | 0.00113* | 0.00128** | 0.00115 | 0.00129* | -0.00019 | 0.00004 | -0.00028 | -0.00006 |
| | [1.73] | [2.00] | [1.59] | [1.84] | [0.25] | [0.05] | [0.34] | [0.07] |
| Age | -0.00850*** | -0.00865*** | -0.01016*** | -0.01046*** | -0.00876*** | -0.00888*** | -0.01041*** | -0.01068*** |
| | [7.49] | [7.42] | [8.51] | [8.51] | [7.72] | [7.63] | [8.72] | [8.70] |
| Number of domestic regular workers | 0.00002*** | 0.00002*** | 0.00002*** | 0.00002*** | 0.00002*** | 0.00002*** | 0.00002*** | 0.00002*** |
| | [3.59] | [3.82] | [3.63] | [3.89] | [3.62] | [3.86] | [3.65] | [3.92] |
| Number of domestic establishments | 0.00086*** | 0.00091*** | 0.00089*** | 0.00096*** | 0.00085*** | 0.00090*** | 0.00088*** | 0.00095*** |
| | [4.88] | [5.10] | [4.62] | [4.92] | [4.82] | [5.04] | [4.56] | [4.87] |
| Number of domestic affiliates | 0.00138** | 0.00140** | 0.00219*** | 0.00216*** | 0.00129* | 0.00130* | 0.00211*** | 0.00207*** |
| | [2.01] | [2.04] | [3.08] | [3.04] | [1.87] | [1.88] | [2.95] | [2.90] |
| R&D expenditure-sales ratio (%) | 0.05478*** | 0.04828*** | 0.05932*** | 0.05282*** | 0.05488*** | 0.04852*** | 0.05945*** | 0.05310*** |
| | [10.43] | [8.38] | [10.58] | [8.62] | [10.46] | [8.43] | [10.61] | [8.67] |
| Value-added productivity (millions of yen, 1994 prices) | | | | | 0.00003*** | 0.00003*** | 0.00004*** | 0.00004*** |
| | | | | | [5.68] | [5.48] | [5.55] | [5.41] |
| TFP | 0.04223*** | 0.03996*** | 0.04430*** | 0.04222*** | | | | |
| | [6.08] | [5.67] | [5.93] | [5.58] | | | | |
| ROA (Returns on asset, %) | 0.00145 | 0.00156 | 0.00125 | 0.00131 | 0.00143 | 0.00154 | 0.00123 | 0.00128 |
| | [1.31] | [1.40] | [1.08] | [1.11] | [1.29] | [1.38] | [1.05] | [1.07] |
| ROE (Returns on equity, %) | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00002 | 0.00002 |
| | [0.26] | [0.31] | [0.87] | [0.99] | [0.26] | [0.31] | [0.87] | [0.99] |
| Average wage (millions of yen) | 0.05553*** | 0.05124*** | 0.05969*** | 0.05429*** | 0.05568*** | 0.05118*** | 0.05976*** | 0.05411*** |
| | [10.17] | [9.05] | [9.94] | [8.62] | [10.18] | [9.02] | [9.92] | [8.56] |
| Constant | -2.68676*** | -2.71013*** | -2.31005*** | -2.36965*** | -2.66699*** | -2.69059*** | -2.28982*** | -2.35047*** |
| | [54.57] | [23.28] | [43.44] | [19.46] | [54.74] | [23.13] | [43.47] | [19.32] |
| *N* | 66,267 | 66,267 | 66,267 | 66,267 | 66,267 | 66,267 | 66,267 | 66,267 |
| Year dummy | No | No | Yes | Yes | No | No | Yes | Yes |
| Industry dummy | No | Yes | No | Yes | No | Yes | No | Yes |
| Log-Likelihood | -2806.97 | -2777.76 | -2491.91 | -2462.86 | -2808.39 | -2778.23 | -2492.99 | -2463.06 |
| Akaike's information criteria | 0.09 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.08 |

Notes:　1) Random-effect probit model is used for estimation.
　　　　2) ***, **, * indicate level of significance at 1%, 5% and 10%.
　　　　3) Figures in brackets indicate t-statistics.
Source:　MITI Database

**Table 5a. Regression Results: Effects of Foreign Ownership on Corporate Performance**

| | Dependent variables: growth of the following variables from year t to year t+1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Independent variables (year t) | KL | Ld | NDE | NDA | RDS | RealVAL | TFP | ROA | ROE | w |
| Foreign owned dummy | -0.79362 | -0.82663* | -1.28144 | -1.11035 | -1.26787 | 6.02848*** | 6.38781*** | 7.32159** | 6.78830* | 4.20848*** |
| | [0.71] | [1.66] | [0.75] | [0.97] | [0.40] | [5.24] | [5.57] | [2.14] | [1.77] | [6.05] |
| Capital-labor ratio (millions of yen, 1994 prices) | -0.14062*** | 0.03190*** | -0.01595 | 0.01484 | -0.01103 | -0.05518** | 0.02652*** | 0.11809*** | 0.09908*** | 0.05974*** |
| | [14.82] | [7.48] | [1.11] | [1.56] | [0.27] | [5.68] | [2.74] | [3.78] | [2.87] | [9.86] |
| Age | 0.02265** | -0.07291*** | -0.03392** | -0.00880 | 0.03530 | -0.04407** | -0.04426*** | -0.11681*** | -0.16533*** | 0.01798*** |
| | [2.08] | [15.02] | [2.05] | [0.70] | [0.78] | [3.94] | [3.97] | [3.39] | [4.35] | [2.63] |
| Number of domestic regular workers | 0.00023** | -0.00015*** | 0.00233*** | 0.00047*** | 0.00097*** | 0.00015 | 0.00013 | 0.00044 | 0.00033 | 0.00008 |
| | [2.18] | [3.17] | [14.88] | [5.73] | [3.14] | [1.41] | [1.25] | [1.34] | [0.94] | [1.12] |
| Number of domestic establishments | -0.00786** | 0.00067 | -0.21583*** | 0.00510* | 0.00976 | 0.00370 | 0.00496 | -0.01365 | -0.01564 | -0.00378* |
| | [2.13] | [0.42] | [38.14] | [1.72] | [0.71] | [0.97] | [1.30] | [1.22] | [1.23] | [1.70] |
| Number of domestic affiliates | 0.01607 | -0.01597** | -0.06349*** | -0.12631*** | -0.05729 | 0.06923*** | 0.06838*** | -0.03000 | -0.04057 | 0.07179*** |
| | [1.14] | [2.50] | [2.99] | [11.65] | [1.10] | [4.82] | [4.77] | [0.66] | [0.82] | [7.88] |
| R&D expenditure-sales ratio (%) | 0.19512** | -0.04603 | -0.14760 | 0.07077 | -6.04362*** | 0.23831** | 0.27792*** | 0.64163** | 0.50113 | 0.49864*** |
| | [1.98] | [1.06] | [0.98] | [0.72] | [23.48] | [2.33] | [2.73] | [2.09] | [1.45] | [8.34] |
| TFP | 1.05919*** | 0.64412*** | 0.07709 | 0.37941*** | 0.44071 | -9.62630** | -9.90484*** | -0.76393* | -0.21157 | 1.49006*** |
| | [7.54] | [10.57] | [0.35] | [2.91] | [0.66] | [65.13] | [67.25] | [1.74] | [0.43] | [18.06] |
| ROA (Returns on asset, %) | 0.04298*** | 0.07703*** | 0.09973*** | 0.05743*** | 0.23957*** | -0.03945** | -0.04401*** | -1.18917*** | -0.96079*** | 0.03331*** |
| | [2.76] | [11.72] | [4.03] | [3.05] | [3.14] | [2.36] | [2.64] | [20.84] | [14.95] | [3.85] |
| ROE (Returns on equity, %) | -0.00010 | -0.00004 | 0.00062 | 0.00007 | -0.00018 | 0.00019 | 0.00022 | -0.00035 | -0.01546*** | -0.00022 |
| | [0.36] | [0.40] | [1.44] | [0.35] | [0.30] | [0.66] | [0.77] | [0.45] | [16.13] | [1.54] |
| Average wage (millions of yen) | -0.46851*** | 0.43979*** | -0.15705 | 0.11425 | 0.75630* | 0.80673*** | 0.76775*** | -0.38409 | -0.55949* | -5.46972*** |
| | [5.08] | [10.85] | [1.11] | [1.26] | [1.81] | [8.40] | [8.03] | [1.34] | [1.74] | [97.82] |
| Constant | 4.53627*** | -0.44506 | 17.43942*** | -1.31726 | 12.44514* | 4.97721*** | 9.37470*** | -5.00350 | -1.24122 | 22.23551*** |
| | [4.22] | [0.94] | [10.51] | [1.00] | [2.11] | [4.43] | [8.38] | [1.48] | [0.33] | [34.11] |
| N | 66,267 | 66,266 | 66,267 | 32,755 | 19,813 | 66,267 | 66,267 | 53,889 | 52,310 | 66,267 |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.00 | 0.02 | 0.13 | 0.01 | 0.03 | 0.07 | 0.07 | 0.02 | 0.02 | 0.14 |

Notes:  1) Random-effect model is used for estimation.

2) ***, **, * indicate level of significance at 1%, 5% and 10%.

3) Figures in brackets indicate t-statistics.

4) Estimated coefficients indicate the gaps of growth rate between foreign-owned and domestically-owned firms.

5) For the definition of dependent variables, see main text.

Source:  MITI Database

**Table 5b.  Regression Results: Effects of Foreign Ownership on Corporate Performance**

| Independent variables (year t) | Dependent variables: growth of the following variables from year t to year t+1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KL | Ld | NDE | NDA | RDS | RealVAL | TFP | ROA | ROE | w |
| Foreign-owned dummy | -0.30966 | -0.88458* | -1.24782 | -1.13330 | -1.11629 | 6.67140*** | 6.87610*** | 7.53928** | 7.02144* | 4.06708*** |
| | [0.28] | [1.78] | [0.73] | [0.99] | [0.35] | [5.78] | [5.97] | [2.20] | [1.83] | [5.84] |
| Capital-labor ratio (millions of yen, 1994 prices) | -0.14516*** | 0.01530*** | -0.01638 | 0.00665 | -0.00986 | 0.18998*** | 0.27194*** | 0.14385*** | 0.11301*** | 0.02121*** |
| | [14.58] | [3.43] | [1.08] | [0.67] | [0.22] | [18.53] | [26.56] | [4.42] | [3.14] | [3.36] |
| Age | 0.01724 | -0.07479*** | -0.03431** | -0.00999 | 0.03384 | -0.01439 | -0.01304 | -0.11503*** | -0.16553*** | 0.01381** |
| | [1.59] | [15.42] | [2.08] | [0.80] | [0.75] | [1.29] | [1.17] | [3.34] | [4.36] | [2.02] |
| Number of domestic regular workers | 0.00022** | -0.00015*** | 0.00233*** | 0.00047*** | 0.00096*** | 0.00009 | 0.00008 | 0.00042 | 0.00032 | 0.00009 |
| | [2.10] | [3.09] | [14.87] | [5.75] | [3.11] | [0.88] | [0.74] | [1.31] | [0.92] | [1.26] |
| Number of domestic establishments | -0.00726** | 0.00055 | -0.21579*** | 0.00508* | 0.01020 | 0.00515 | 0.00622 | -0.01331 | -0.01529 | -0.00405* |
| | [1.97] | [0.34] | [38.13] | [1.72] | [0.75] | [1.34] | [1.62] | [1.19] | [1.20] | [1.82] |
| Number of domestic affiliates | 0.02149 | -0.01840*** | -0.06313*** | -0.12695*** | -0.05362 | 0.10114*** | 0.09849*** | -0.02427 | -0.03603 | 0.06588*** |
| | [1.52] | [2.87] | [2.96] | [11.68] | [1.02] | [7.00] | [6.83] | [0.53] | [0.73] | [7.22] |
| R&D expenditure-sales ratio (%) | 0.19131* | -0.04424 | -0.14789 | 0.07234 | -6.04918*** | 0.20895** | 0.25005** | 0.63709** | 0.49681 | 0.50267*** |
| | [1.94] | [1.02] | [0.98] | [0.74] | [23.50] | [2.04] | [2.44] | [2.08] | [1.44] | [8.40] |
| Value-added productivity (millions of yen, 1994 prices) | 0.00001 | 0.00051*** | 0.00000 | 0.00024** | -0.00006 | -0.00720*** | -0.00717*** | -0.00080** | -0.00046 | 0.00119*** |
| | [0.12] | [10.67] | [0.02] | [2.42] | [0.13] | [63.11] | [62.93] | [2.38] | [1.23] | [18.46] |
| ROA (Returns on asset, %) | 0.04832*** | 0.07691*** | 0.10012*** | 0.05777*** | 0.24389*** | -0.04048** | -0.04679*** | -1.18707*** | -0.95782*** | 0.03314*** |
| | [3.10] | [11.70] | [4.05] | [3.07] | [3.19] | [2.41] | [2.79] | [20.80] | [14.91] | [3.83] |
| ROE (Returns on equity, %) | -0.00010 | -0.00005 | 0.00062 | 0.00007 | -0.00018 | 0.00020 | 0.00023 | -0.00035 | -0.01546*** | -0.00023 |
| | [0.36] | [0.41] | [1.44] | [0.35] | [0.30] | [0.68] | [0.79] | [0.45] | [16.12] | [1.56] |
| Average wage (millions of yen) | -0.28658*** | 0.44380*** | -0.14426 | 0.12329 | 0.84995** | 0.68412*** | 0.58884*** | -0.34289 | -0.49448 | -5.46675*** |
| | [3.12] | [10.97] | [1.02] | [1.36] | [2.05] | [7.14] | [6.15] | [1.20] | [1.54] | [97.96] |
| Constant | 4.99349*** | -0.19025 | 17.47179*** | -1.13301 | 12.66467** | 0.96770 | 5.24802*** | -5.31994 | -1.32880 | 22.82191*** |
| | [4.65] | [0.40] | [10.54] | [0.86] | [2.15] | [0.86] | [4.68] | [1.58] | [0.35] | [35.07] |
| N | 66,267 | 66,266 | 66,267 | 32,755 | 19,813 | 66,267 | 66,267 | 53,889 | 52,310 | 66,267 |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.00 | 0.02 | 0.13 | 0.01 | 0.03 | 0.06 | 0.06 | 0.02 | 0.02 | 0.14 |

For notes and sources, see Table 5a.

**Table 6.  Regression Results: Determinants of Firm Survival**

| Independent variables (year t) | Dependent variable: survive dummy (year t+1) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Foreign-owned dummy | -0.02726 | -0.04073 | -0.04413 | -0.05779 | -0.03446 | -0.04542 | -0.05138 | -0.06256 |
| | [0.47] | [0.70] | [0.76] | [0.99] | [0.60] | [0.78] | [0.88] | [1.07] |
| Capital-labor ratio (millions of yen, 1994 prices) | -0.00020 | -0.00025 | -0.00021 | -0.00026 | -0.00032 | -0.00036 | -0.00031 | -0.00035 |
| | [0.50] | [0.62] | [0.52] | [0.63] | [0.76] | [0.84] | [0.74] | [0.81] |
| Age | 0.00530*** | 0.00508*** | 0.00566*** | 0.00548*** | 0.00533*** | 0.00510*** | 0.00570*** | 0.00551*** |
| | [10.50] | [9.83] | [11.23] | [10.61] | [10.60] | [9.91] | [11.34] | [10.71] |
| Number of domestic regular workers | 0.00014*** | 0.00013*** | 0.00013*** | 0.00012*** | 0.00014*** | 0.00013*** | 0.00013*** | 0.00012*** |
| | [8.56] | [7.81] | [8.43] | [7.64] | [8.60] | [7.82] | [8.46] | [7.65] |
| Number of domestic establishments | -0.00067*** | -0.00045** | -0.00064*** | -0.00042* | -0.00068*** | -0.00046** | -0.00064*** | -0.00042* |
| | [3.33] | [2.11] | [3.11] | [1.92] | [3.36] | [2.14] | [3.14] | [1.94] |
| Number of domestic affiliates | 0.00189 | 0.00245* | 0.00091 | 0.00147 | 0.00170 | 0.00232* | 0.00074 | 0.00136 |
| | [1.46] | [1.85] | [0.75] | [1.17] | [1.31] | [1.75] | [0.61] | [1.08] |
| R&D expenditure-sales ratio (%) | 0.03195*** | 0.01853*** | 0.03023*** | 0.01685*** | 0.03204*** | 0.01867*** | 0.03032*** | 0.01697*** |
| | [5.80] | [3.19] | [5.49] | [2.91] | [5.82] | [3.21] | [5.51] | [2.93] |
| Value-added productivity (millions of yen, 1994 prices) | | | | | 0.00001 | 0.00001 | 0.00001 | 0.00000 |
| | | | | | [1.10] | [0.92] | [0.97] | [0.82] |
| TFP | -0.00406 | -0.00143 | -0.00524 | -0.00243 | | | | |
| | [0.63] | [0.22] | [0.82] | [0.37] | | | | |
| ROA (Returns on asset, %) | 0.00999*** | 0.00987*** | 0.01004*** | 0.00993*** | 0.00993*** | 0.00983*** | 0.00998*** | 0.00989*** |
| | [13.94] | [13.73] | [13.99] | [13.79] | [13.84] | [13.67] | [13.89] | [13.73] |
| ROE (Returns on equity, %) | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 |
| | [0.63] | [0.67] | [0.69] | [0.72] | [0.63] | [0.67] | [0.69] | [0.72] |
| Average wage (millions of yen) | 0.01328*** | 0.01392*** | 0.01314*** | 0.01405*** | 0.01124*** | 0.01260*** | 0.01101*** | 0.01265*** |
| | [3.20] | [3.25] | [3.12] | [3.22] | [2.72] | [2.95] | [2.62] | [2.91] |
| Constant | 1.17671*** | 0.84059*** | 1.01954*** | 0.69995*** | 1.17343*** | 0.83932*** | 1.01618*** | 0.69846*** |
| | [47.22] | [19.78] | [38.10] | [16.10] | [47.47] | [19.81] | [38.22] | [16.11] |
| *N* | 71,279 | 71,279 | 71,279 | 71,279 | 71,279 | 71,279 | 71,279 | 71,279 |
| Year dummy | No | No | Yes | Yes | No | No | Yes | Yes |
| Industry dummy | No | Yes | No | Yes | No | Yes | No | Yes |
| Log-Likelihood | -17822.03 | -17705.76 | -17681.52 | -17566.74 | -17821.60 | -17705.35 | -17681.36 | -17566.46 |
| Akaike's information criteria | 0.50 | 0.50 | 0.50 | 0.49 | 0.50 | 0.50 | 0.50 | 0.49 |

Notes:     1) Random-effect probit model is used for estimation.

2) ***, **, * indicate level of significance at 1%, 5% and 10%.

3) Figures in brackets indicate t-statistics.

Source:     MITI Database