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Foreign Owners and Plant Survival

by

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Abstract

In recent years international capital flows of all types have increased dramatically and most governments have been actively encouraging inflows of direct investment. However, concerns remain that reliance on foreign multinationals may be a risky development strategy as foreign firms are likely to be less rooted in the local economy and may be quicker to close down production. This paper asks whether foreign owners are more likely to close plants than domestic owners. In Indonesia, plants with any foreign ownership are far *less* likely to close than wholly-owned domestic plants. However, the lower probability of shutdown is a result of the larger size of foreign plants rather than their nationality of ownership. Controlling for plant size and productivity, we find that foreign plants are significantly *more* likely to close than comparable domestic establishments.

JEL classification: F23, L25

Keywords: multinationals, shutdown, exit, closure, public ownership

Outline

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2. *Firms, Ownership and Plant Survival*
3. *Foreign-owned Plants in Indonesia, 1975-1989*
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Non-Technical Summary

The behavior of multinational corporations in developing countries is the subject of contentious, intense debate. Proponents of direct investment by foreign multinationals point to higher wages, technology transfer, access to markets, and increased product market competition. Detractors focus on lower labor and environmental standards and weak links to the local community. The opinions of potential host countries have changed over time. In the immediate post-colonial period, many developing countries were skeptical of foreign direct investment and associated foreign capital inflows with a loss of domestic sovereignty. Recently, international capital

flows of all types have increased dramatically and most governments have been actively encouraging inflows of direct investment by foreign multinationals through marketing, tax incentives, and outright subsidies. However, concerns remain that reliance on foreign multinationals may be a risky development strategy as foreign firms are likely to be less rooted in the local economy and may be quicker to close down production. In this paper, we test whether foreign ownership is associated with plant survival in the context of a developing economy.

Using data from 1975-1989 on Indonesian manufacturing establishments, we ask whether foreign ownership and the characteristics of foreign plants are associated with increased flexibility on the extensive margin, i.e. plant shutdowns. Our study has the advantage of using data on a large number of plants over a long time period where failure, characteristics, and foreign ownership are recorded for each plant every year.

Using a semiparametric estimation of the hazard function, we find that plants with some foreign ownership are far less likely to close down compared to plants that are completely domestically-owned. However, the higher survival rate among foreign-owned plants is caused by plant characteristics rather than by their nationality of ownership; foreign plants are much larger and have dramatically higher levels of productivity than domestically-owned plants. Controlling for such characteristics reveals that foreign ownership is associated with an increased probability of closure. Using information on changes of ownership, we confirm that foreign ownership, rather than unobserved plant characteristics, is associated with the lower survival rates.

1. Introduction

The behavior of multinational corporations in developing countries is the subject of contentious, intense debate. Proponents of direct investment by foreign multinationals point to higher wages, technology transfer, access to markets, and increased product market competition. Detractors focus on lower labor and environmental standards and weak links to the local community. The opinions of potential host countries have changed over time. In the immediate post-colonial period, many developing countries were sceptical of foreign direct investment and associated foreign capital inflows with a loss of domestic sovereignty. Recently, international capital flows of all types have increased dramatically and most governments have been actively encouraging inflows of direct investment by foreign multinationals through marketing, tax incentives, and outright subsidies. However, concerns remain that reliance on foreign multinationals may be a risky development strategy as foreign firms are likely to be less rooted in the local economy and may be quicker to close down production. In this paper, we test whether foreign ownership is associated with plant survival in the context of a developing economy.

Research on multinationals has tended to concentrate on plant location choices, characteristics of firms that become multinationals, and the effects of foreign operations on domestic (home) labor markets.¹ Research on the effects of foreign direct investment on host countries is less common, especially for developing countries, and has focused primarily on potential productivity spillovers.² Given the increasing importance of multinationals in manufacturing employment in developing countries, there is a surprising absence of work on the host country performance of multinational plants, especially on aspects of plant survival and labor demand.³

Rodrik (1997) and others argue that increased trade and foreign investment may have led to increases in the elasticity of labor demand. While

¹Examples of recent work in these three areas include Markusen (2002) Helpman, Melitz, and Yeaple (2003), and Blomström, Fors and Lipsey (1997).

²See Haddad and Harrison (1993) [Morocco], Aitken and Harrison (1999) [Venezuela], and Blomström and Sjöholm (1999) [Indonesia]. Lipsey (2002) surveys the literature on home and host country effects of foreign direct investment.

³Almost all the existing research on multinational behavior in developing country labor markets concentrates on wage levels, e.g. Lipsey and Sjöholm (2004).

numerous studies have documented increases in labor market volatility in OECD countries, see Fabbri, Haskel, and Slaughter (2003), to our knowledge no studies have asked whether multinationals survive longer in developing countries, or whether they have different labor demand elasticities.

Indeed, even in developed economies, few studies have examined if foreign-owned firms are more likely than domestically-owned firms to exit the domestic market. Looking at U.S. manufacturing plant deaths, Bernard and Jensen (2002) find that plants owned by U.S. multinationals are substantially less likely to close than other U.S. plants over five year intervals. However, they also find that controlling for establishment, firm, and industry characteristics, U.S. multinationals are more likely to close a domestic plant. Görg and Strobl (2003) find that Irish plants with majority foreign ownership are more likely to exit their sample of manufacturing plants, where exit can be either due to closure or a change in ownership.

Our paper provides the first evidence on the relationship between foreign ownership and plant survival in a developing country. Using data from 1975-1989 on Indonesian manufacturing establishments, we ask whether foreign ownership and the characteristics of foreign plants are associated with increased flexibility on the extensive margin, i.e. plant shutdowns. Our study has the advantage of using data on a large number of plants over a long time period where failure, characteristics, and foreign ownership are recorded for each plant every year.

Using a semiparametric estimation of the hazard function, we find that plants with some foreign ownership are far less likely to close down compared to plants that are completely domestically-owned. However, the higher survival rate among foreign-owned plants is caused by plant characteristics rather than by their nationality of ownership; foreign plants are much larger and have dramatically higher levels of productivity than domestically-owned plants. Controlling for such characteristics reveals that foreign ownership is associated with an *increased* probability of closure. Using information on changes of ownership (domestic \leftrightarrow foreign), we confirm that foreign ownership, rather than unobserved plant characteristics, is associated with the lower survival rates.

The rest of the paper is organized as follows: Section 2 surveys the literature on firms and plant shutdowns. Section 3 describes the data. In Section 4, we estimate the hazard function and identify the effects of

foreign ownership. Section 5 concludes.

2. Firms, Ownership and Plant Survival

Our paper asks whether the nationality of ownership is correlated with plant survival. Plant exit has been the subject of a large number of studies all of which have documented the importance of plant and industry characteristics for plant survival. Dunne, Roberts, and Samuelson (1988, 1989) established that plant survival is positively associated with both plant age and size and that exit rates vary across industries and persist over time. Subsequent studies have repeatedly confirmed these findings for different time periods in different countries, e.g. Disney, Haskel, and Haden (2003).

The role of firm characteristics, including the nationality of ownership, in plant failure is less well understood. The theoretical literature on the role of firms in plant closures focuses on behavior in declining industries, e.g. Ghemawat and Nalebuff (1985), and is generally limited to a discussion of the interaction of plant size and multi-plant firms. The role of multinationals in plant survival, or host country labor demand more generally, is absent from the theoretical literature.

Work in related areas implicitly suggests that firms with cross-border operations should be relatively flexible in terms of labor demand, see Helpman (1984) and Feenstra and Hanson (1997). In comparison with purely domestic firms, multinationals either have an enhanced ability to shift production between various locations within the firm, establish new production locations at a relatively lower cost, or more easily source inputs from foreign plants that are substitutes for local labor.⁴ All these factors should increase use of the extensive shutdown margin for foreign firms relative to domestic firms. However, foreign multinationals may face substantially higher sunk costs of plant creation in developing countries than do comparable domestic firms. Higher sunk entry costs should lead to lower exit rates for foreign firms, especially for greenfield investments. A recent set of empirical papers has argued that multinationals may actually improve plant performance during times of crisis by shielding them from liquidity

⁴Brainard and Riker (1997) argue that employment at affiliates of U.S. multinationals in less developed economies is a complement to employment in affiliates in developed countries.

constraints, thus presumably increasing their chances for survival.⁵

Empirical work on firm characteristics such as ownership and plant exit is also relatively limited. Bernard and Jensen (2002) find that unconditional survival probabilities are higher for U.S. plants that are part of multi-plant and multinational firms. Conditioning on plant characteristics, they find reduced survival rates at those same firm types. Görg and Strobl (2003) also find increased probabilities of exit for Irish plants that are majority foreign-owned. Disney et al (2003) find differences in exit behavior for stand-alone and group establishments. This paper adds to this recent literature by explicitly separating the effects of ownership from the role of plant characteristics and by providing the first study of plant survival in a developing country context.

3. Foreign-owned plants in Indonesia, 1975-1989

Indonesia has changed its policy towards foreign direct investment considerably over the years. After independence in 1949, Indonesia pursued an inward looking development policy with severe restrictions on foreign multinationals. Foreign firms were only allowed in some sectors of the economy and some Dutch firms were even nationalized by the Indonesian government. This suspicion of foreign interests in general and of foreign multinationals in particular, was caused by a host of factors, ranging from the generally accepted development paradigm of the 1950s, to the experience of colonization under the Dutch, and an attempt by President Sukarno to unite the ethnically very heterogeneous country by a supposed foreign threat to the nation.

The restrictive policy towards foreign direct investment continued, with a brief period of a more outward looking policy in the late 1960s, until the beginning of the 1980s when falling prices of oil and other raw-materials forced Indonesia to change development strategy. Manufacturing was emphasized and developed partly through inflows of foreign multinationals. The reforms included reductions in import licensing restrictions and relax-

⁵Blalock, Gertler, and Levine (2003) and Amiti and Wei (2003) focus on Indonesian plants during the financial crisis in the late 1990s. Desai, Foley, and Forbes (2003) consider the relative performance of U.S. multinational affiliate in a number of currency crises. However, none of these papers explicitly considers the effects of multinational ownership on plant survival.

ation of foreign investment rules. Our study spans several of these foreign investment regimes, starting in 1975 and continuing through 1989.

3.1. Data

One reason for the lack of empirical studies on ownership and plant survival rates is the relatively high data requirement for such an analysis. Starting with a panel of plants and their characteristics over time (now available from numerous countries), one needs to have information on the national origin of ownership, which is often not collected in economic censuses. Secondly, the survey must accurately record plant deaths separately from other reasons for exiting the sample such as a change in ownership or the level of employment falling below a sampling threshold.⁶

For this paper we use information from the Indonesian manufacturing census which has been collected annually since 1975.⁷ From 1975 to 1989, once a plant entered the manufacturing census sample, it was kept in the sample until its failure. Data was also collected on the ownership shares in the hands of public-domestic, private-domestic, and foreign entities. While the annual Indonesian manufacturing censuses continued after 1989, beginning in 1990 plants were excluded from the sample if their size fell below 20 employees. Thus it is not possible to know if a plant exits in the 1990s because of a closure or because of a decrease in size. Since small plants are likely to have a relatively high exit rate (Bernard and Jensen, 2002, Disney et al, 2003) and since foreign plants tend to be relatively large, this is likely to seriously bias any results on ownership and plant closure. As a result we must restrict our analysis to data between 1975 and 1989 and cannot include the 1990s, a period of substantial growth in foreign investment into Indonesia.

Before we formally test for any relationship between foreign ownership and plant exit, we provide a brief description of the data. The share of manufacturing employment and value added for plants with some foreign ownership is given in Table 1. The foreign share of value added is higher than the foreign share of employment, reflecting higher labor productivity

⁶In the Irish data used by Görg and Strobl (2003), plants exit if they change owners regardless of nationality.

⁷Our data includes revisions from the so-called ‘backcast’ sample which provides important corrections for errors in the raw data.

in foreign-owned plants. The foreign share is relatively constant during the sample at around 8 percent of employment and 20 percent of value added. However, output and employment shares accounted by foreign plants vary across industries; they are relatively high in Fabricated Metal Products and relatively low in Food Products and in Paper and Pulp. In our econometric analysis, we allow for differences in survival rates by industry.

Foreign ownership usually coincides with foreign control during this period, as seen in Figure 1. More than 80 percent of the plants with some foreign ownership are majority foreign-owned, although wholly-owned foreign plants are far less common, only 15% of the sample. The median 'foreign' plant has both foreign and domestic owners with 70 percent of the capital in foreign hands.

Table 2 shows the fraction of foreign and domestic plants that are still operating after one and five years. Across industries the one year survival rate is typically lower for domestic than for foreign plants, ranging from 91-100 percent. After five years, the difference between foreign and domestic plants has increased: 68-83 percent of foreign plants and between 59-78 percent of domestic plants are still operating. The exit rate differs between sectors and is relatively high in Wood products and low in Chemicals.

These one and five year survival rates suggest that foreign plants have a lower propensity than domestic plants to shut down. However, this is not necessarily caused by the differences in ownership since foreign and domestic plants might differ in characteristics that affect the likelihood of a closure. Table 3 compares the size, age and productivity of domestically-owned and foreign-owned plants. The average size of a foreign plant increases from 207 employees in 1975 to about 372 in 1989. The corresponding size for domestically-owned plants is substantially smaller, 87 and 141 employees in 1975 and 1989 respectively. Foreign plants are larger than domestic plants in all years and in all industries with the exception of Basic Metal, i.e. iron and steel plants.

Our productivity measure is the percent deviation from the mean plant labor productivity level in the industry and year. By this measure, foreign-owned plants are almost twice as productive as the average plant in 1975, while wholly-domestic plants have productivity levels 3.4 percent below the average. The gap in productivity between foreign-owned and domestically-owned plants is found in every sector in all years and seems to increase

over time. Age shows no systematic differences across ownership types; domestic plants are slightly older than foreign plants in 1975 but there is no difference in age in 1989.

The results presented here suggest that domestically-owned plants have a higher exit rate than foreign-owned plants but they are also smaller and less productive. In the next section, we continue with an econometric analysis to further disentangle the effect of ownership on plant closure from the effects of other plant characteristics.

4. Estimation

In this paper, we consider the role of foreign ownership on employment adjustment through the extensive margin, i.e. plant shutdown.⁸ Unlike many settings in economics, we are not fundamentally interested in the shape of the baseline hazard, but instead focus on the effect of covariates on the hazard. As a result, we employ a semiparametric Cox proportional hazard model for most of our estimations. This assumes that the hazard, $\lambda(t; \mathbf{x})$, takes the form,

$$\begin{aligned} \lambda(t; \mathbf{x}_t) &= \lim_{h \downarrow 0} \frac{P(t \leq T \leq t + h | T \geq t, \mathbf{x}_t)}{h} \\ &= \kappa(\mathbf{x}_t) \lambda_0(t) \end{aligned} \tag{1}$$

where $\kappa(\cdot)$ is a nonnegative function of \mathbf{x}_t and $\lambda_0(t) > 0$ is the baseline hazard (see Wooldridge (2002)).⁹

We start by considering the simplest nonparametric estimate of the survivor function, $S(t)$, i.e. the probability of surviving past time t . The Kaplan-Meier estimate of the survivor function is given by

$$\hat{S}(t) = \prod_{j|t_j \leq t} \left(\frac{n_j - d_j}{n_j} \right) \tag{2}$$

where n_j is the number of plants that have survived to t_j years of age and d_j is the number of plants that die at age t_j . Figure 2 shows a nonparametric

⁸Of equal interest is whether employment volatility or job duration are higher at foreign-owned plants. We leave this to future research.

⁹Parametric estimations assuming Weibull (proportional and accelerated time), Gompertz, log-normal or Gamma distributions yielded identical conclusions.

estimate of the survivor function for two types of plants: those with no foreign ownership and those with some foreign ownership. Analysis time represents the number of years that the plant has been in the sample.

These results confirm our priors about the relative survival performance of foreign-owned and domestic plants. Survival probabilities are significantly higher at all time horizons for foreign-owned plants. After fifteen years the cumulative probability of exit is almost twice as large for domestic plants (68%) than for foreign plants (39%). However, these nonparametric estimates do not give us information on the source of the lower hazards for foreign plants.

4.1. Ownership and plant characteristics

In this section we consider the nature of the survival advantage for foreign-owned firms. Specifically, we ask whether foreign ownership itself is linked to improved survival probabilities or whether foreign-owned plants have characteristics associated with lower failure probabilities. The research described in section 2 suggests that hazard rates are likely to vary across industries, in particular due to sunk costs of entry. We allow the baseline hazard, $\lambda_0(t)$, to vary by industry, region, and year of initial operation, $\lambda_0(t) = \lambda_{i,r,sy,0}(t)$. This allows us to control for geography, industry, and cohort effects in a nonparametric fashion. The effects of ownership type and plant characteristics shift the hazard proportional to these baselines.¹⁰

Row (I) in Table 4 confirms the nonparametric result given above. Foreign plants have a significantly lower hazard ratio than domestic plants (0.57). Similarly in Row II, we find that plants with some public ownership (public) also have a significantly lower hazard than privately held plants.¹¹

To check the source of these higher survival probabilities, we first add the natural log of employment to control for the large variation in plant size between foreign and domestic plants. Size is strongly negatively related to the hazard, and, in fact, is sufficient to fully explain the improved survival chances of both foreign and public plants, as seen in Rows III-V in Table 4.

¹⁰None of the conclusions are sensitive to this stratification of the baseline hazards.

¹¹Restricting the sample to just domestic firms left the results on public ownership unchanged as did including the foreign ownership dummy.

After the inclusion of plant size, neither foreign-owned nor publicly-owned plants show any better survival performance. This result strongly suggests that neither foreign nor public ownership provide improved survival chances beyond the larger size of the plants.

In row VI, we estimate the hazard with the ownership dummies and a measure of plant productivity. The productivity variable is defined as the percent difference in value-added per worker at the plant from that at the average plant in the industry in the year. This within-industry labor productivity measure is less than ideal as it captures a variety of effects beyond differences in multi-factor productivity, including differential mark-ups across plants and variation in capital intensity.¹² The labor productivity measure is positively and significantly correlated with plant survival. However, while it reduces the estimated effects of both types of ownership, it does not completely undue them.

Finally, we estimate the hazard with both ownership variables, size and productivity in Row VII. Now we find that foreign-owned plants have significantly *higher* hazards than comparable domestic plants. Adjusting for the beneficial effects of their larger size and greater labor productivity, foreign-owned plants are 20% more likely to close in any year than domestic plants. In contrast, public ownership remains uncorrelated with survival.

As a robustness check, in Table 5, we consider the effects of additional plant characteristics on the estimated hazard.¹³ In Row VIII, we include the share of white collar workers at the plant as a measure of the composition of the workforce and the share of inputs that are imported to proxy for foreign exposure of the plant. In Row IX, we supplement the specification with log inputs per employee, log energy used per employee (a proxy for capital), and the log wage per worker, all measured as percent deviations from the value at the average plant. The addition of these variables does not affect the sign, magnitude, or significance of the estimated coefficient on foreign ownership, public ownership, size or productivity. Foreign-owned plants remain significantly more likely to fail (22-31 percent) than comparable domestic establishments while public ownership neither improves nor

¹²We are limited in the construction of plant performance measures by the absence of both measures of capital stocks and adequate industry price deflators.

¹³The estimates in this table run from 1978-1989 as imported input shares are not recorded from 1975-1977. None of the results are sensitive to this change in the sample.

harms plant survival.¹⁴

4.2. *Types of foreign plants*

Our data permit us to examine the effect of foreign ownership in more detail. First, we ask whether the increased hazard at foreign-owned plants differs according to whether the plant had foreign capital from the beginning (greenfield) or whether some fraction of the capital was purchased by a foreign entity after startup (takeover).¹⁵ If foreign ownership itself increases the hazard, then both the greenfield and takeover measures should be greater than one. If, instead, the higher foreign hazard is associated with attributes of the plant itself, it should appear for greenfield plants but not for plants that are acquired by foreign owners. In Table 6 we find that both types of foreign-owned plants have higher hazards than domestic plants. In fact, the hazard ratio for acquired plants is higher than that for greenfield plants. We also include a dummy for domestic plants that previously had foreign ownership. The “formerly-foreign” plants do not have significantly different hazards than other domestic plants.

These results suggest that foreign ownership itself may be the source of the increased shutdown probability rather than unobserved plant characteristics associated with foreign-owned establishments. The higher hazards for foreign plants appear at plants that switch from domestic to foreign ownership but they do not persist after a sale back to domestic owners.

Finally, we check whether the degree of foreign holdings affects the probability of closure. As noted above, more than 80% of the plants with any foreign ownership are majority-owned (50+%) by foreigners. In Table 7, we allow for differential effects of majority and minority foreign ownership.¹⁶ Both types of foreign-owned plants have higher hazards,

¹⁴Higher imported input shares are associated with a significantly lower probability of plant shutdown. High levels of imported inputs may signal plants of higher quality, such as exporters. Higher shares of white collar workers are surprisingly associated with higher hazard rates. Instead of signalling a more skilled workforce, this variable may instead capture plants that are at odds with Indonesia’s comparative advantage or plants with large numbers of inefficient overhead staff.

¹⁵The "takeover" dummy is zero in the years before the ownership changes hands, and one while there is positive foreign ownership.

¹⁶It is likely that even the plants with foreign holdings below 50% are in fact controlled by foreign firms. The mean foreign ownership at these "minority" plants is 38%.

although the coefficient for foreign minority-owned plants is significant at only the 11% level.¹⁷ We are unable to reject the equality of the coefficients for the majority and minority dummies and a joint test that the hazard ratios are equal to one is rejected at the 5% level leading us to conclude that there is no substantial difference in the effects of majority and minority holdings by foreigners.

5. Conclusions

This paper has investigated the relationship between foreign ownership and plant survival in a developing country. Using data from 1975-1989 for the Indonesian manufacturing sector, we find that plants with some foreign ownership have dramatically lower failure probabilities than plants with only domestic owners in the same industry and region. However, these same foreign-owned plants are also substantially different from their domestic counterparts in terms of size and productivity, factors that work to reduce the probability of shutdown.

Controlling for size and productivity, we find that foreign-owned plants are 20 percent more likely to close than purely domestic plants. To check whether our results are driven by the characteristics of the plant, we examine changes of ownership from domestic to foreign and back. We find that foreign greenfield plants and foreign acquisitions of domestic plants have similar, significantly higher hazards than any type of domestic plant.

Relative to the average domestic plant, foreign plants have desirable characteristics that reduce their probability of failure. At the same time, the presence of foreign owners substantially decreases the plant survival rate. Multinational firms use the extensive margin available to them to close plants more often than their domestic counterparts. Our results suggest that work on multinationals both at home and abroad should explicitly control for increased plant hazard rates, e.g. the higher wages for workers at multinational plants after controlling for size and other characteristics may in part reflect the higher probability of plant shutdown. In light of the explosion of foreign direct investment in recent years, substantial further research is needed to explore the role of multinationals in both home and

¹⁷This is probably due to the relatively small sample size, the coefficient is actually larger for this group.

host labor markets.

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Sector		Foreign share	
		1975	1989
Total	employment	7.7	8.0
	value added	19.6	22.5
Food	employment	3.8	3.7
	value added	16.7	7.5
Textiles	employment	7.4	8.4
	value added	25.3	21.9
Wood	employment	11.1	8.0
	value added	23.9	13.8
Paper	employment	7.2	4.1
	value added	17.4	11.3
Chemicals	employment	13.9	10.9
	value added	21.8	24.4
Non-Metal	employment	6.8	5.4
	value added	12.0	17.5
Basic Metal	employment	6.8	5.4
	value added	16.3	24.9
Fabricated Metal	employment	17.0	15.9
	value added	22.6	52.1
Other	employment	4.5	6.0
	value added	1.7	17.3

Table 1: Share of industry employment and output by ownership type

Sector	ISIC	Fraction remaining			
		One year later		Five years later	
		domestic	foreign	domestic	foreign
All		0.93	0.96	0.68	0.78
Food	31	0.93	0.97	0.69	0.83
Textiles	32	0.91	0.94	0.65	0.78
Wood	33	0.90	0.92	0.59	0.68
Paper	34	0.94	1.00	0.76	0.78
Chemicals	35	0.98	0.96	0.78	0.80
Non-metal	36	0.95	0.88	0.67	0.81
Basic Metal	37	1.00	1.00	0.78	0.70
Fabricated Metal	38	0.98	1.00	0.75	0.78

Note: Foreign plants are those with any amount of foreign ownership in the initial year.

Table 2: Survival rates by industry and ownership

Sector		1975		1989	
		Domestic	Foreign	Domestic	Foreign
All	Size (employees)	87	207	141	372
	Productivity (% deviation)	-3.4	98.8	-5.3	159.5
	Age (years)	10.7	9.5	12.7	12.9
	Number of plants	7162	250	13898	462
Food	Size (employees)	111	166	133	301
	Productivity (% deviation)	-2.6	101	-3.5	205.4
	Age (years)	11.7	16.6	14.7	16.4
	Number of plants	2253	59	4133	71
Textile	Size (employees)	79	416	153	735
	Productivity (% deviation)	-1.2	79	-2.8	146.2
	Age (years)	10.9	10.7	12.8	12.4
	Number of plants	2258	34	3129	60
Wood	Size (employees)	58	146	185	570
	Productivity (% deviation)	-1.7	33.3	-3.1	109
	Age (years)	7.8	8.8	8.1	10.5
	Number of plants	482	24	1629	46
Paper	Size (employees)	69	157	99	286
	Productivity (% deviation)	-4.4	130.4	-1.7	111.5
	Age (years)	14.5	4.7	16.4	12.1
	Number of plants	324	11	608	9
Chemicals	Size (employees)	85	146	158	225
	Productivity (% deviation)	-12.4	131.1	-13.5	156.3
	Age (years)	9.6	7	13	14.1
	Number of plants	601	57	1666	144
Non-metal	Size (employees)	50	260	80	421
	Productivity (% deviation)	-1.5	110	-2.3	206.5
	Age (years)	9.1	11.4	11.5	10.3
	Number of plants	570	8	1184	13
Basic metal	Size (employees)	167	96	548	535
	Productivity (% deviation)	-9.6	35.2	-16.1	60.4
	Age (years)	3.9	2	9.4	7
	Number of plants	11	3	30	8
Fabricated metal	Size (employees)	98	222	139	319
	Productivity (% deviation)	-9.1	100.6	-13.9	168
	Age (years)	9.6	4.8	11.8	10.9
	Number of plants	589	53	1293	107
Other	Size (employees)	48	167	86	313
	Productivity (% deviation)	-0.3	20.6	-2.9	164.8
	Age (years)	10	4	10.3	12.3
	Number of plants	74	1	226	4

Note: Domestic plants have 100 percent domestic ownership. Foreign plants have some foreign ownership. Productivity is measured as the percent deviation in value-added per worker for the average plant in the industry for that year.

Table 3: Average plant characteristics by industry and ownership

Specification	Variable	1975-1989			
		Hazard Ratio	Std.Err.	z	p-value
(I)	foreign	0.57	0.04	-7.38	0.00
(II)	public	0.61	0.04	-7.62	0.00
(III)	foreign	1.04	0.08	0.49	0.63
	log employment	0.58	0.01	-38.52	0.00
(IV)	public	0.93	0.06	-1.20	0.23
	log employment	0.58	0.01	-38.41	0.00
(V)	foreign	1.03	0.08	0.44	0.66
	public	0.93	0.06	-1.18	0.24
	log employment	0.58	0.01	-38.10	0.00
(VI)	foreign	0.76	0.06	-3.57	0.00
	public	0.69	0.04	-5.76	0.00
	labor productivity	0.79	0.01	-24.26	0.00
(VII)	foreign	1.22	0.10	2.57	0.01
	public	0.98	0.06	-0.25	0.80
	log employment	0.60	0.01	-34.61	0.00
	labor productivity	0.85	0.01	-15.62	0.00

Note: The baseline hazard is allowed to vary over region-industry-startyear groups. All standard errors are clustered on plants. Labor productivity is measured as the percent difference in value-added per worker from the average plant in the industry-year group.

Table 4: Basic Hazards

Specification	Variable	Hazard Ratio	1978-1989		
			Std.Err.	z	p-value
(VIII)	foreign	1.26	0.11	2.71	0.01
	public	0.97	0.07	-0.50	0.62
	log employment	0.60	0.01	-32.56	0.00
	labor productivity	0.86	0.01	-13.84	0.00
	white collar labor share	1.36	0.10	4.03	0.00
	imported input share	0.91	0.05	-1.87	0.06
(IX)	foreign	1.31	0.11	3.12	0.00
	public	0.99	0.07	-0.10	0.92
	log employment	0.60	0.01	-30.68	0.00
	labor productivity	0.92	0.02	-4.22	0.00
	white collar labor share	1.50	0.12	5.11	0.00
	imported input share	0.90	0.05	-1.97	0.05
	inputs/employee	0.98	0.01	-1.63	0.10
	energy/employee	0.98	0.01	-2.03	0.04
	average wage	0.90	0.02	-5.14	0.00

Note: The baseline hazard is allowed to vary over region-industry-startyear groups. All standard errors are clustered on plants. Labor productivity, inputs/employee, energy/employee and the average wage are measured as the percent difference from the value in average plant in the industry-year group.

Table 5: Hazards with Additional Plant Characteristics

Specification	Variable	1978-1989			
		Hazard Ratio	Std.Err.	z	p-value
(X)	foreign - greenfield	1.22	0.12	2.06	0.04
	foreign - takeover	1.41	0.23	2.08	0.04
	domestic - takeover	1.05	0.09	0.52	0.61
	public	0.97	0.07	-0.50	0.62
	log employment	0.60	0.01	-32.56	0.00
	labor productivity	0.86	0.01	-13.83	0.00
	white collar labor share	1.37	0.11	4.06	0.00
	imported input share	0.91	0.05	-1.85	0.06

Note: The baseline hazard is allowed to vary over region-industry-startyear groups. All standard errors are clustered on plants. Labor productivity is measured as the percent difference in value-added per worker from the average plant in the industry-year group.

Table 6: Greenfield and Takeovers

Specification	Variable	1975-1989			
		Hazard Ratio	Std.Err.	z	p-value
(XI)	foreign - minority	1.30	0.22	1.58	0.11
	foreign - majority	1.24	0.12	2.31	0.02
	public	0.97	0.07	-0.50	0.62
	log employment	0.60	0.01	-32.57	0.00
	labor productivity	0.86	0.01	-13.84	0.00
	white collar labor share	1.36	0.10	4.03	0.00
	imported input share	0.91	0.05	-1.86	0.06

Note: The baseline hazard is allowed to vary over region-industry-startyear groups. All standard errors are clustered on plants. Labor productivity is measured as the percent difference in value-added per worker from the average plant in the industry-year group.

Table 7: Minority vs. Majority Ownership