

# Multinationals and Plant Survival in Swedish manufacturing

by

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## Abstract

This paper analyzes the survival differences between foreign and domestic MNEs, on one hand and between globally engaged plants and purely domestic plants, on the other. This paper also investigates separately how foreign presence affects the survival prospects of the domestic MNEs, export-active and purely domestic-oriented plants. Using a panel of the entire Swedish manufacturing plants during the period 1993 and 2002 the results suggest that plants owned by MNEs have higher probability to exit the market than plants owned by Swedish non-MNEs. The results are robust even when other variables affecting the survival probabilities are controlled for. The results also reveal that foreign MNEs and export active plants have the highest survival rates while the domestic oriented and especially domestic MNEs have the lowest rates. Foreign presence seems to explain some part of the exit risk of domestic oriented plants but not of Swedish MNEs. The estimates also indicate that older, larger and more productive plants and plants in export intensive and growing industries have the highest surviving rates.

**Key words:** Survival analysis, multinational enterprises, foreign ownership

**JEL classification:** C41, F23, J31

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## 1. Introduction

International capital flows and, most important, foreign direct investment (FDI) have increased substantially during the 1990s. Most government, including Sweden, have launched liberal reforms, e.g. tax reduction, market deregulation and financial support, in order to attract FDI. This strategy has caused major concerns due to the risk involved in relying on foreign multinationals (MNEs). The effects of foreign MNEs on host country companies are unclear. On one hand, inward FDI is an important channel for technological transfer into the host country. The superior knowledge imposed by foreign MNEs can lead to technology spillovers and thus higher survival prospects to the domestic companies. On the other hand, the presence of foreign MNEs and the high competition that follows may force domestic companies into bankruptcy. Moreover, since foreign MNEs are less rooted in the local economy they can shift their production to another country whenever the present environment changes to their disadvantages.

Although it is important to study the effect of foreign ownership on the domestic companies survival prospects and to analyse whether there is differences in the survival between them, little attention has been made in this area. The focus in the earlier literature has been on identifying a set of plant (firm) characteristics that are associated with survival. Only few studies have compared the survival patterns of foreign and domestic plant (firm) and the findings are ambiguous (see section 2). The main shortcoming in these studies is the lack of separating the indigenous plants (firms) into multinationals and non-multinationals<sup>1</sup>. This is crucial since MNEs are associated with high flexibility and can through their engagement with international networks easily shift their production between countries. This footloose behaviour of MNEs is regardless of the nationality of ownership.

To my knowledge, no study has ever compared the survival of foreign MNEs and domestic MNEs, in one hand, and of globally engaged plants and domestic oriented non-MNEs, on the other. Moreover, this paper will provide the first empirical analyse in how foreign presence affect the survival prospect of domestic MNEs, domestic non-MNEs and export-oriented plants separately. The aim of this paper is then three-fold: i) to empirically test whether

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<sup>1</sup> These studies have failed in other aspects as well. For example i) the data does not separate merger and acquisitions from true exits (e.g. Mata and Portugal, 2002 and Görg and Strobl, 2003), ii) the data include only larger plants. Plants exit can be due closure or due decreasing in size (e.g. Alvarez and Görg, 2005), iii) the data does not cover the 1990s which had high growth in inward foreign direct investment (FDI) relative to previous decades (e.g. Bernard and Sjöholm, 2003)

MNEs, Swedish-owned MNEs and foreign-owned MNEs, located in Swedish manufacturing have different survival rates than domestic non-MNEs, ii) whether globally engaged and purely domestic plants exhibit different survival rate and iii) whether foreign presence have any impact on domestic plants survivability.

The finding reveals that during the period 1993-2002 Swedish manufacturing plants owned by MNEs (foreign and Swedish) are more likely to exit the market than Swedish non-MNEs. The results stand even when other plant- firm- and industry specific variables are controlled for.

The survival probability is reduced by 30 percent if the plants are owned by foreign MNEs and by 40 percent if the plants are owned by Swedish MNEs. This result support the idea that MNE plants, and in particular plants of Swedish MNEs, are inherently footloose. The estimates also indicate that older, larger and more productive plants have higher survival rates. Furthermore, plants in export intensive and growing industries seem to be less likely to close. In estimating how globally engaged plants perform in regards to survival I find that foreign MNEs and export oriented Swedish plants have the highest survival rates and that purely domestic plants and especially Swedish MNEs have the lowest. Finally, foreign presence seems to have a negative effect on the survival only to purely Swedish non-MNEs.

The plan of the paper is as follows. In section 2 I will present the basic premise on the determinants on survival and summarize the main empirical results. Section 3 presents the data and shows some descriptive statistics on foreign and Swedish MNEs and domestic non-MNEs to see to what extent they differ. Section 4 presents the model used in this paper and the results of the survival function and Cox proportional hazard model. Section 5 summarizes and concludes.

## **2. Determining survival**

The existing theoretical and empirical works about the factors determining survival have recently being summarized by Sutton (1997), Caves (1998) and Audretsch and klepper (2000). The determinants or the factors affecting the probability of plants (or firms) survival or failure are gathered in three groups.

The first group, analysed by Evans (1987), Dunne et al (1988) and Dunne and Hughes (1994) etc., includes plants (firms) age and size. The literature has emphasized that we would expect the probability of exit to decline with age and size. There have been several suggestions why we would expect it to be so. First; new entrants have greater risk of failure than incumbents since they face the “liability of newness” effect (Stinchcombe, 1965), that is not knowing which performance and efficiency level they have to keep in order to stay in business. Eventually, when the plant (firm) goes through a process of learning about their own efficiency and about the market environment they act in, they grow older and the risk of exit can be reduced (Jovanovic, 1982). Second; new entrants, in general tend to start at relatively small size and therefore may face the “liability of smallness” effect (Aldrich and Auster, 1986) including cost disadvantages, difficulties in rising capital and competing for labor<sup>2</sup>. Therefore, small plants (firms) should be more likely to exit than large ones.

The second group of determinants, analysed by Doms et al (1995), Audretsch and Mahmood (1995) and Mata and Portugal (2002) etc., includes plant (firm) and industry characteristics such as capital intensity, productivity, industry growth and concentration. Plants (firms) using advanced technologies and having high productivity are more likely to adopt new production methods and therefore may increase their survivability. Regards to industry characteristics, plants (firms) in growing industry are more likely to survive while the effects of industry concentration on survival is ambiguous.

The third group of determinants can be divided into three subgroups including ownership structure of the plants (firms) (single or multi-unit ownership), whether the plants (firms) are globally engaged or not and how foreign ownership and foreign acquisitions affect the survival prospects.

Dunne et al (1989) and Disney et al (2003) find that group ownership, i.e. multi-unit plants, increases the probabilities of survival in US and UK manufacturing, respectively, while Bernard and Jensen (2005) find, after controlling for plant variables known to reduce the survival rates, that single plants rather than multi-unit plants enjoy better survival prospects in US manufacturing.

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<sup>2</sup> For a comprehensive discussion why new firms in general are small when they enter the market see Mata and Portugal (2002).

Kimura and Fujii (2003) and Esteve Pérez et al. (2004) included firms export status among the determinants of the probability of surviving. The authors find a positive effect meaning that globally engaged firms have greater chances to survive than domestic oriented firms in the Japanese and Spanish manufacturing, respectively.

Mata and Portugal (2002) investigate whether foreign and domestic firms experience different chances of survival in Portugal. The result reveals, after controlling for a range of determinates, no significant differences in the exit rate between the two types of firms. Görg and Strobl (2003) ask whether foreign owners are more likely to shutdown than domestic owners. Controlling for other plant and industry specific characteristics the authors find that foreign owned plants are more footloose, i.e. shifting their production whenever there are adverse changes in the host country, than indigenous plants in the Irish manufacturing. Girma and Görg (2003) investigate the survival prospects of foreign acquired plant in the UK electronics and food industries in the 1980s and early 1990s. They find that foreign takeover have negative effect on the plant survival in both industries. Bernard and Sjöholm (2003) find that foreign owned plants as well as foreign greenfield and plants who shifted from being domestic owned to foreign-owned are more likely to close than domestic plants. Özler and Taymaz (2004) find no evidence for different survival probability between domestic and foreign owned firms in Turkish manufacturing industries. Alvarez and Görg (2005) show that foreign-owned plants have a lower probability of survival than domestic plants in Chilean manufacturing industries. However this is true only for the late 1990s.

Although, recent studies have more focused on the ownership structure of the establishment in determining survival, little attention, theoretically and empirically, has been made on how foreign presence affects the host country plants (firms) survival. As discussed in Görg and Strobl (2000) the effects of foreign presence are ambiguous. On one hand, foreign presence can affect the host country plants (firms) survival positive. This entails however, knowledge and technological spillover from foreign MNEs to indigenous company in order to increase the performance and the survival probabilities. On the other hand, domestic companies, which in general are less endowed with advanced technique, may find it hard to stay in business due to the competition imposed by foreign MNEs.

In analyzing how the structure of ownership influence the exposure to exit risk one must consider the differences in characteristics, which are associated with survival, between foreign

and domestic establishment. The first and second group of determinants as well as the work of Bernard and Sjöholm (2003) shows us that plant (firm) and industry characteristics may account for the whole differences in the survival between foreign and domestic ownership. We know from previous literature (see e.g. Aitken et al, 1996, Girma et al, 2002 and Karpaty, 2004) that foreign owned establishment differ in many respects from indigenous firms. Recent studies have showed that there are differences even within the domestic owned plants (firms)<sup>3</sup>. Thus, to make a proper inference about how the survival is being affected by foreign ownership contra domestic counterparts it is crucial to separate the latter into MNEs and non-MNEs, on one hand and into globally active and purely domestic plants (firms), on the other.

In distinction to the existing literature I can separate the domestic plants into different ownership type. Hence, this paper will contribute to the existing literature in i) directly identifying the systematical relationship between different ownership structure and the probability of surviving and ii) empirically study the effects of foreign presence of the host country plants survival.

### **3. Data and description**

The dataset used in this paper come from Statistics Sweden (SCB) and Swedish Institute for Growth Policy Studies (ITPS) and contains information on the financial accounts of enterprises, register-based labor statistics and foreign trade statistics. The derived panel, covering the period 1993-2002, includes the entire Swedish manufacturing plants for which age, number of employment divided into different skill-level and firm and industry code number are reported for<sup>4</sup>. The firm code numbers enables us to link each plant to its incorporated firm. In that way we can use firm level variables such as labor productivity and capital-labor ratio at the plant level.

We are also able to divide the plants into different ownership status in using the firm code number. More specific, the plants can be divided into multinationals (Swedish owned MNEs

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<sup>3</sup> Hansson and Lundin (2004) found that productivity and output growth of exporters was significantly different from that of non-exporters in Swedish manufacturing. Doms and Jensen (1998) and Bandick (2004) state that the main differences are between multinationals (foreign and domestically owned) and non-multinational rather than between foreign and domestic owned firms.

<sup>4</sup> I chose 1993 as the start year since at that year and onward I am able to separate domestic ownership into MNEs and non-MNEs.

or foreign-owned MNEs) and Swedish owned non-multinationals (non-MNEs). A Swedish owned multinational plant is a domestically owned plant that are incorporated with domestically owned firm that has at least one affiliate abroad or are part of an enterprise group that has affiliates abroad. The plants are defined as foreign-owned if foreign investors possess more than 50 percent of the voting rights and Swedish non-MNEs are plants that neither are Swedish MNEs nor are foreign MNEs.<sup>5,6</sup> The industry code numbers enables us to link industry level variables such as industry sales and employment growth, import- and export intensity at the plant level.

The advantage of our dataset relative to all these in previous study in examining the survival patters between foreign and domestic ownership is that we are able to control for different ownership structure of the plants, i.e. MNEs contra non-MNEs and globally engaged contra domestic oriented. This is important since different ownership structure may have different survival prospects. Moreover, the data in previous studies: i) does not sort out mergers and acquisitions from true exits (e.g. Mata and Portugal, 2002 and Görg and Strobl, 2003), ii) include only larger plants resulting in not knowing whether the exit is due to closure or due to decreasing in size (e.g. Alvarez and Görg, 2005) and iii) does not cover the 1990s which had high growth in inward foreign direct investment (FDI) relative to previous decades (e.g. Bernard and Sjöholm, 2003). 1990s is more important and interesting period to study than previous years.

During 1990s Sweden also experienced high inward FDI. Figure 1 illustrates how the employment shares have developed for Swedish and foreign MNEs and for Swedish non-MNEs during the past decade. The employment share in Swedish MNEs dropped from 47 to 29 percent. At the same time the employment share in Swedish non-MNEs and foreign-owned MNEs increased by 2 and 16 percent, respectively. During this period several large Swedish MNE, e.g. Pharmacia and Upjohn in 1995 and Ford and Volvo Car Corporation in 1999, has become foreign owned due to merger/acquisition. Other explanations to the increased foreign ownership in Swedish manufacturing are among others; i) much of the hindrance for foreigners to acquire Swedish establishment was abolished in the 1990s ii) it has been more inviting to acquire Swedish firms after the EU membership iii) due to the depreciation of the

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<sup>5</sup> See Bandick (2004) for more information.

<sup>6</sup> The panel provides coverage of 84,786 unique Swedish non-multinational plants and of 17,299 unique multinational plants. 15,355 of the former and 2,562 of the latter are in the panel the whole ten-year period (see Table A1 in Appendix).

Swedish krona in the beginning of the 1990s Swedish firms were particularly cheap to acquire and iv) Swedish tax system has favoured foreign ownership at the expense of private Swedish ownership.

The total number of observation per year, shown in *Table 1*, reveals the same pattern. During 1993 and 2002 nearly 2,500 of the total observation, 1,600 of them was Swedish MNEs, dropped of. Swedish MNEs share of the total observation decreased by 3 percent and at the same time Swedish non-MNEs share increased by the same amount. Although the number of foreign MNEs observation increased by almost 130, the share of total observation was constant at 5 percent during the entire period. *Table 1* provides also information about the exit and entry ratio of the three groups of plants<sup>7</sup>. During the period, 13 percent of Swedish non-MNE plants and about 18 and 24 percent of the foreign and Swedish owned multinational plants closed down. The entry rates for the three groups of plants are 13 percent for the non-MNEs and around 18 percent for the multinationals.

To serve the foreign markets, either through export or by establishing affiliates, the firm must possess specific assets, like technological assets, in order to compensate for the disadvantages they face in foreign countries. According to Helpman et al (2003) and to the theory of MNEs (Dunning, 1977 and Markusen, 2002) only firm with high productivity chose to serve foreign market and among them only the most productive will further chose to establish affiliates abroad. I therefore, in *Table 2a*, investigate whether plant- and firm specific characteristic differs between MNEs (foreign and domestically owned) and non-MNEs and in *Table 2b*, between globally engaged and Swedish oriented plants<sup>8,9</sup>.

The summary statistics in *Table 2a* shows the differences in plant specific characteristics such as plant age, plant size and skill intensity as well as firm specific characteristics such as labor productivity, capital-labor ratio and export intensity between foreign MNEs, Swedish MNEs and non-MNEs in year 2002. It seems that multinational plants are older, larger in terms of employment, have higher labor productivity and capital-labor ratio. They also have higher export intensity compared with domestic non-multinational plants. *Table 2b* shows that

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<sup>7</sup> A plant is treated as an exit from year t to t+1 if the unique plant code number is identified up to and including year t and missing from year t+1 and after. A plant which plant code number identified from year t+1 but not year t is classified as an entry plant in t+1.

<sup>8</sup> The analyze were I separate the domestic non-MNEs into exporters and non-exporters are based on plants of larger firms since the export data is only available to firms with 50 employees and more.

<sup>9</sup> More than 60 percent of the domestic non-MNEs are engaged in export activity.



among the domestic non-MNEs, these plants that are engaged in export activity are much larger in terms of employment and have higher productivity than these plants that are only domestic oriented. However, MNEs seems to have advantages in the plant- and firm specific characteristic relative to the two types of domestic non-MNEs.

Since MNEs and non-MNEs differ in characteristics that may affect the likelihood of a closure I will in the econometric analysis disentangle the effect of ownership on plant closure from the effects of other plant and firm characteristics.

#### 4. Survival of the plants

In this section we turn to an econometric analysis to examine the probabilities of plants survival taking into account for different ownership structure of the plants. We start with non-parametric estimate of the Kaplan-Meier survival function in subsection 4.1 to calculate the probability of surviving past time  $t$ . We then turn to the Cox proportional hazard model in subsection 4.2.

##### 4.1 Non-parametric estimation

To compare plant survival across multinationals and non-multinationals in Swedish manufacturing we apply the Kaplan-Meier survival function given by:

$$S(t) = \prod_{j|t_j \leq t} \left( \frac{n_j - d_j}{n_j} \right) \quad (1)$$

where  $S(t)$  denotes the probability of surviving past time  $t$ .  $n_j$  stand for the number of plants that have survived and  $d_j$  for the number of plants that died at time  $t$ .

The Kaplan-Meier survival function for the three groups of plants, foreign MNEs, Swedish MNEs and Swedish non-MNEs are graphed separately in *Figure 2*. As we can see in *Figure 2* there is clear differences in the survival probabilities between the three groups of plants. Plants of multinationals (foreign or Swedish owned) are less likely to survive than Swedish owned non-multinationals. After 5 years 58 percent of foreign-owned plants and 46 percent of

Swedish multinational plants survives and after 10 years 28 percent of the former and 21 percent of the latter plants are still operating. However, the survival probabilities for Swedish non-multinational plants are 72 percent after 5 years and 46 after 10 years. The log-rank test presented in *Table 3* allows us to reject the hypothesis that the survivor function across the three groups are equal.

Obviously, such nonparametric estimate as Kaplan-Meier survival function does not consider other factors that may affect plant survival. Variables that have been generally used in the survival literature are among others; plant size, plant age and labor productivity. As we saw in *Table 2a* MNEs and non-MNEs differ in plant and firm characteristics. In the next section we follow the previous literature and adopt a more general hazard model that control for other characteristics with are associated with the survival probabilities.

## 4.2 The Hazard model

The hazard function describes the probability density function of the risk of some event occurring, in our case exit, and are in general defined by the following equation:

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{\Pr(t \leq T \leq t + \Delta t | T \geq t)}{\Delta t} \quad (2)$$

Where  $T$  is a non-negative random variable, or the lifetime duration of the plants. Eg. (2) gives the rate of failure at time  $t$ , given that the plants survives up to  $t$ .

In order to analyze a vector of parameters  $(\beta x_i)$  based upon the hazard function we utilize a Cox proportional hazard model, which are the extended version of eg. (2). This model treat each hazard rate  $h_i(t)$  as a function of  $\beta x_i$ :s and are specified as follows:

$$h_i(t) = h_0(t) \exp(\beta x_i) \quad (3)$$

Where  $h_0(t)$  is the baseline hazard.<sup>10</sup> A positive (negative) coefficient suggests that the independent variable increases (decreases) the probability of exit.

In separating for ownership status of multinationals and non-multinationals and controlling for plant-, firm- and industry specific characteristics, the Cox proportional hazard will have the following form:

$$h_{ikj}(t) = h_0(t)e^{(\beta_1 FMNE + \beta_2 SMNE + \beta_3 Plant + \beta_4 Firm + \beta_5 Industry)} \quad (4)$$

where  $i, k$  and  $j$  denotes plant, firm and industry. *FMNE* is a dummy variable for foreign ownership that takes a value of one if plant  $i$  is foreign owned. The plant is defined as foreign-owned if a foreign owner holds more than half of the voting stock. *SMNE* is a dummy variable for Swedish owned multinational plants. A Swedish multinational plant is a domestically owned plant that are incorporated with domestically owned firm that has at least one affiliate abroad or are part of an enterprise group that has affiliates abroad. We would expect that these two dummies to have higher hazard of exiting if we fully belief in the footloose behavior of multinationals. The variable *Plant* is a vector of plant specific characteristics such as plant size in terms of employment, plants age and plants share of skilled labor<sup>11</sup>. The variable *Firm* is a vector of firm specific characteristics including a dummy for exporter and non-exporters, labor productivity, capital-labor ratio<sup>12</sup>. The export variable is only available to plants incorporated with larger firms since SCB collects export data only for firm with 50 employees and more. Export and import intensity at industry level and sectional employment growth are all included in the vector variable *industry*.

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<sup>10</sup> The Cox proportional model is well suited since it does not assume any particular distribution for the baseline hazard (see Kiefer, 1988).

<sup>11</sup> The variable skilled share is defined as the difference in the share of employees with post-secondary education at plant level from the skilled share at industry level.

<sup>12</sup> The variables labor productivity (value-added per employee) and capital-labor ratio are defined as the differences in plant level labor productivity and capital-labor ratio from the industry level.

Table 4 provides the regression results estimating the hazard model of eq. (4) for all Swedish manufacturing plants during the period 1993-2002.<sup>13,14</sup> In the first column I control for plant specific characteristics such as plant size, plant age and skill intensity. The result indicates that the exiting hazard is much higher if the plants are owned by multinationals. Being MNEs reduces the survival probability by 20 (foreign MNEs) and 29 (Swedish MNEs) percent. The 9 percent difference in the survival ratio between domestic and foreign MNEs is statistically significant. This means that domestic MNEs exhibit the biggest chances in exposure the exit risk of all plants in the Swedish manufacturing.

The vector of plants variable seems to have the expected effect on survival. Consistent with previous studies, plant age and size have negative effect on the hazard. This means that older and larger plants have higher survival probabilities than new and small plants.

In column (2) I estimate the hazard with both plant- and industry specific characteristics. The industry variables are growth in employment, import- and export intensity. Again, the results suggest that MNEs and in particular Swedish MNEs have the highest hazard ratio of all plants. As we can observe, the MNEs exit hazard ratios increases by 1-2 percent comparing to column (1). This is since we in column (2) add more control variables that are associated with higher survival and are more pronounced in MNEs than non-MNEs. Sectional employment growth and export intensity increases the survival probabilities by 0.3 and 11 percent, respectively, while the import intensity at the industry level decreases the survival by 6 percent.

In column (3) I add the firm specific characteristics such as labor productivity and capital-labor ratio to the estimates. The firm level variables are available for the entire manufacturing firms only from the year 1996 and onward<sup>15</sup>. I therefore restrict the analyze time period to 1996 and 2002. Column (3) shows the same pattern as in Column (1) and (2) expect that it is higher hazard ratio for the MNEs compared with the period 1993-2002. Labor productivity increases the survival while capital-labor ratio decreases it.

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<sup>13</sup> For robustness test and to avoid left-censoring problems in the Cox model I also analyzed newly born plants i.e. plants born 1994 and after. These results, which are not reported here, yield similar results as in forthcoming tables.

<sup>14</sup> I allow the baseline hazard to vary by industry and year in all specifications, except the specifications with the industry level variables where I only use year dummies. Plants experienced more than one ownership changes are excluded from the analysis.

<sup>15</sup> Only larger firms, i.e. firms with 50 employees and more are represented in the hole time period 1993-2002.

Since we saw that there are differences in plant and firm specific characteristics among the domestic non-MNEs in *Table 2b* I estimate, in column (4), the hazard separating these plants into globally engaged (in form of export active) and purely domestic. The domestic plants are then classified as domestic owned MNEs, export-oriented domestic plants and purely domestic plants. The export variable is only available for firms with 50 employees or more since SCB collects export data only for larger firms. Thus in controlling for different ownership structure of the domestic plants I have to limit the analysis only to those that are incorporated with larger firms. The result reveals that plants of large foreign owned firms and plants of export active firms have almost 12 and 10 percent higher survival ratio than plants of domestic oriented firms (the difference in survival between these plants are not statically significant). However, plants of Swedish owned MNEs have more than 5 percent higher changes to exit compared with purely Swedish non-MNEs.

The survival of the domestic plants may be determined by the presence of foreign ownership. Therefore, in *Table 5* I investigate separately how foreign presence affects the survival prospect of the domestic MNEs, in column (1), export active plants, in column (2) and purely domestic oriented plants, in column (3).<sup>16</sup> The result reveals that foreign presence only has negative effect on the survival of the latter type of plants. It seems that 8 percent of the purely Swedish plants exit rate can be explained by the competition effect imposed by foreigners. However, foreign presence seems not to explain the high exit rate of Swedish MNEs.

In summing up; this study supports the idea of footloose behavior but only for domestic-owned MNEs. This since the results point out that these plants have lower survival ratio than other plants in all the estimates. Foreign owned MNEs seem also to have lower survival rates but only if we consider plants incorporated with smaller firms. Plants of larger foreign owned firms and globally engaged, in form of export, seems to have higher survival ratio than plants of domestic firms and especially domestic MNEs. Foreign presence seems to explain some part of the exit rate of domestic oriented plants but not of Swedish MNEs. The results also suggest that older, larger and productive plants as well as plants in export intensive and growing industries have higher probability to survive.

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<sup>16</sup> I use the share of foreign employment at the industry level to proxy the presence of foreign ownership.

## 5. Summary and conclusions

This paper analyzes the survival differences between foreign and domestic MNEs, on one hand and between globally engaged plants and purely domestic plants, on the other. This paper also investigates separately how foreign presence affects the survival prospects of the domestic MNEs, export-active and purely domestic-oriented plants. Using a panel of the entire Swedish manufacturing plants during the period 1993 and 2002 the results suggest that plants owned by MNEs and especially domestic MNEs have higher probability to exit the market than plants owned by Swedish non-MNEs. The results are robust even when other variables affecting the survival probabilities are controlled for. Plants in export intensive and growing industries as well as old, large and productive plants seems to be less likely to close.

In separating the domestic non-MNEs into globally engaged and purely domestic we have to limit the analyze only to those plants that are incorporated with larger firms, i.e. 50 employees and more. The result reveals that plants of larger foreign owned firms and globally engaged, in form of export, seems to have higher survival ratio than plants of domestic firms and especially domestic MNEs.

In investigating how foreign ownership affects the survival prospects of the domestic plants I find that purely Swedish non-MNEs are being negatively affected by foreign presence. Foreign presence does however not affect the survival of Swedish export active plants and Swedish MNEs.

Finally, I obtain strong evidence that ownership structure have different influence on the survival prospects. The MNE ownership, especially Swedish MNE, by itself implies lower survival ratio while global engagement and foreign ownership, at least for larger firms implies higher survival. These results support the idea that in order to make an proper comparison between plants survival, one must separate for different ownership structure, not only for foreign contra domestic ownership. The results also suggest that foreign presence only affect plants of no global activity. These plants might find it difficult to compete with the superior competitor and therefore leave the market. It is again important to separate the domestic plants into different ownership structure, since the absorptive or learning capacity is different between globally engaged and purely domestic oriented.

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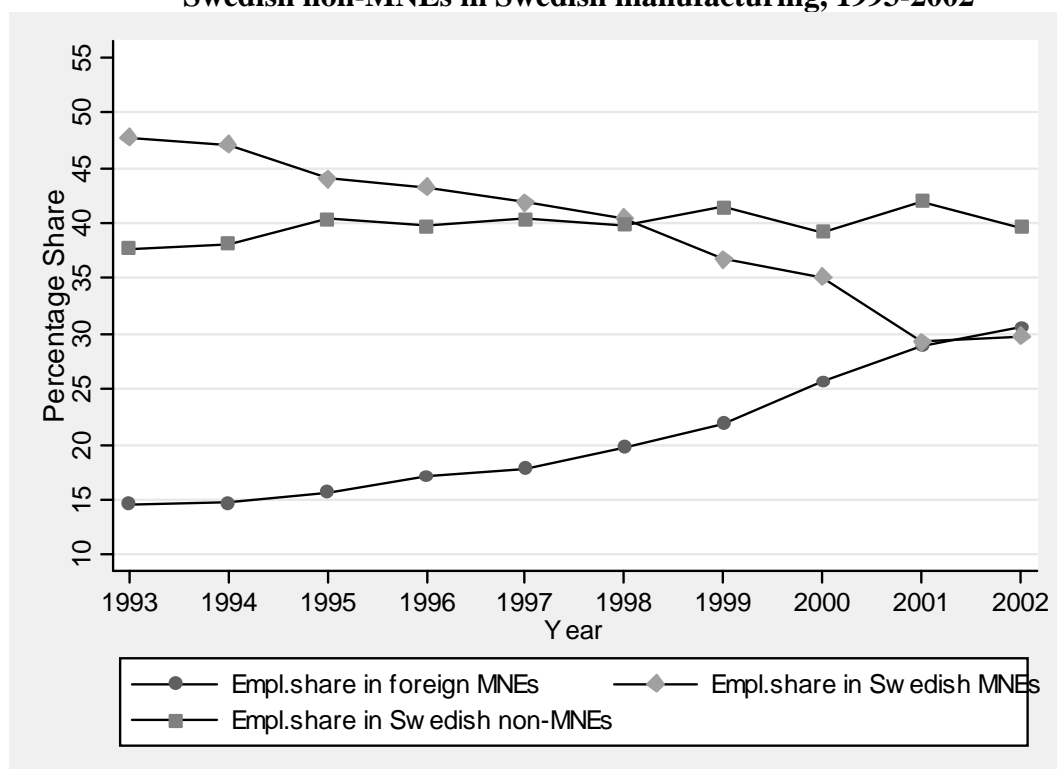
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**Figure 1 Employment share of foreign MNEs, Swedish MNEs and Swedish non-MNEs in Swedish manufacturing, 1993-2002**



**Table 1 Plant distribution**

Year	Number of plants			
	All Plants	Foreign MNE (Percent)	Swedish MNE (Percent)	Swedish Non-MNE (Percent)
1993	43,104	2,152 (0.05)	3,884 (0.09)	37,068 (0.86)
1994	43,607	2,190 (0.05)	4,136 (0.09)	37,281 (0.85)
1995	42,934	2,240 (0.05)	3,646 (0.08)	37,048 (0.86)
1996	43,018	2,166 (0.05)	3,348 (0.08)	37,504 (0.87)
1997	42,596	1,972 (0.05)	3,121 (0.07)	37,503 (0.88)
1998	42,468	2,086 (0.05)	2,911 (0.07)	37,471 (0.88)
1999	40,984	2,105 (0.05)	2,392 (0.06)	36,487 (0.89)
2000	41,156	2,170 (0.05)	2,663 (0.06)	36,323 (0.88)
2001	40,867	2,403 (0.06)	2,089 (0.05)	36,375 (0.89)
2002	40,606	2,281 (0.06)	2,261 (0.06)	36,064 (0.89)
1993-2002	421,340	21,765 (0.05)	30,451 (0.07)	369,124 (0.88)
Exit ratio 1993-2002	14.1	17.7	24.3	13.0
Entry ratio 1993-2002	13.2	18.0	19.1	12.8

**Table 2a Plant and firm characteristics, 2002**

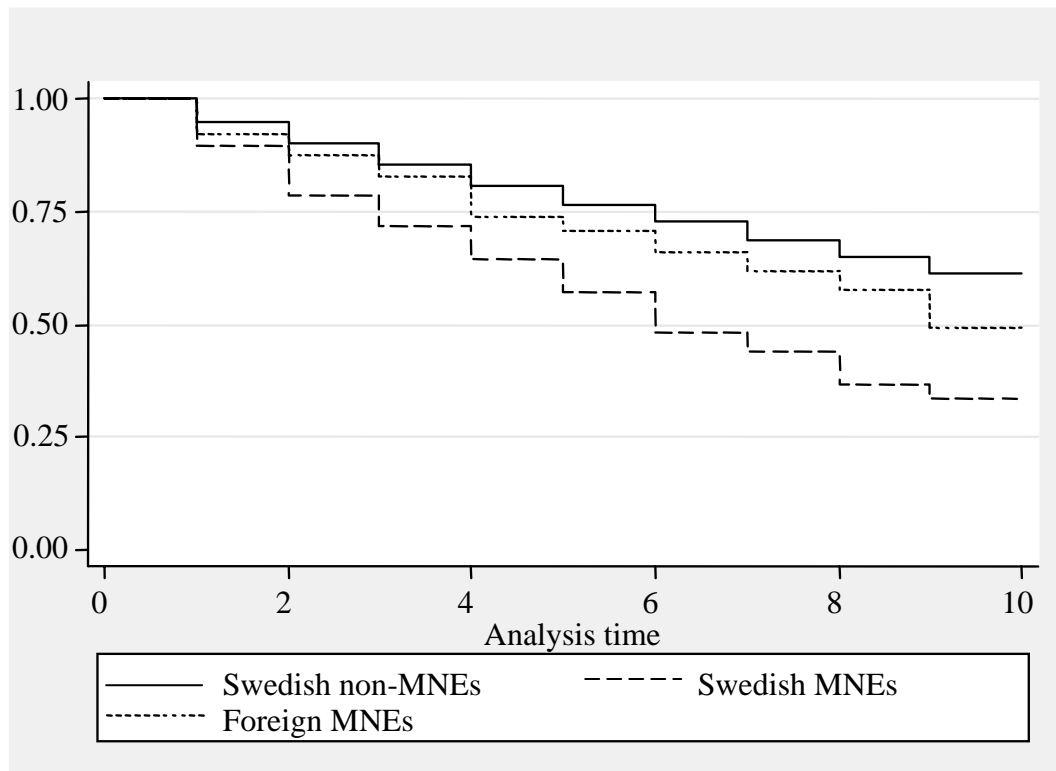
Variable	All Plants	Foreign MNE	Swedish MNE	Difference foreign MNEs and Swedish MNEs (t-ratio)	Swedish Non-MNE	Difference Swedish MNEs and non-MNEs (t-ratio)
<i>Plant variable</i>						
Age	8.8	9.2	9.3	-0.1 (-0.69)	8.7	0.6 (5.48)
Size	17	74	75	-1 (-0.17)	8	67 (45.62)
Skill intensity	15.2	22.3	26.7	-4.4 (-5.39)	13.7	13 (23.23)
Number of plants	40,606	2,281	2,261		36,064	
<i>Firm variable</i>						
Productivity	459	586	583	3 (0.09)	427	156 (13.37)
Capital-labor ratio	32.1	207.3	72.9	134.4 (6.34)	4.2	68.7 (41.18)
Export intensity <sup>a)</sup>	24.4	32.1	28.7	3.4 (3.53)	12.3	16.4 (18.94)
Number of firms	36,517	1,157	1,221		34,139	

Notes: a) Export intensity is only available for firm with 50 employees and more.

**Table 2b differences in plant and firm characteristics between Swedish export active plants and other plants, 2002**

Variable	Difference export-active and Swedish oriented (t-ratio)	Difference export-active and Swedish MNEs (t-ratio)	Difference export-active and foreign MNEs (t-ratio)
<i>Plant variable</i>			
Age	-0.6 (-2.48)**	1.4 (5.71)***	1.5 (6.48)***
Size	19 (5.35)***	-32 (-3.59)***	-33 (-3.45)***
Skill intensity	-1.8 (-1.44)	-5.3 (-4.70)***	-1.5 (-1.4)
<i>Firm variable</i>			
Productivity	132 (14.67)***	-110 (-8.82)***	-146 (-12.80)***
Capital-labor ratio	12.8 (-1.90)	-62.4 (-8.04)***	-231 (-6.36)***

**Figure 2 MNEs and domestic non-MNEs survival**



**Table 3 Test for equality of the survival function across the three groups**

	<b>Log-rank</b>
<b>Foreign MNEs vs Swedish non-MNEs</b>	352.08 <sup>***</sup>
<b>Swedish MNEs vs Foreign MNEs</b>	242.64 <sup>***</sup>
<b>MNEs vs non-MNEs</b>	2285.66 <sup>***</sup>
<b>Swedish MNEs vs Swedish non-MNEs</b>	2404.37 <sup>***</sup>

**Table 4** Hazard ratio of MNE:s vs. Swedish non-MNE:s

Variables	Specification			
	1993-2002 Hazard Ratio (z-statistics)	1993-2002 Hazard Ratio (z-statistics)	1996-2002 Hazard Ratio (z-statistics)	1993-2002 Hazard Ratio (z-statistics)
Foreign MNE	1.199 (15.55) <sup>***</sup>	1.210 (17.85) <sup>***</sup>	1.287 (14.79) <sup>***</sup>	0.878 (-7.24) <sup>***</sup>
Swedish MNE	1.287 (28.42) <sup>***</sup>	1.311 (36.46) <sup>***</sup>	1.426 (23.52) <sup>***</sup>	1.052 (3.15) <sup>***</sup>
Swedish Exporter				0.894 (-5.98) <sup>***</sup>
Age (Plant level)	0.351 (-335.99) <sup>***</sup>	0.349 (-352.05) <sup>***</sup>	0.368 (-154.00) <sup>***</sup>	0.433 (-130.12) <sup>***</sup>
Size (Plant level)	0.797 (-54.51) <sup>***</sup>	0.802 (-54.34) <sup>***</sup>	0.743 (-39.40) <sup>***</sup>	0.778 (-35.94) <sup>***</sup>
Skill intensity (Plant level)	1.000 (0.19)	1.000 (-0.04)	0.998 (-1.34)	0.996 (-2.32) <sup>**</sup>
Employment Growth (Industry level)		0.997 (-9.85) <sup>***</sup>	0.995 (-7.85) <sup>***</sup>	0.997 (-4.68) <sup>***</sup>
Import intensity (Industry level)		1.063 (5.24) <sup>**</sup>	1.021 (0.71)	0.972 (-1.17)
Export intensity (Industry level)		0.887 (-10.22) <sup>***</sup>	0.829 (-7.89) <sup>***</sup>	
Labor Productivity (Firm level)			0.979 (-3.58) <sup>***</sup>	0.977 (-3.19) <sup>***</sup>
Capital-Labor ratio (Firm level)			1.014 (5.96) <sup>***</sup>	1.012 (4.15) <sup>***</sup>
$\beta_1 = \beta_2 (\beta_3)$ (T-test)	0.088 (0.000) <sup>***</sup>	0.101 (0.000) <sup>***</sup>	0.139 (0.000) <sup>***</sup>	0.174 (0.016) (0.000) <sup>***</sup> (0.27)
Year	Yes	Yes	Yes	Yes
Industry	Yes	No	No	No
No. of obs.	421,340	421,340	181,443	63,875
Wald Chi Square	164,499	189,655	62,375	32,773
Prob>Chi Square	0.000	0.000	0.000	0.000

Notes: Industries are defined on SNI92 3-digit level (99 industries). \*\*\*, \*\*, \* indicate significance at 1, 5 and 10 percent levels, respectively. 16,067 observation or 1,880 plants was dropped out from the analysis. This is due that the plants was experienced more than one ownership changes during the period 1993-2002. Skill intensities are in percentages. Employees with post-secondary education are defined as skilled labor. The t-statistics test the null hypotheses of equality between foreign MNE and Swedish MNEs.

**Table 5**      *The effects of foreign MNE presence on indigenous plants survival, 1993-2002*

<b>Variables</b>	<b>Specification</b>		
	<b>Swedish MNEs (z-statistics)</b>	<b>Swedish exporter (z-statistics)</b>	<b>Swedish non-exporter (z-statistics)</b>
<b>Foreign MNE Presence</b>	1.001 (1.35)	0.993 (-0.82)	1.080 (4.50) <sup>***</sup>
<b>Plant level variables</b>	Yes	Yes	Yes
<b>Firm level variables</b>	Yes	Yes	Yes
<b>Industry level variables</b>	Yes	Yes	Yes
<b>Year</b>	Yes	Yes	Yes
<b>Industry</b>	No	No	No
<b>No. of obs.</b>	22,036	13,222	10,929
<b>Wald Chi Square</b>	11,548	5,469	5,529
<b>Prob&gt;Chi Square</b>	0.000	0.000	0.000

**Table A1 Panel information**

Years in the panel				
Years	All Plants	Foreign MNE	Swedish MNE	Swedish Non-MNE
10	17,917	1,002	1,560	15,355
9	3,044	156	177	2,711
8	3,366	161	248	2,957
7	3,980	190	263	3,527
6	4,997	285	449	4,263
5	5,357	325	340	4,692
4	7,216	568	579	6,069
3	9,819	541	778	8,500
2	14,404	762	1,436	12,206
1	31,985	2,564	4,915	24,506
Total number of plants	102,085	6,554	10,745	84,786