LICOS

Centre for Transition Economics

LICOS Discussion Papers

Discussion Paper 168/2006

"Footloose Multinationals in Belgium?"

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1425

Katholieke Universiteit Leuven

FOOTLOOSE MULTINATIONALS IN BELGIUM?

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Latest version: September 2006

ABSTRACT

Using firm level panel data for the years 1996-2001, covering all sectors of the economy, the impact of multinational ownership on the exit decisions of firms located in Belgium is estimated. In the analysis, I clearly distinguish for nationality of ownership, allowing for differences between firms that are foreign-owned and multinationals rooted in the domestic economy. Controlling for various firm- and industry-specific factors, it is found that while foreign multinationals are more likely to shut down operations compared to national firms in both manufacturing and service sectors, domestic multinationals only exhibit significantly higher exit rates in the manufacturing industries. The analysis has important policy implications, especially in terms of the desirability of the large impact of multinational firms on employment and output generation in Belgium. JEL no. D21, F23, L20, L25.

Keywords: exit, duration, multinational firms, nationality of ownership.

1. Introduction

The popular claim that production abroad has a detrimental impact on employment and exports at home is generally not confirmed by the available empirical evidence (see Lipsey (2002) for a review of this extensive literature). Within host countries, multinational firms tend to pay higher wages for given productivity levels and they are also generally found to be more efficient than local firms. Although evidence on the existence of spillovers of these effects to the domestic economy is mixed, foreign direct investment (FDI) has played a clear role in the transformation of some economies from exporters of agricultural goods and raw materials to exporters of manufacturing goods (Lipsey 2002). However, in spite of all the evidence pointing to the beneficial impact of multinational firms and their operations on home and host countries' economic performance, public concerns largely remain.

One reason for these concerns is that multinationals, due to their ability to set up production abroad in a profitable way, are often considered to be 'footloose'; causing them to react more swiftly to shocks and hence possibly to relocate production more rapidly than national[1] firms. This naturally raises policy concerns, particularly with respect to 'foreign' multinationals, as the recent turmoil surrounding the takeover of the European steel group Arcelor by Mittal Steel has illustrated[2].

The main objective of the present paper is to determine the impact of multinational ownership on the exit decisions of firms located in Belgium. The empirical analysis links in with a small and recent literature[3] dealing with the impact of multinational ownership on exit patterns of manufacturing establishments and contributes to this literature in two important

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[1] The term 'national firms' will be used to refer to firms without access to a global network.

[2] The Economist (2006, February 2nd: 11-12). Several government officials in France and Luxembourg were strongly opposed to the takeover of Arcelor, Europe's largest steel company, by Mittal Steel, in spite of the weak strategic importance of the steel industry today. Similarly, the French government raised objections against possible plans of US-based PepsiCo to take over the French dairy group Danone (The Economist 2005, September 1st: 56).

[3] Both Bernard and Sjöholm (2003) and Görg and Strobl (2003) provide evidence that foreign multinationals, in Indonesia and Ireland respectively, are more 'footloose' than domestic companies, i.e. they are more likely to exit the market, after controlling for various firm and industry characteristics. Bernard and Jensen (2006) provide similar evidence for US multinationals in their home market. For a more detailed discussion of the related literature, I refer to section 2.

respects. First, to my knowledge, the role of ownership structure in shutdown decisions at the firm level has thus far only been considered for the manufacturing sector. Due to the extensive coverage of the database employed, I am able to extend the analysis to cover all sectors of the economy[4]. Second, this study is the first to control for the (possibly differing) impact of foreign and domestic multinational ownership on shutdown decisions at the firm level.

From a policy perspective, the analysis could yield several important insights. The reduction of the corporate tax rate in Belgium in 2003, as well as the introduction of the "notional interest deduction" scheme[5] in June 2005, although both non-discriminatory between domestic and foreign companies, are primarily aimed at the attraction of new, capital-intensive investments by foreign multinationals. Moreover, Vandenbussche and Tan (2005) find evidence of substantial tax discrimination in favor of foreign multinationals in Belgium compared to domestic companies.

If, as was shown for a number of other countries, multinationals (either foreign- or domestically-owned) are found to be more 'footloose' than national firms, this information could certainly be of relevance in fine-tuning current policies, especially given the impact of multinational firms on the Belgian economy, both in terms of employment and sales. Although less than 2 percent of the population of firms in Belgium are foreign-owned and an equal percentage are domestic multinationals; foreign multinationals accounted for about 25 percent of total employment and 31 percent of net value added in 2001. Domestic multinationals accounted for another 18 percent of employment and 21 percent of total net value added[6].

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[4] Since the primary sector represents only a small share of the sample total (less than 2 percent of all firms are active in this sector, accounting for 0.66 percent of total employment and 1.37 percent of net value added in 2001), it is excluded from the analysis. However, results do not change when firms active in agriculture and mining are taken into account in the empirical estimations.

[5] A tax deduction for equity financing, implemented since January 2006.

[6] Data are calculated by the author on the basis of the Belfirst database (Bureau Van Dijk 2004), which groups the annual accounts of virtually all limited-liability companies active in Belgium. A more detailed description of the database will be given in section 3.

The rest of the paper is organized as follows. In section 2 I present a selective review of the related literature. Section 3 introduces the data set and presents some summary statistics, while section 4 discusses the empirical model and results. In section 5 the robustness of the results is verified on the basis of a number of sensitivity analyses applied to the model. The final section concludes.

2. Literature review

The focus in this section is on the literature investigating the 'footloose' nature of multinational enterprises (MNEs) and specifically on the impact of multinational ownership on firm turnover. For a more complete review of the main theoretical and empirical contributions in the industrial organization literature on firm dynamics and turnover, I refer to Caves (1998), although I will come back to some of the relevant issues emerging from this literature when I discuss the empirical model in section 4.

Flamm (1984) looks into the 'footloose' image of US multinationals abroad, by modeling the volatility of US FDI in the semiconductor industry in response to changes in the host country environment. His findings indicate that while US FDI is only moderately sensitive to wage levels in the host countries, adjustment of the investment portfolio in response to adverse shocks (such as changes in wages or other costs) occurs extremely rapid.

Rodrik (1997) further notes the asymmetry between groups in the economy that are free to take their resources wherever they are most in demand, such as multinational firms; and those that can not, including semi-skilled and unskilled workers in the home country. He argues that the increased substitutability of the services of these immobile groups is likely to lead to a higher elasticity of demand for their services. Konings and Murphy (2006) find support for this hypothesis using firm level data on 1,067 multinational firms and their 2,078 affiliates located in the European Union (EU) and Central and Eastern European Countries (CEECs). Their results indicate that some substitution in employment takes place between the

parent firm and its North EU affiliates, i.e. the elasticity of parent employment with respect to affiliate wages is positive and statistically significant; while no substitution effects are found for the CEEC and South EU affiliates, contrary to the popular belief that major reallocation of employment towards the CEECs is taking place. Stronger substitution effects are found when the sectors of activity of the parent and affiliate are different.

Similarly, Vandenbussche and Tan (2005) argue that since corporate tax policy is an important instrument for national governments wanting to attract foreign direct investment and given the fact that multinationals' mobility increases their bargaining power, it is likely that foreign multinationals[7] pay lower (effective) taxes. Their empirical results, for Belgium, suggest that there is considerable tax discrimination in favor of foreign firms, again lending support to the 'footloose' image of MNEs.

Focusing on the extensive margin, several studies have taken up the issue whether multinationals are more footloose. Theoretically, the expected impact of multinational ownership on firm turnover is ambiguous. On the one hand, it can be argued that MNEs have certain specific characteristics that enable them to set up production abroad in a profitable way; allowing them in turn to respond more swiftly to negative shocks than is possible for national firms. On the other hand, given the fact that multinationals are on average more skill- and capital-intensive than incumbent firms, they might face higher sunk costs when setting up production, causing them to exit the market less rapidly, all else equal (Lipsey 2002). Moreover, since domestic MNEs are likely to be more strongly rooted in their home country; it is not certain that domestic and foreign multinationals will react in the same way to changes in the economy.

Bernard and Sjöholm (2003), Görg and Strobl (2003) and Gibson and Harris (1996) provide some of the first evidence on the footloose nature of multinationals in the *host* country; i.e. they assess the effect of foreign ownership on plant-level exit patterns in the

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[7] They do not distinguish between domestic firms with and without access to a global network.

manufacturing sector in Indonesia, Ireland and New Zealand respectively. Both Bernard and Sjöholm (2003) and Görg and Strobl (2003) find that while foreign-owned plants face lower hazard rates than domestic plants, this difference is caused by the different characteristics of these plants, rather than by their foreign character as such. Foreign plants are on average older, larger and more productive, causing them to exhibit lower exit rates. After controlling for these plant-specific differences, foreign plants become *more* likely to exit the market. Gibson and Harris (1996) on the other hand, find evidence that foreign MNEs are *less* likely to exit the market than incumbent firms, after controlling for plant and industry characteristics; although it is possible these results are partly driven by the increased trade liberalization that was taking place in New Zealand at the time.

Bernard and Jensen (2006) perform an analysis of US manufacturing plants' deaths in order to determine the impact of the multinational character of US firms on exit patterns in the *home* country (they are not able to identify foreign MNEs in the data). Their model also takes into account whether an establishment is part of a single- or multi-plant firm. Their findings indicate that multinational plants, as well as plants belonging to a larger group, are *more* likely to exit the market, after controlling for various other plant- and industry-specific variables. Unconditionally, both plants owned by multi-plant firms and plants owned by US multinationals exhibit lower exit rates than incumbent plants.

For Belgium, both Van den Cruyce (1999) and Pennings and Sleuwaegen (2000, 2002) have searched for the determinants of different modes of downsizing at the firm level (exit, partial relocation or downsizing) in the manufacturing sector. They find a positive impact of multinational ownership on relocation decisions of firms, but no significant impact on exit patterns. However, a serious drawback of their multinational ownership variable is that it does not distinguish for nationality of ownership; foreign and domestic multinationals firms are taken together in the empirical analysis.

This paper differs from previous studies in two important respects. First, due to the extensive coverage of the database employed, I am able to investigate the impact of multinational ownership on exit patterns separately for firms active in manufacturing and services. Second, by distinguishing between foreign firms and domestic MNEs in the empirical analysis, it is possible to investigate whether nationality of ownership plays a role in shaping the exit patterns of multinational firms.

3. Data and preliminary facts

The dataset employed in this paper is constructed on the basis of the Belfirst database, which groups the annual accounts reported by firms located in Belgium to the National Bank of Belgium[8]. The database is commercialized by Bureau Van Dijk (2004) and has been used in a growing number of academic papers in recent years[9]. Firms in the database are uniquely defined by their VAT number and data on employment, wages, net value added etc. are available for the years 1996-2003. Sectors in the database are classified according to the Nace-Bel nomenclature, i.e. a 5-digit extension of the Nace (Revision 1) Classification commonly used for European statistics[10]. Furthermore, the database includes information on the ownership structure of firms, in terms of both subsidiaries and shareholders, either foreign or domestic.

To identify entry and exit, I follow the procedure used by Mata and Portugal (1994) and Mata et al. (1995). For the specifics associated with the exit variable and the selection of

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[8] "Most enterprises in which the liability of the shareholders or members is limited to their contribution to the company, plus some other enterprises, have to file their annual accounts and/or consolidated accounts with the Central Balance Sheet Office at the National Bank every year" (www.nbb.be). This implies that the database consists of the complete population of (limited-liability) firms in Belgium (318,316 companies). However, about 160,000 firms in the database are very small, i.e. they have no recorded employment over the sample period. Since a number of variables used in the empirical analysis (such as firm size and wages) are not available for these companies and given the otherwise limited reporting requirements for these firms, they are necessarily excluded from the analysis.

[9] Examples include Vandenbussche et al. (2005) in a study on the determinants of effective corporate tax rates of large Belgian firms and De Loecker (2005) who estimates the impact of increased trade liberalization on productivity in the Belgian textile sector.

[10] The Nace Rev. 1 classification can be downloaded from the Eurostat Ramon server: http://europa.eu.int/comm/eurostat/ramon/.

the sample used in the empirical analysis, I refer to the data appendix (Appendix A). Omitting all observations that do not fit the definition of exit, as well as all firms for which data needed in the empirical analysis are incomplete, results in an unbalanced sample of 26,046 companies[11].

A firm is considered to be foreign-owned in the data set if it has *some* foreign ownership. Likewise, a firm is identified as a domestic multinational if it has subsidiaries in countries other than Belgium and it is not foreign-owned. Ideally, I would have liked to identify multinationals on the basis of some minimum *share* of direct ownership, but unfortunately these data are missing for the majority of cases[12]. Another drawback of the ownership measure is that it is time-invariant; the information refers to the latest year available. Figure 1 displays the country distribution of the foreign firms in the sample.

[Figure 1]

As can be seen in the figure, most ownership of foreign firms is concentrated in the EU (83 percent); the US accounts for about 10 percent and only 7 percent of foreign owners originate in other countries of the world. Germany, the Netherlands, the U.K. and France, which are all direct neighbors of Belgium, together account for over 70 percent of foreign ownership. Table 1 shows the sector distribution of firms in the sample, distinguished by ownership type.

[Table 1]

About 25 percent of all firms in the sample are active in manufacturing (6,524 firms), while 75 percent or 19,522 firms are active in services. Within manufacturing, the largest share is taken up by the metal industries (19 percent), followed closely by the food and textile industries (shares of 14 and 11 percent respectively). Compared to the sample average,

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[11] Omitting all companies with no recorded employment over the sample period, as well as firms that exhibit irregular entry and exit patterns or were subject to an ownership change over the sample period and observations with missing data for any of the independent variables results in a sample of 98,100 enterprises. Following Mata et al. (1994, 1995), only firms that employ 10 employees or more in at least one sample year are included (see Appendix A). Some of these restrictions will be relaxed in section 5 however.

[12] Similarly, information regarding indirect ownership was missing for the majority of cases.

domestic multinationals are somewhat overrepresented in the manufacturing sector; 41 percent of all domestic MNEs are active in this sector, compared to 25 percent for the overall sample. Within the service sector, most firms are active in wholesale and retail activities (38 percent) and in construction (20 percent).

In order to examine whether multinational firms, either foreign or domestic, are *unconditionally* more or less likely to exit than national firms, I calculate (nonparametric) Kaplan-Meier survival estimates separately for each group in *Own* (*Own* = 0 for national firms; 1 for foreign MNEs and 2 for domestic MNEs):

$$\hat{S}(a) = \prod_{j|a_j \leq a} \left(\frac{n_j - d_j}{n_j} \right) \tag{1}$$

where n_j indicates the number of plants that have survived up to a_j years of age; d_j is the number of plants that die at age a_j and $\hat{S}(a)$ gives the probability of surviving up to age a_j (Greene 2003: 798-799). The survival functions corresponding to (1) are plotted in figure 2. Analysis time represents firms' age.

[Figure 2]

From the graph, it is clear that multinationals (foreign or domestic, *Own* equals 1 or 2) have a higher survival rate than national firms (*Own* equals 0). A log-rank test of equality of the survival functions yields similar results; the hypothesis that survival functions are equal for multinational firms and national firms is rejected decisively (with probabilities of 0.00 and associated Chi-square values higher than 10) for both foreign and domestic MNEs. This result holds when stratifying over 2-digit sectors and years. The difference between foreign and domestic MNEs is less clear-cut, both graphically and mathematically. If survival is not stratified by sector and year, their survival functions are significantly different at 5 %-level (probability of 0.03). This result no longer holds when stratifying over sector and years, the log-rank test of equality of the survival functions does not reject the hypothesis of equality in this case (probability of 0.13).

The finding that multinationals exhibit lower exit rates can also be seen in the second row of table 2. Between 1996 and 2001, about 9 percent of national firms exit the sample, compared to 6 percent for domestic MNEs and 7 percent for foreign firms. Hence, it is clear that multinationals, either foreign or domestic are *unconditionally less likely* to exit the market compared to national firms. This finding is consistent with the results obtained by Bernard and Jensen (2006), Bernard and Sjöholm (2003) and Görg and Strobl (2003); who also report lower exit rates for multinational firms.

Table 2 further reports summary statistics for the pooled sample, distinguished by ownership type. All reported measures, with the exception of the number of firms and exits, represent averages over the sample period; standard deviations are reported in brackets. For a detailed description of the data and variables used, I refer to Appendix A.

[Table 2]

The first row in table 2 shows the number of firms distinguished by ownership type. National firms account for about 85 percent of the sample total, while domestic and foreign MNEs account for about 5 and 10 percent respectively. Although the number of multinationals in the sample seems rather limited, their importance in terms of employment and turnover should not be underestimated. Multinational firms account for over 50 percent of total employment and more than 60 percent of net value added in the sample. This is caused by the fact that multinationals, both domestic and foreign, are on average much larger than national firms. The average foreign multinational employs more than 5 people for each person employed in a national firm (165 versus 30); domestic MNEs employ (on average) more than 6 people for each employee in a national firm (205 versus 30). The average multinational is also older than national firms (23 versus 19 years).

Turning to the figures on wages and productivity per employee in table 2, it is clear that multinationals, either foreign or domestic, are on average more productive and pay higher wages compared to national firms. Since economic theory suggests a close link between labor

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costs and productivity, table 2 also displays the sample average of labor costs relative to productivity. The figures indicate that the average foreign firm pays 89 cents per euro of net value added, compared to 83 cents per euro for national firms and only 78 cents per euro for domestic MNEs. If these numbers are interpreted as a measure of competitiveness at the firm level, they suggest that foreign firms are, on average, less competitive than their domestic counterparts (either national or multinational) given that they pay higher wages after controlling for productivity[13] (Konings 2003). The last row of table 2 shows that multinationals tend to be active in sectors characterized by a higher industry concentration, as measured by the Herfindahl concentration index (see Appendix A for the specifics of this variable).

Since the simple summary measures presented here do not allow us to disentangle the impact of firm- and industry-specific effects from that of multinational ownership (foreign or domestic) on firms' propensity to exit, I now turn my attention to the full empirical model.

4. Empirical model and results

a. Empirical model

In order to assess the impact of multinational ownership on exit patterns, it is necessary to estimate a model that accounts for the differences in size, productivity and wages between multinational and national firms. Given the nature of the data[14] and following the related literature (eg. Audretsch and Mahmood 1995; Bernard and Sjöholm 2003; Chen 2002; Disney et al. 2003; Görg and Strobl 2003; Mata et al. 1994, 1995), I estimate a proportional hazard model:

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[13] If labor productivity is considered a proxy for total output, the ratio of the total wage bill to labor productivity gives an indication of the relative competitiveness of a firm, since it measures to what extent value added of the firm covers the wage bill. Lipsey (2002) sums up a number of motives for foreign firms to pay higher wages for labor of a given quality.

[14] The data are characterized by left truncation (delayed entry), i.e. firms may exist for some time before the sample period starts; and right censoring occurs, i.e. it is possible that a firm has not failed at the end of the sample period. Kiefer (1988) presents an overview of the different concepts related to duration data. Unlike conventional regression methods, duration models are specifically designed to take these issues into account.

$$\lambda\left(a,x,\beta,\lambda_0\right)=\phi\left(x,\beta\right)\lambda_0\left(a\right) \tag{2}$$

where the hazard function $\lambda(.)$ depends multiplicatively on the vector of explanatory variables x with unknown coefficients β and the baseline hazard $\lambda_0\left(a\right)$ (corresponding to $\phi(.)$ equal to 1). For the special case where $\phi\left(x,\beta\right)=\exp\left(x'\beta\right)$, estimation of β does not require specification of the baseline hazard $\lambda_0\left(a\right)$ (Kiefer 1988: 666).

Since the fundamental interest is in the effect of the covariates on the hazard (and not in the shape of the baseline hazard), a natural choice is to normalize the baseline hazard to 1 and estimate (2) using the partial likelihood approach first suggested by Cox (1972). Specifically, the empirical model looks as follows:

$$
\begin{aligned}
h\left(a\right) &= h_0\left(a\right)\exp\left[\alpha Own+\beta X\right] \\
X &= \left[ln\left(Size_{it}\right),ln\left(Wage_{it}\right),ln\left(Prod_{it}\right),ln\left(Herf_{jt}\right)\right] \\
Own &= \left[For_i,Dom_i\right]
\end{aligned} \tag{3}
$$

where

$h\left(a\right)$	hazard rate; rate at which plants exit at age a, conditional upon having survived up to a-1;
$h_0\left(a\right)$	baseline hazard, allowed to vary over 2-digit sectors and years;
$ln(Size_{it})$	log of employment of firm i in year t;
$ln(Wage_{it})$	log of average wage per employee (thousands of euros) for firm i in year t;
$ln(Prod_{it})$	net value added per employee (thousands of euros) at firm level, in logs;
$ln(Herf_{jt})$	log of Herfindahl concentration index at industry level (3-digit Nace);
For_i	foreign multinational ownership dummy;
Dom_i	domestic multinational ownership dummy.

Estimations of (3) are stratified by 2-digit sector and year, allowing for equal coefficients across strata, but baseline hazards specific to each sector and year. In what

follows, I will briefly discuss the definitions and expected signs of the variables included in (3).

An empirical implication of models dealing with firm dynamics and allowing for entry, exit and heterogeneity across firms (eg. Hopenhayn 1992; Ericson and Pakes 1995); is that firms' hazard rate is decreasing in size, conditional on age. Dunne et al. (1988; 1989) already established a positive relationship between firms' age and size and their survival probabilities and many empirical studies find support for this hypothesis (eg. Audretsch and Mahmood 1995). Consequently, I include firms' current size[15] in the model, defined in terms of employment at time t (expressed in logarithm form). Firm size is expected to have a negative effect on the hazard rate (positive effect on firm survival).

The wage variable is defined as firms' wages[16], divided by employment in year t. To the extent that higher wages reflect higher skill intensities and associated sunk costs at the firm level (related to training and investment in firm-specific human capital), higher wages can be expected to have a negative effect on firm failure. Audretsch and Mahmood (1995) find support for the negative relationship between wages and the propensity to exit in their study on the post-entry performance of 12,000 US manufacturing plants. However, it is not certain whether this result will hold when taking into account productivity at the firm level. As was already alluded to in section 3; if firms pay higher wages for given levels of productivity, this could signal lower competitiveness and hence increase their exit probability, ceteris paribus (Konings 2003).

Several theoretical models (eg. Jovanovic 1982; Hopenhayn 1992) predict that the growth and exit of firms is motivated to a large extent by productivity differences at the firm level. Empirically, Farinãs and Ruano (2005) find, for a sample of Spanish manufacturing

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[15] The effect of age on the hazard rate is incorporated directly into the model, since duration is a function of the firm's age. Consequently, multicollinearity issues prevent inclusion of the firm's age as a separate regressor in the model.

[16] The wage variable covers both remunerations and social security costs (including pensions). For an overview of the definitions of the independent variables, I refer to Appendix A.

firms, that entry and exit decisions are systematically negatively related to differences in productivity at the firm level. A negative effect of the labor productivity variable on firms' hazard rates is therefore expected.

In addition to the firm-specific variables, an industry-specific variable is introduced in the model. Economic theory predicts a negative relationship between industry concentration and turnover. Higher industry concentration, as measured by the Herfindahl index, is expected to lead to increased price-cost margins and, through increased profitability, reduce firm turnover (Mueller 1991). However, Caves (1998) notes that as concentration is determined by the extent of entry barriers in an industry, as well as the degree of cooperation among producers, it is not clear what the effect of including this variable to explain hazard rates will be. Results obtained in earlier studies are similarly ambiguous. Görg and Strobl (2003) find a significantly positive impact of concentration on hazard rates at the firm level, while Mata and Portugal (1994) find a negative, though insignificant effect of concentration on exit patterns. The Herfindahl index ($Herf_{jt}$) is calculated at the three-digit industry level using all firms with reported turnover in the Belfirst database (see Appendix A). The market shares are calculated on the basis of firm and industry turnover in each specific year.

Finally, I come to the two ownership variables, Dom_i and For_i. As was noted previously, there is no clear theoretical indication about the impact of multinational ownership on exit patterns at the firm level. It can be argued that multinationals' ability to shift production around the world in a profitable way enables them to respond more swiftly to adverse shocks in the home or host country, causing them to exit the market more rapidly, all else equal. However, it is also possible that multinationals face higher sunk costs when setting up production, due to their higher capital and skill intensity (on average), causing them to exit the market less rapidly, ceteris paribus. In addition, it is not inconceivable that foreign multinationals react differently to adverse shocks compared to domestic multinationals that

are more firmly rooted in the local economy. I now turn to the discussion of the empirical results.

b. Empirical results

Table 3 reports the results of the Cox proportional hazard model applied to the unbalanced sample of 26,046 firms over 6 years (1996-2001). Correlations between the independent variables are generally low, with the exception of $ln(Wages_{it})$ and $ln(Prod_{it})$ for which the correlation amounts to 0.70. For each regression, coefficients and associated robust standard errors, adjusted for clustering at the firm level, are reported. The first two columns in the table show the results of the model applied to all sectors (Nace 15-99), while columns III-IV and V-VI display results separately for manufacturing and services respectively.

[Table 3]

Columns I, III and V in table 3 show the results for the basic model in (3). From figure 2 it is clear that multinationals (either foreign or domestic) exhibit lower exit rates than national firms. Estimation of the full model however, reveals that after controlling for the fact that multinationals are on average larger, more productive and pay higher wages, foreign firms are *more* likely to exit the market than national firms; the coefficient on For_i is positive and significant both for the manufacturing and service sectors. Results for the domestic ownership variable (Dom_i) are less clear-cut. While the domestic ownership dummy is found to have a significantly positive coefficient in the manufacturing sector, its coefficient is very small and insignificant for services.

In order to interpret the magnitude of these effects, it is useful to calculate the hazard ratio corresponding to these coefficients by taking its exponential. For a dummy variable, the hazard ratio can be interpreted as the increase in the overall hazard rate facing the firm, corresponding to For_i or Dom_i equal to 1. Calculation of the exponential of the coefficients on For_i yields hazard ratios between 1.27 (for services) and 1.70 (for manufacturing), indicating

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that the hazard rate of foreign firms is between 1.3 and 1.7 times higher for foreign firms than for national firms, depending on their sector of activity. Similarly, taking the exponential of the coefficient on Dom_i yields hazard ratios between 0.96 for services (insignificant) and 1.65 for firms active in manufacturing, indicating that domestic MNEs active in the production sector are 1.65 times as likely to exit than national firms.

The results obtained for the foreign ownership variable are in line with the findings of Bernard and Sjöholm (2003) and Görg and Strobl (2003) for Indonesia and Ireland respectively. The result for the domestic ownership dummy similarly lends support to the results obtained by Bernard and Jensen (2006) for the US. These findings lend support to the hypothesis that MNEs, either domestic or foreign, are indeed more footloose than national firms. Furthermore, the fact that domestic multinationals engaged in service activities do not exhibit significantly higher exit rates than national firms, after controlling for their differing characteristics, has important policy implications.

Results obtained on the firm- and industry-specific independent variables in table 3 are in accordance with expectations. The coefficient on firm size is significantly negative, supporting the hypothesis that larger firms tend to exhibit lower exit rates. Wages have a positive impact on firms' hazard rate after controlling for productivity at the firm level, in line with the hypothesis that firms are relatively less competitive if they pay higher wages for given productivity levels. However, if productivity is omitted from the regression (unreported), I find a significantly negative sign for the wage variable, supporting the hypothesis that higher wages reflect a higher relative skill intensity, leading to higher sunk costs and hence a lower probability of exit. The coefficient on industry concentration as measured by the Herfindahl index is never statistically significant.

Columns II, IV and VI in table 3 present the results of a refinement to the model. Specifically, I introduce three separate variables representing the home countries of the foreign firms to replace the foreign ownership dummy. Discussion of results here is limited to

the ownership variables, since all other variables perform similarly to the basic model. The variable EU_i groups all firms with home countries in the European Union (EU), while US_i represents firms originating in the US or Canada. ROW_i groups all other home countries.

As can be seen in the table, a positive and significant effect is found for all three variables in the manufacturing sector, while for services only firms originating in the EU exhibit significantly higher exit rates than national firms. For manufacturing, corresponding hazard ratios for the coefficients are 2.18 (for US_i) and 4.81 (for ROW_i), compared to 1.57 for firms in the European Union. For services, the hazard ratio corresponding to EU_i amounts to 1.35; while for firms originating in the US or the rest of the world, results are insignificant. These results suggest that manufacturing firms, originating from outside the EU, are more likely to exit the market, not only compared to national firms, but also compared to foreign MNEs originating in the EU.

In summary, after controlling for the fact that multinational firms tend to be larger, more productive and pay higher wages than domestic firms (see table 2), both foreign and domestic multinationals show a higher propensity to exit than national firms active in manufacturing. For services, only foreign multinationals exhibit significantly higher hazard ratios. Furthermore, within the manufacturing sector, firms originating from outside the EU are found to exhibit higher hazard ratios, both compared to foreign firms from within the EU and compared to national firms. The magnitude of these effects is in line with results obtained in earlier studies. Görg and Strobl (2003) find that foreign firms' hazard rates are 1.4 times as high as domestic companies and Bernard and Sjöholm (2003) associate foreign ownership with an increase in the exit probability of 20 percent.

5. **Robustness checks**

In order to verify the robustness of the results presented in the previous section, a number of sensitivity analyses have been applied to the original model, both in terms of

sample selection and methodology used. First, as is explained in detail in Appendix A, the sample used to estimate (3) in the previous section consists only of firms employing 10 or more people in at least one sample year. However, a common finding in papers dealing with exit rates at the firm level is that small plants tend to exhibit (proportionately) higher exit rates than their larger counterparts (eg. Bernard and Jensen 2006; Disney et al. 2003). Bernard and Sjöholm (2003) further note that given the larger average size of MNEs, exclusion of small firms from an empirical analysis dealing with the impact of multinationality on exit patterns is likely to seriously bias the results[17].

In order to verify the sensitivity of the results displayed in table 3 to the inclusion of small firms in the sample, I have re-estimated (3) using the full sample of firms with positive employment in at least one sample year (98,100 firms). The results are displayed separately for manufacturing and services in the first two columns of table 4. The most notable differences compared to estimation of the restricted sample include the increase in the size effect for the full sample (from about 0.60 to more than 1.00); the significantly negative coefficient for wages; the significantly positive effect of industry concentration for services and the lower coefficient for the productivity variable, which is only half as large as for the restricted sample. For the ownership variables, results are very similar to those obtained in table 3, although the coefficient on the foreign ownership variable is somewhat larger in both sectors (0.83 for manufacturing and 0.33 for services, compared to 0.53 and 0.24 respectively). Hence, it has been shown that the results obtained in the previous section are robust to the inclusion of small firms in the analysis.

Second, although the Belfirst database provides information on whether firms have been subject to a change in ownership (eg. a merger or takeover), it is not possible to track these firms following the ownership change. It is possible that a takeover results in an exit, followed by the start-up of a new firm; in which case only the exit of the firm can be

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[17] I am thankful to an anonymous referee for pointing out the importance of controlling for these sample selection issues.

observed. Since the exit rate of those firms that have been subject to some form of ownership change amounts to 85 percent, compared to 8.90 percent for the sample; it seems more than likely that a number of these 'exits' are in fact misclassified. Moreover, no information is available on the nationality of ownership before and after the change. Therefore, all firms that have been subject to a takeover, a merger or a scission over the sample period, were initially omitted from the sample.

However, it is possible to re-estimate (3) on the sample including firms that have been subject to an ownership change, taking their different nature into account by introducing a dummy variable indicating whether the firm has been subject to some form of merger or takeover ($Merger_i$). Results for this alternative model are displayed in columns III and IV of table 4. Again, results are in line with those obtained in table 3. Results for the sample including all firms subject to an ownership change, but excluding the merger dummy[18] (unreported), are also in line with the results obtained using the restricted sample.

Finally, in the last two columns of table 4 the sensitivity of the results to the estimation technique used is verified. Following Bernard and Jensen (2006), a probit model is used to assess the determinants of exit behavior at the firm level. Focusing on the ownership variables, the associated marginal effects for the coefficients on For_i and Dom_i are between 0.003 and 0.007, implying that multinational firms are between 20 (for domestic MNEs active in manufacturing) and 50 percent (for foreign MNEs active in manufacturing) more likely to exit compared to national firms[19]. Again, overall, results of the probit model are very similar to results obtained using the Cox proportional hazard model.

6. Conclusions

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[18] Both Bernard and Jensen (2006) and Bernard and Sjöholm (2003) include firms subject to ownership changes in the sample, while allowing for their different nature using a dummy variable. Görg and Strobl (2003) can not distinguish between an actual exit or an ownership change, hence their sample includes both.

[19] Since on average about 1.5 percent of firms exit in each sample year (8.9/6), an increase in this probability by 0.3 (0.7) percentage points represents an increase in the number of exiting companies by 20 (50) percent (1.8/1.5=1.2 or alternatively, 2.2/1.5=1.5).

This paper has investigated the hypothesis that multinational companies in Belgium are more footloose than national firms. In the empirical analysis I have distinguished for nationality of ownership, using a different ownership variable for foreign and domestic multinationals. Using an unbalanced sample of 26,046 firms located in Belgium between 1996 and 2001, I find that multinational firms, both foreign and domestic, have a lower propensity to exit unconditionally; that is, they exhibit lower exit rates compared to national firms. However, multinationals also tend to be larger, more productive and pay higher wages than national firms. Since all these characteristics have been found to have significant effects on the probability of firm failure, a Cox proportional hazard model is estimated to explicitly test for the determinants of exit in the sample.

Consistent with previous studies, I find a significantly negative influence of size and productivity at the firm level on the exit probability of firms. Results further indicate that firms that pay higher wages for given levels of productivity, are more likely to exit. For the ownership variables, the results are mixed. The analysis clearly shows that foreign multinationals are more 'footloose' than national firms of comparable size, age and productivity, both in the manufacturing and service industries. Domestic MNEs on the other hand, while more likely to exit in the manufacturing sector, do not exhibit significantly higher exit rates than national firms in the service sectors, after controlling for firm- and industry-specific variables. I have presented a number of refinements and sensitivity analyses to the model to verify the robustness of these results.

These findings have clear policy implications, especially in terms of the desirability of the large impact of multinational firms on employment and output generation in Belgium. The fact that domestic multinationals, while sharing most of the beneficial characteristics of foreign firms in terms of employment generation and average productivity, do not seem to share the footloose nature of their foreign counterparts in the service sector sheds a new light on recent government measures in Belgium, primarily aimed at attracting foreign investments;

as well as on the recent liberalization of many service industries, such as telecommunications and electricity. Naturally, a drawback of the present analysis is that it only focuses on the extensive margin, i.e. on the shutdown decision of the firm.

Appendix A: Data

Data source: Belfirst database (Bureau Van Dijk 2004).

Definition exit variable: Exit[20] occurs if a firm's employment drops to zero in a particular year. Likewise, a firm enters the market in a certain year if there was no previous employment recorded. In order to ensure that a failure to report in a given year or a sudden drop in employment for some other reason is not misclassified as an exit, the data is subject to a number of robustness checks. First, to ensure that an entering plant is indeed 'new', I impose the condition that a plant's year of incorporation can not differ by more than two years from the year the firm enters the market according to the entry variable[21]. Second, to avoid misclassification of 'temporary exits', all firms that re-enter within two years after having exited are dropped from the sample[22]. For similar reasons, I omit the last two years for which data are available (2002 and 2003), since I can not reliably identify entry and exit for these years. Third, I omit all firms that have been subject to takeovers, mergers or acquisitions from the sample[23]. Finally, since it is more plausible for small firms[24] to reduce employment to zero without actually exiting the market, I further limit attention to those firms employing at least 10 employees in any particular sample year.

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[20] Although the Belfirst database reports firms' legal status and hence also legal exit, I have chosen not to rely on this measure for two reasons. First, inspection of the data reveals that the official date associated with the legal status in the database often does not concur with the actual time the firm exits the market. Second, communications with Bureau Van Dijk made clear that although the legal status is correctly reported whenever available; many companies fail to report to the National Bank after ending their activities.

[21] I allow for this two year lag, since it is possible that a firm already exists as a legal entity for some time before actually starting its activities. The official year of incorporation is replaced by the actual date of entry in these cases.

[22] This procedure differs somewhat from that employed by Mata and Portugal (1994) who only omit firms with a temporary exit of at least two years. If a firm exits only one year and then enters again, it is considered alive in their sample, while in this case it is omitted from the sample.

[23] Cases are identified using the legal status variable. The categories omitted are: 'Merger with another company to form a third one', 'Absorption by another company' and 'Scission into several companies'.

[24] I consider firms employing less than 10 employees to be 'small'.

Definition of variables:

Age_{it} Difference between year t and the official year of incorporation of the firm (replaced by the actual date of entry where necessary).

$Size_{it}$ Average number of employees (full-time equivalents, fte) at the firm level in year t.

$Wage_{it}$ "Remunerations, social security costs and pensions" per employee (fte) of firm f in year t, measured in thousands of euros.

$Prod_{it}$ "Net Value Added" per employee (fte) for firm f in year t, measured in thousands of euros.

$Herf_{jt}$ Herfindahl concentration index, measured at 3-digit NACE level and calculated for the full sample of firms in the Belfirst database with available data on turnover. Market shares are calculated on the basis of firm and industry turnover.

For_i Foreign multinational ownership variable. A firm is considered to be foreign-owned if it has some foreign ownership.

Dom_i Domestic multinational ownership variable. A firm is identified as a domestic MNE if it has subsidiaries in countries other than Belgium and it is not foreign-owned.

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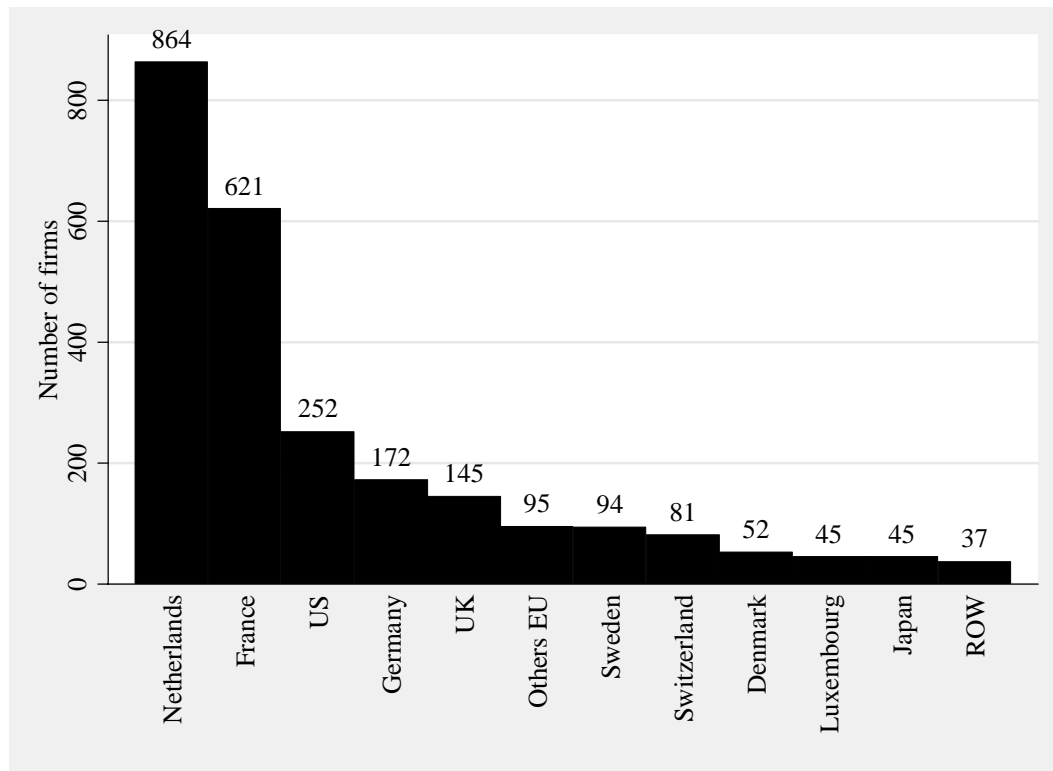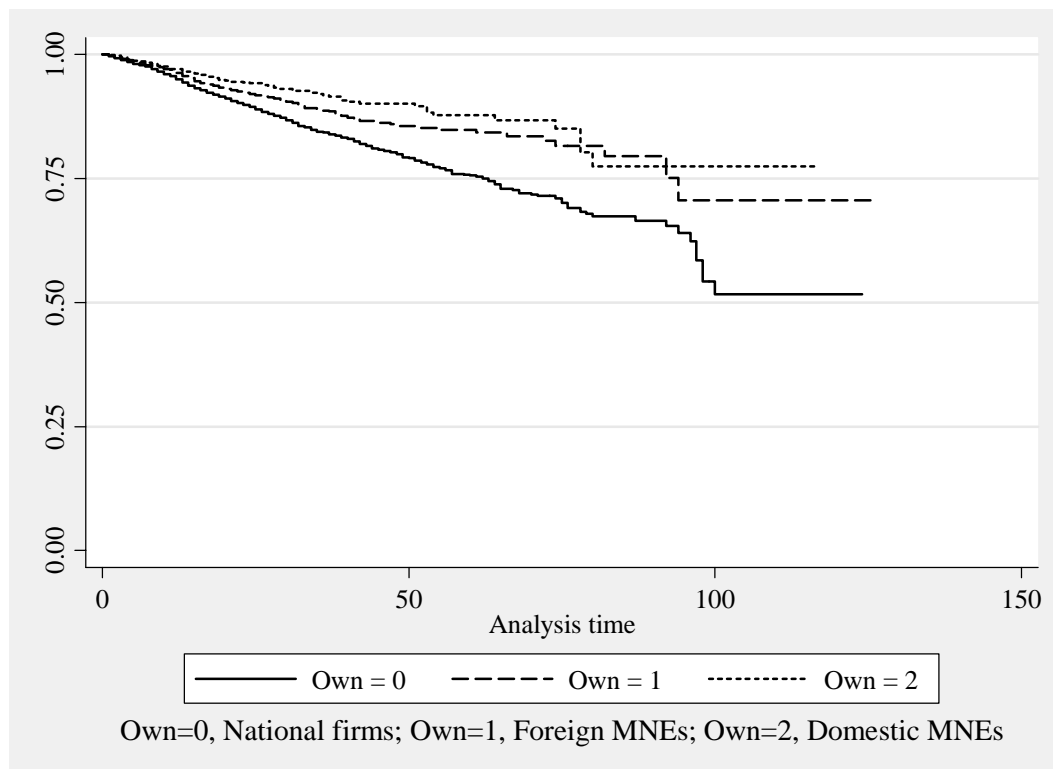Figure 1: *Foreign multinationals by country of origin*[25]

Figure 2: *Kaplan-Meier survival functions by nationality of ownership (Own)*

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[25] The category 'Others EU' includes: Austria, Finland, Ireland, Italy and Spain. The 'ROW'-category (Rest of the World) includes: Bahrain, Bahamas, Canada, Israel, India, Kroatia, Moldavia, Norway, Singapore and South Africa.

	Table 1: *Sector distribution of firms*				
	Sector	National firms	Foreign MNEs	Domestic MNEs	Total number of firms
D.	*Manufacturing*	*5,202*	*704*	*618*	*6,524*
DA.	Manufacture of food products, beverages and tobacco	756	75	93	924
DB.	Manufacture of textile and textile products	646	23	64	733
DC.	Manufacture of leather and leather products	33	1	2	36
DD.	Manufacture of wood and wood products	231	7	13	251
DE.	Manufacture of pulp, paper and paper products; publishing and printing	583	51	59	693
DF.	Manufacture of coke, refined petroleum products and nuclear fuel	7	9	4	20
DG.	Manufacture of chemicals, chemical products and man-made fibres	170	127	58	355
DH.	Manufacture of rubber and plastic products	201	48	43	292
DI.	Manufacture of other non-metallic mineral products	337	53	30	420
DJ.	Manufacture of basic metals and fabricated metal products	1,032	111	80	1,223
DK.	Manufacture of machinery and equipment n.e.c.	329	72	61	462
DL.	Manufacture of electrical and optical equipment	259	73	63	395
DM.	Manufacture of transport equipment	130	32	18	180
DN.	Manufacturing n.e.c.	488	22	30	540
E-Q.	*Services and related activities*	*16,828*	*1,799*	*895*	*19,522*
E.	Electricity, gas and water supply	28	10	4	42
F.	Construction	3,670	145	97	3,912
G.	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	6,212	785	343	7,340
H.	Hotels and restaurants	1,165	39	13	1,217
I.	Transport, storage and communication	2,017	196	112	2,325
J.	Financial intermediation	269	57	37	363
K.	Real estate, renting and business activities	2,504	516	249	3,269
L.	Public administration and defense, compulsory social security	12	0	0	12
M.	Education	44	4	4	52
N.	Health and social work	380	2	7	389
O.	Other community, social and personal service activities	524	45	29	598
P.	Private households with employed persons	1	0	0	1
Q.	Extra-territorial organizations and bodies	2	0	0	2
	Total	*22,030*	*2,503*	*1,513*	*26,046*

Table 2: *Summary statistics by ownership type (1996-2001)*			
Variable	*Domestic firms*	*Foreign MNEs*	*Domestic MNEs*
Number of firms (% of total firms)	22,030 (84.58 %)	2,503 (9.61 %)	1,513 (5.81 %)
Number of exits (Total % over sample period)	2,040 (9.26 %)	187 (7.47 %)	90 (5.95 %)
Age[1] (years)	18.99 (14.83)	22.82 (18.96)	23.30 (18.98)
Size[1] (number of employees)	29.97 (120.83)	165.22 (577.67)	204.51 (1,453.59)
Wage per employee[1] (x 1,000 €)	34.14 (33.95)	52.20 (28.56)	45.58 (38.40)
Productivity per worker[1] (x 1,000 €)	54.19 (91.71)	95.08 (208.76)	100.37 (518.70)
Labor costs relative to productivity[2]	0.83 (8.79)	0.89 (4.79)	0.78 (2.03)
Industry concentration[1] (Herfindahl index 3-digit NACE)	503.71 (870.59)	811.97 (1,107.58)	823.07 (1,165.77)
[1] Values represent sample means. Standard deviations are reported in brackets. [2] Wage over productivity. Value represents sample mean, standard deviation reported in brackets.			

Table 3: *Regression results: Cox proportional hazard model (1996-2001)*						
Sectors	All (Nace 15-99)		Manufacturing (Nace 15-37)		Services (Nace 40-99)	
Variables	I	II	III	IV	V	VI
Dom_i	0.10 (0.12)	0.09 (0.12)	0.50^b (0.20)	0.50^b (0.20)	-0.04 (0.15)	-0.05 (0.15)
For_i	0.30^a (0.09)	-	0.53^a (0.18)		0.24^b (0.10)	-
EU_i	-	0.32^a (0.09)	-	0.45^b (0.19)	-	0.30^a (0.10)
US_i	-	0.35 (0.28)	-	0.78^c (0.45)	-	0.16 (0.38)
ROW_i	-	-0.24 (0.46)	-	1.57^a (0.50)	-	-0.88 (0.67)
$\ln(Size_{it})$	-0.60^a (0.03)	-0.60^a (0.03)	-0.61^a (0.06)	-0.61^a (0.06)	-0.61^a (0.04)	-0.61^a (0.04)
$\ln(Wage_{it})$	0.11 (0.07)	0.11 (0.07)	0.55^a (0.19)	0.55^a (0.19)	0.04 (0.08)	0.05 (0.08)
$\ln(Prod_{it})$	-0.76^a (0.04)	-0.76^a (0.04)	-0.95^a (0.10)	-0.95^a (0.10)	-0.73^a (0.05)	-0.73^a (0.05)
$\ln(Herf_{jt})$	0.001 (0.03)	0.001 (0.03)	-0.10 (0.08)	-0.10 (0.08)	0.02 (0.03)	0.02 (0.03)
Wald test (Chi²)	764.58^a	769.56^a	219.70^a	225.03^a	578.69^a	581.32^a
N	143,010		36,721		106,289	
Number of firms	26,046		6,524		19,522	
Number of failures	2,317		520		1,797	
% of total	8.90		7.97		9.20	

Robust standard errors, adjusted for clustering at the plant level (reported in brackets).
Baseline hazard stratified by 2-digit sector and year.
Efron option for handling ties.
[a] significant at 1 % level ; [b] significant at 5 % level ; [c] significant at 10 % level.

Table 4: *Robustness checks*						
	Cox PH Model[1] Incl. small firms[2]		Cox PH Model[1] Incl. takeovers[3]		Probit[4]	
	I	II	III	IV	V	VI
Sector of Activity	Industry	Services	Industry	Services	Industry	Services
Constant	-	-	-	-	-1.07[a] (0.35)	-1.19[a] (0.32)
Dom_i	0.59[a] (0.22)	-0.02 (0.09)	0.50[a] (0.19)	0.00 (0.14)	0.14[c] (0.08)	0.01 (0.06)
For_i	0.83[a] (0.19)	0.33[a] (0.08)	0.43[b] (0.17)	0.20[b] (0.09)	0.25[a] (0.07)	0.11[a] (0.04)
$Merger_i$	-	-	3.09[a] (0.20)	2.61[a] (0.07)	-	-
$\ln(Age_{it})$	-	-	-	-	0.01 (0.02)	-0.03[a] (0.01)
$\ln(Size_{it})$	-1.12[a] (0.04)	-1.26[a] (0.01)	-0.57[a] (0.06)	-0.55[a] (0.04)	-0.25[a] (0.03)	-0.23[a] (0.02)
$\ln(Wage_{it})$	-0.47[a] (0.05)	-0.46[a] (0.01)	0.52[a] (0.19)	0.02 (0.08)	0.28[a] (0.09)	0.06 (0.04)
$\ln(Prod_{it})$	-0.46[a] (0.04)	-0.33[a] (0.01)	-0.91[a] (0.10)	-0.67[a] (0.05)	-0.44[a] (0.05)	-0.35[a] (0.03)
$\ln(Herf_{jt})$	-0.00 (0.04)	0.06[a] (0.01)	-0.08 (0.07)	0.03 (0.03)	-0.04 (0.03)	0.01 (0.01)
Wald test (Chi²)	1,434.21[a]	13,600.59[a]	382.38[a]	1,807.64[a]	509.03[a]	1,738.41[a]
N	71,226	367,747	37,079	107,897	36,721	106,289
Number of firms	14,017	84,083	6,594	19,826	6,524	19,522
Number of failures	1,760	19,172	583	2,049	520	1,797
% of total	12.56	22.80	8.84	10.33	7.97	9.20

Robust standard errors, adjusted for clustering at the plant level (reported in brackets).
[a,b,c] indicates significance of coefficients at 1, 5 and 10 percent level respectively.
[1] Baseline hazard stratified by 2-digit sector and year.
[2] Breslow option for handling ties[26].
[3] Efron option for handling ties.
[4] Time and 2-digit industry dummies are included.

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[26] Although the efron approximation to handle tied failure times is more accurate if many ties occur in the data, the breslow method is less time-consuming, which is why it has been used to estimate the model for the sample including small firms. However, results in table 3 (for the restricted sample) were not sensitive to the method used to approximate ties. For a detailed account of the different options to handle tied failures in continuous duration models, see StataCorp (2005: 120-154).