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The death of German firms: What role for foreign direct investment?*

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Abstract

This paper aims at examining the role played by inward Foreign Direct Investments (FDI) in affecting the exit probabilities of German manufacturing firms in the pre-crisis year 2007. We introduce two main novelties: in the first place, we include the FDI variable, dividing it between types of foreign investor (industrial vs. financial) besides the usual analysis with the division by country of origin. Secondly, we analyze whether FDI may have effects not only on the probability that a firm exits the domestic market, but also on whether it stops being internationally involved, that is, whether it stops importing or exporting. We find that German firms in most cases suffer from higher competition introduced by foreign firms except when they are part of a high-R&D region or a high-tech sector when they have the needed absorptive capacity to take advantage of possible spillover effects. We also find that U.S. FDI has a crowding out effect for firms located in low-tech sectors but not in high-tech sectors. The results are reversed when considering financial investments instead of industrial investments. Finally, we find that FDI is negatively correlated with exits from export markets but positively with those from import markets.

JEL Classification: F23; L60; O30.

Keywords: MNE, FDI, foreign ownership, survival, Germany.

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1 Introduction

The increasing pace of globalization is putting progressively more emphasis on the role played by trade and foreign direct investments (FDI) in affecting market dynamics. After the initial empirical contributions, among which the most relevant was Mansfield (1962), who found a negative relation between the initial size and the growth of a firm[1], the industrial organization literature has started, from the 1980s, to focus on the study of the determinants of firm survival rates. Most of these studies have used both firm and industry level determinants to explain the exit probability of firms from the market. Among the former, we usually find age, size, total factor productivity (TFP) or labour productivity, R&D investment, and firm ownership.[2] Among the industry determinants, the variables that are usually included are market concentration or technological intensity, whereas empirical research has not devoted much analysis to how the sectoral presence of foreign firms can affect the survival of local firms. Indeed, when multinational enterprises (MNEs) choose FDI as a mode of entry into the host market, the superior firm-specific assets owned by those firms could spill over to domestic firms and therefore increasing their performance. This theoretical expectation has led many governments to adopt policies to stimulate FDI inflows. The majority of empirical analyses have concentrated their efforts on the investigation of the likely indirect impacts of FDI on local firms, making use of the concept of productivity spillovers: that is, by measuring whether an industry level measure of FDI can affect TFP of local firms. However, looking at the large body of empirical evidence gathered so far, only mixed results have been found, regardless of the country considered. Most of the time it has not been considered that foreign firms can also reshape the market forces causing a higher competition effect to emerge, a consequent shrinkage of profit margins, and, in the end, their own exit

[1] This result was against Gibrat's Law, stated in 1931, according to which the size of a firm is irrelevant in explaining its performance.

[2] The literature examining the issue of firm survival first aimed at comparing the dynamics of the survival of foreign and local firms to investigate whether the two dynamics could be different in some way. The general finding is that foreign MNEs are more likely to survive than domestic market oriented firms, as they are bigger, more R&D intensive, and more productive.

from the market. Two main mechanisms are at work: the first implies an increase in the efficiency of the sector, causing the least efficient domestic firms to leave the market; the second is the transmission of a spillover effect to domestic firms, causing an increase in their performance and therefore allowing them to stay in the market despite the greater competition. Which of the two effects is going to dominate is an empirical matter. Only a few papers have investigated this research question. For example, Görg and Strobl (2003b), examining the case of Ireland, found that only in high-tech sectors does the presence of foreign firms not cause local firms to exit from the market.

Following this branch of the literature, which goes beyond the usual debate about an FDI productivity spillover, we analyze whether FDI may influence the exit probability of domestic firms in Germany. In doing this, we make use of a tailor made dataset of manufacturing enterprises in which we are able to distinguish between foreign and domestic firms. The present paper contributes to the literature in several ways: first, it provides the first empirical evidence of the FDI survival effect for the German economy. We choose to focus on the German case mainly because this European country is one of the leading destinations, worldwide, for FDI, and the share of employees working for foreign firms is remarkably high: more than 10% (Nahm (2011)). The way the dataset is built allows us to analyze exits in 2007, giving us the opportunity to test how the presence of foreign firms shaped the market before the crisis started. The crisis period has recently been under scrutiny: for example, Godard et al. (2012) analyzed the behavior after 2008 of foreign and local firms in the Irish case. Similarly, Alfaro and Chen (2012) examined how foreign affiliates around the world responded to the crisis in comparison to local firms, finding that foreign firms had more chances of survival than local counterfactuals with similar economic characteristics. However, the time period just immediately before the crisis has not been explored by the FDI survival literature.

The second main contribution is that we introduce heterogeneity both on the part of the domestic firms, accounting for their international status (exporters, importers, and two-way traders) and on the part of the MNEs, that is, by considering FDI from different countries and considering different types of foreign ownership (industrial

vs. financial). Third, we do not limit our analysis to the effect of FDI on exit from the domestic market, but also study whether firms stop being involved in exporting or importing activities, that is, whether they lose their international status. This research question has been rarely examined: for example, Alvarez and Lopez (2008) analyze the determinants of the exit from export and import markets in the Chilean case but without considering the role played by FDI.

Although we only have cross-sectional data, and therefore we can interpret our results only in terms of correlations, our main findings point to a negative effect of FDI on the survival of domestic firms: the effect is the same when we split the sample between East and West Germany and is also independent of the international status of the firm. However, the size of the coefficient for West Germany indicates that the displacement effect is higher in this part of the country than in East Germany. Local firms are more likely to survive when they belong to a high-tech sectors and a high-tech region: this is in accordance with the fact that firms that are part of those categories benefit from high spillover effects, being in the position of balancing the clearing effect due to their higher absorptive capacities. It is also interesting to note that when we combine FDI heterogeneity with local firm heterogeneity, we find that industrial FDI generates a crowding out effect only in low-tech industries, unlike financial FDI, which mainly generates positive spillover effects. When coming to consider the effect of FDI on the probability of firms' pursuing their international activities, we find that exporting firms more easily continue being exporters while importing firms can be forced to give up this activity, even though the effect seems to be driven by firms in East Germany.

The remainder of this paper is organized as follows: Section 2 reviews the literature about the role played by FDI in affecting local firms' survival; Section 3 describes the dataset; Section 4 presents the econometric methodology and covariates used. Section 5 reports the probit estimates, and Section 6 offers some conclusive remarks.

2 FDI and firm survival: The related literature

The literature concerning the impact of FDI on local firms started more than a decade ago, with the aim of exploring the effects of foreign-owned firms on the productivity of local firms (e.g., Aitken and Harrison (1999)). The empirical approach followed requires the estimation of a production function augmented with a sectoral measure of FDI. The empirical analyses produced through this approach have mainly achieved mixed results, especially when taking into consideration the horizontal spillover effect rather than the vertical effect, for which positive results are usually found (e.g., Javorcik (2004)).[3] Therefore, the efforts to investigate this multifold concept are still under way. However, the empirical approach used, which implies the measurement of the spillover effects in terms of TFP, can be quite narrow: therefore, some related strands of the literature have started to explore different methodologies to go beyond this approach. In the first place, the export spillover effect, that is, the effect played by MNEs on the exporting activities of the local firms (e.g., Kneller and Pisu (2007)), has been one of the first to be examined. The main research question revolves around the possibility that foreign firms influence both the export decisions and the export intensities of local firms. In a similar way, the second empirical approach that has recently emerged has concentrated attention on the explanation of the innovation spillover effect coming from FDI (e.g., Garcia et al. (2012)). In this case, the dependent variable is not the amount of exports, but rather the innovation activities of the firms, such as the product innovation counts or the number of patent applications. The last strand of the literature trying to explore further avenues of research is related to the investigation of the effect of MNEs on the probability of local firms' survival. Nevertheless, a similar but distinct research question was first examined: at first, authors concentrated on explaining what are the effects of foreign ownership on the probability of exit of the same firm

[3] In the case of the horizontal measure, the FDI variable is represented as the share of foreign firm sales or employees in total sales or in total employees of the sector under consideration. Instead, in the vertical FDI measure, the variable is built by multiplying the horizontal measure by the amount of production supplied or sold to the upstream, respectively, downstream sector.

from the market. In this respect, two opposing views emerged: according to the first, MNEs should display higher probabilities of survival in the market, as they are more likely to invest in more technology intensive sectors, they are bigger, and they are more productive. Moreover, the role played by sunk costs is quite relevant in this respect as investing abroad involves setting up or taking over a new plant, therefore causing a higher involvement in the host country. According to this view, if the macroeconomic conditions of the host country do not deteriorate by much, MNEs may show a more rooted character.

On the other side, a distinguished characteristic of MNEs is that, as compared to non-MNEs, they can respond more easily to adverse changes in the macroeconomic variables affecting the host country by simply shifting production to another country. Hence, foreign MNEs can be less rooted in the local economy than local firms as well as domestic MNEs (and non-MNEs). Empirical results trying to account for such effects are quite mixed: with respect to the first hypothesis, Baldwin and Yan (2011) consider the role of real-exchange-rate movements and tariff reductions in affecting the exit rate in Canada, finding that foreign firms and firms that export are more likely to stay in the market than are local firms. Instead, Van Beveren (2007) controls for plant specific differences, showing that domestic and foreign MNEs in Belgium were less rooted in the host country than domestic MNEs and national firms. The second hypothesis is confirmed by looking at the results of Bernard and Sjöholm (2003) and Görg and Strobl (2003a), who use data for Ireland and Indonesia and look at whether there are differences in the probabilities of exit between foreign and domestic firms. They both find that foreign firms are more likely to exit. Non-significant results are found as well: for example, Taymaz and Özler (2007), once they control for industry or plant characteristics, find that in the Turkish case, between 1983 and 2001, differences in terms of survival probabilities disappear. This all points to a high specificity of results. The case of Germany has been analyzed as well: Wagner and Weche Gelübcke (2012) as well as Andrews et al. (2012) have found foreign owned firms to have exit probabilities equivalent to those of the whole population of German owned firms. However, Wagner and Weche Gelübcke (2012) show that foreign owned firms have lower survival probabilities than those of German

firms that are also dependent affiliates and are therefore part of a company network just as are their foreign owned competitors.

Instead, we see that much less attention has been paid to the investigation of the effects that MNEs may have on the survival of domestic firms. Indeed, empirical studies documenting this effect are very scarce. From a theoretical point of view, MNEs may enhance the competition effect in the same industry in which they invest through FDI, pushing some firms out of the market. Two opposing effects can shape the market dynamics: FDI can expand the set of technologies available to local firms but, at the same time, changing the market structure, they enhance competition. The potential disadvantage is that local firms may not be able to adopt the new technologies immediately and, as a consequence, their productivity (at least in the short run) declines, showing negative spillover effects. Usually, the overall effect we observe works in the direction of crowding out local firms, because of the reduction in prices that causes a decrease in the profit function. As a consequence, less efficient firms will be pushed out of the market.

One of the first papers to account for such an effect is Görg and Strobl (2003b) who, using plant-level data for the Irish manufacturing sector in 1973–1996, find that MNEs do not negatively influence the survival of Irish plants. Kosova (2010) analyzes the case of the Czech Republic over 1994–2001, finding that when foreign firms first enter, domestic firms are going to experience several disadvantages, but, after this initial effect has vanished, they may receive substantial benefits from the expanding foreign industry. Instead, Burke et al. (2008), who examine the effects of FDI on the survival of new firms in the UK, find that taking into account the sectoral differences can be very important: they distinguish between static and dynamic industries on the basis of the measure of the firm entry and exit relative to the overall stock of firms. They mainly find a negative effect in dynamic markets while the positive knowledge spillover dominates in the static industries.

Alvarez and Görg (2009) continue in this stream of research, investigating the Chilean case and finding that the presence of MNEs has a positive impact on the survival of local firms: the effect is completely captured by enhancement in TFP. This means that by including TFP in their regressions, the positive effects of FDI

disappear. The case of another extra-European country, namely China, is examined by Anwar and Sun (2012): they concentrate their analysis on market entry and exit in period 2003–2007. One important novelty they introduce in their analysis is the disaggregation of FDI according to the country of origin, distinguishing between FDI from Western countries and FDI from the area of Hong Kong, Macau, and Taiwan (HMT). They discover that FDI from HMT has contributed more than FDI from all the other countries to increase the probability of firm exit, while FDI from other countries has made a significant contribution to the rate of firm entry. The reason for the former result could lie in the fact that FDI from HMT is from countries in which the managerial practices are quite similar to those used in China, causing local firms to face higher competition.[4] Recently, Bandick (2010) examined the case of Sweden, separating the effect caused by foreign MNEs, domestic MNEs, exporting firms, and firms merely domestically oriented. The findings reveal that MNEs negatively affect the survival of domestic firms while a foreign presence does not influence the exit rate of Swedish MNEs. Moreover, they find that a foreign presence has a negative impact specifically on those firms that are non-exporting. With respect to the case of Slovenia, Kejzar (2011) considers what is the role for FDI in the firm selection process in 1994–2003. His results can be mainly summarized by saying that FDI seems to have a negative effect on local incumbent firms but not on those that have a higher export propensity. This effect especially holds when considering the intra-industry spillover effect. This reinforces the idea that the export status of the firm is a relevant variable to take into consideration, as firms belonging to this group benefit from having international exposure in terms of a lower death probability. In the Turkish case, no effect is detected: Taymaz and Özler (2007) find that, in the long term, foreign presence seems not to affect the probabilities that local firms will

[4] The ability of MNEs to influence the rate of domestic entry is the focus of a parallel research question: one of the most relevant empirical studies has been carried out in Ayyagari and Kosova (2010), which examines whether FDI can create positive entry spillovers by bringing new technological knowledge, thus causing the entrance of domestic firms into the country. They use data from 1994–2000 for 245 three-digit industries in the Czech Republic, finding that foreign presence can stimulate the entry of domestic firms especially through inter-industry spillovers.

exit the market. Finally, the Italian case is examined by Ferragina et al. (2012), who carry out the analysis for the period from 2004 to 2008 based on a Cox proportional hazard model. Besides finding that foreign MNEs are more likely to exit the market than national firms both in the manufacturing and service sectors, they also find that MNEs contribute to positively affect local firms' life only in the service sectors.

3 Data and variables of main interest

The database used involves mainly three data sources. The first source is the monthly and annual reports of establishments from the manufacturing, mining, and quarrying sectors administered by the German statistical offices. The information is aggregated at the enterprise level and available in the form of annual results for all German firms which employ at least 20 persons and operate in the corresponding industries (for more information see Konold (2007)). These data are of particularly high quality because firms in Germany are legally required to respond to these surveys.

Firm exits are defined as firms which reported to the monthly or annual survey in the year t but not in $t+1$. Unfortunately, surviving and exiting firms can only be identified for the year 2007 because in 2009 the monthly reports were adjusted to the German industry classification WZ2008 and thus the population of covered firms was subject to changes. The definition of exits should be treated with caution as there may be identification errors. For example, if a firm relocates abroad or shifts its activities to another sector, outside manufacturing, it is not obliged to report anymore and is regarded as exiting although it survived. However, while this would not be an exit in terms of a firm's death, it is an exit from the particular market or mode of serving it. Another possibility of misidentification would be if firms shrink below the threshold of 20 persons and become exempt from the obligation to report. According to the staff of the Research Data Center, cases of any type of relocation rarely happen and the latter possiblity of a firm's shrinking is alleviated due to the fact that most firms go on reporting even if they fall below the threshold simply because they do not realize that they are not obliged to report anymore. In

2007, for manufacturing, 1,802 firm exits were identified, 120 of which were foreign controlled enterprises and are not the focus of this analysis, thus, the exit rate of domestically owned firms is 4.85%.

A second source of information is the Enterprise Group Database created by the German Federal Statistical Office to comply with EU regulation (EC) 716/2007. Since 2007, the European Union legislation demands harmonized statistics on foreign controlled enterprises in each member state (e.g., Vergina and Grell (2009)). A foreign controlled enterprise,[5] is defined as an enterprise of which more than 50% is owned by a legal or natural person situated abroad. Capital shares as well as voting rights and other forms of control are considered, such as indirect or effective minority control (Eurostat, 2009).[6] For being able to provide Foreign Affiliates Statistics (FATS) for Germany, the institutions in charge had to purchase information on ownership structures from the commercial data vendor Bureau van Dijk and to integrate this into the national business register (*Unternehmensregister*). Therefore, industry and topic specific surveys recently have become available for analyses related to foreign ownership (for a detailed description of this new database see Weche Gelübcke (2011)).

The role of FDI in a specific industry of the German economy is measured by the role of foreign controlled firms therein. The importance of foreign presence in Germany is not mirrored by the number of foreign owned firms, as they account only for about 1% of all firms in the German non-financial sector (Nahm 2011). Their economic weight is more adequately addressed by considering their employment and turnover shares. In 2007, foreign owned firms employed 13% of the workforce

[5] The terms *foreign controlled*, *foreign owned*, and *foreign* are used interchangeably in this text. The term multinational enterprise (MNE) is also used mainly to describe foreign multinationals as we are not able to identify domestic MNEs. MNEs form the vast majority of foreign controlled firms in Germany although it should be kept in mind that the controlling unit of a foreign enterprise can be, for instance, a natural person.

[6] Indirect control refers to the an enterprise A's being controlled by enterprise B, both being domestic companies, when enterprise B is, in fact, controlled by an entity abroad. Then, enterprise A is also foreign controlled. Effective minority control is when several minority owners with shares of more than 50% in sum act in concert.

and generated 23% of the total turnover (ibid.). Consequently, foreign presence is measured as the percentage share of employees working for foreign owned firms in a 2-digit industry. The percentage share of turnover generated by foreign owned firms in certain industries is also considered but reported only for robustness purposes as the results are fairly similar. The descriptive statistics in Table 2 in the following section show that the average foreign employment share across industries is about 18%.

The information as to whether or not a firm imported from other EU or extra-EU countries stems from a third source, namely the German Turnover Tax Statistics Panel (see Vogel and Dittrich (2008) for detailed information).[7] Since the turnover tax statistics cover firms with a turnover of at least 17,500 EUR, information about importing activities can only be obtained for those. However, this threshold is quite low, considering that only enterprises of more than 20 employees are covered by the monthly and annual surveys.

The data for this study were merged within the AFiD-Project (Official Firm Data for Germany) for the available years 2007 to 2009, and were analyzed via remote access due to the confidentiality of the micro-data (on the AFiD-Project, see Malchin and Voshage (2009)).[8] For this analysis, the observations were restricted to enterprises from the manufacturing sector in accordance with the NACE classification.

[7] Wagner (2011) used this information on imports in the context of firm survival for the first time.

[8] All computations were programmed in Stata 12 and carried out within the Research Data Center of the statistical office Berlin-Brandenburg.

4 Econometric strategy and covariates

The model through which we analyze a firm's exit decision is a probit model:

$$Pr(Exit_a = 1) = Pr(a > b*), \tag{1}$$

where b* is the cost threshold above which a firm exits from the market. Indeed, at that critical point, a firm earns zero expected profits. Therefore, a firm will exit if its costs are higher than the cut-off point which causes it to earn negative profits. Our main research question is that of investigating whether the cost level of a firm may depend on firm- and industry-level factors, among which the focus of our analysis is the FDI variable.

$$a = x\beta = \alpha + \delta V_{it} + \phi Z_{it} \tag{2}$$

Here, β is a vector of coefficients and X is a vector that includes both firm characteristics and industry level characteristics. We can write the equation as in (3), where Φ is the standard normal cumulative distribution:

$$Pr(Exit_a = 1) = \Phi(x\beta) = \Phi(\alpha + \delta V_{it} + \phi Z_{it}) \tag{3}$$

The firm and industry characteristics introduced are calculated according to the definitions given in Table 1 and are discussed in the following. Some descriptive statistics of these control variables can be found in Table 2.

- *Firm age*: the dummy variable through which we know whether the firm existed before the year 1996 is a proxy for the firm's age. This variable allows us to distinguish older from younger firms: according to the theoretical literature, a firm's exit from the market is a decreasing function of its age. The main reason is that older firms staying in the market for a longer period have learned how to deal with managing day to day businesses. The so called 'liability of newness' is theoretically described by Bellone et al. (2008), who point out how younger

firms, as they may suffer from a lack of reputation and a more difficult access to finance, may be more at risk when competing in imperfectly competitive markets. This effect has been empirically tested also in the case of Germany: Fackler et al. (2012) find that the probability of exit is much higher for younger firms, as the probability of exit for a firm in the first year of life is 12% higher than for firms that are 25 years old. Therefore we expect a negative sign for this variable.

- *Firm Size*: this variable, measured as the number of employees per firm, should be a proxy for the so called effect of 'liability of smallness,' according to which smaller firms usually have lower probabilities of survival. This may be for several reasons: they can be financially constrained and they can suffer from higher costs as they cannot fully exploit economies of scale. Fackler et al. (2012) empirically verify this effect for Germany, confirming that a negative sign is going to be expected.

- *Export Status*: firms operating in foreign markets usually display a higher level of productivity than firms that operate only in the domestic market as they can diversify the risk more easily, substituting domestic sales with foreign sales. Therefore they should have higher probabilities of survival than firms that only produce for the local market, even though it is also likely that firms that export suffer more from sudden shocks of demand that may happen abroad. Moreover, the export status of a firm can also capture a sort of absorption capacity effect. Firms that are more export oriented should also be able to get in touch with knowledge coming from foreign sources. Therefore, we mainly expect a negative sign for this variable.

- *Import Status*: as some recent literature points out, importing firms are more productive than non-importing firms. The reason is that buying cheaper and more technologically advanced intermediate inputs from abroad can cause the firm to be more profitable. Therefore, the probability of exit for these firms is lower as well.

- *Two-way traders*: this type of firm are those that benefit both from exporting and importing activities, besides having usually higher productivity than firms that only import or export. For this reasons, we expect them to have the highest probability of survival.

- *Market Concentration*: the variable measuring the Herfindahl concentration ratio (HHI) at the industry level (2-digit NACE) should account for a double effect: a higher market concentration can result in a higher price–cost margin which should cause a higher survival probability for firms. Nevertheless, a second effect can occur: firms in highly concentrated markets can suffer from aggressive behavior on the part of competitors, reducing their chances of survival. From an empirical point of view, both positive (e.g., Görg and Strobl (2004)) and negative effects (e.g., Mata and Portugal (2002)) are found. Hence, we do not have a priori expectations for the sign of this variable.

- *Productivity*: this variable is proxied by labor productivity (measured as the amount of sales per employee); it plays a crucial role in the theoretical models by Jovanovic (1982) of industrial dynamics as firms with different levels of productivity have different probabilities of entry, exit, and growth. Therefore we expect that more productive firms are going to have lower exit probabilities.

[Table 1 about here]

[Table 2 about here]

We also include in this specification a set of 3-digit industry dummies in order to control for unobserved heterogeneity across industries.[9] Our estimation strategy has several steps: in Section 5.1, we first estimate a benchmark model for the full sample of firms in which we take into consideration the role played by the foreign presence variable in enhancing the probability of exit. Then, we split the sample between

[9] As we estimate the relatively rare event of firm exits, the consideration of 3-digit industry dummies leads to the exclusion of certain industries due to perfect predictions. However, the consideration of differences between industries seems indispensable and outweighs the disadvantage of their inclusion.

East and West Germany in order to account for possible differences between the two regions.[10] In Section 5.1 we also split firms by international status (exporters vs. importers). We further explore what are the exit probabilities for several other subsamples, to take into account any heterogeneous impact of foreign presence: to differentiate between high-R&D and low-R&D regions as well as high-tech and low-tech sectors, we ran separate regressions (Section 5.2). Moreover, we consider heterogeneity on the side of the FDI by performing estimates for different categories of FDI: first by dividing them according to their country of origin and then according to the type of investor (Section 5.3). This detailed analysis has never yet been carried out. Lastly, in Section 5.4 we analyze the effect of FDI on the probabilities of local firms' exit from import and export markets.

5 Results

5.1 Exit probabilities and foreign presence

Table 3 gives the estimates of the exit probabilities of domestically owned firms according to the model introduced in the previous section. Starting with benchmark estimates for the full sample, we notice that all controls, except our main variable of interest, foreign presence, have a negative sign. For the dummy variables, the reported marginal effect at the sample mean measures the change in probability of exit when the value of the dummy is 1 instead of 0. As expected, the dummies which account for the international status of the firm have a negative and statistically significant sign. In line with the literature, this stands for the fact that being present in international markets helps the firm to successfully survive the higher competition introduced by foreign MNEs. However, a sort of ranking can be made among the three categories of internationalization: by looking at the size of the marginal effects,

[10] Even more than twenty years after the German reunification in 1990, the two German regions still differ markedly in economic terms. This has been recently confirmed by a 2011 report on East Germany's economic situation and perspectives, carried out by leading German research institutes (IWH et al. (2011)). For instance, the eastern part is much less integrated into the international division of labor, although significant efforts were made by the government to attract FDI.

we note that the highest is the one for two-way traders, followed by the one for importers and then the one for exporters. In this respect, the marginal effect for exporters is not only the lowest but also the level of significance is 5% and not 1%, as for the other coefficients. This means that firms that import or are two-way traders have higher probabilities of survival than firms that only export. This seems to be perfectly in line with what is found by Wagner (2011).

As to these benchmark results, we also notice that, in line with expectations, firm age and size are both negative. Instead, we note that productivity is not significant. The explanation we might give for this unexpected result is that this variable can pick up the productivity spillover effect which is one of the two effects that FDI can have on host country firms. As it is not significant, it means that firms do not absorb any productivity spillover effect and therefore are overwhelmed by the crowding out effect.

The Herfindahl index captures the level of market concentration at the industry level: the sign of the coefficient is negative and it is statistically highly significant. According to our hypotheses, this means that firms in more concentrated markets can achieve a higher level of profitability and therefore remain in the market. It is interesting to note that these control variables maintain the same sign and size of their marginal effects over all regressions for the benchmark model.

As for our main variable of interest, looking at column 1 we first notice that foreign presence is positive and statistically significant, supporting the idea that foreign presence may actually contribute to reduce the probability that a German firm survives. This fact also helps in understanding that, even before the crisis started, the German markets were already suffering from the tougher level of competition introduced by foreigns MNEs. As we are estimating horizontal FDI spillover effects, through this result we also contribute to better understand why inconclusive results are mainly found in empirical studies. By avoiding taking into account the crowding out effect, the literature misses an important part of the story.

As the economic structure of the two main macro-regions, viz., East and West Germany, is still quite relevant, we have taken this fact into account by performing separate regressions for the two subsamples. We still find a negative and statistically

highly significant sign of the coefficients although, by looking at the size of the marginal effects, we see that in West Germany the displacement effect is higher.[11]

Although the marginal effect of foreign presence is statistically significant, this does not necessarily imply its economic relevance. A marginal effect of 0.001 for the West German sample (Table 3) appears fairly small at a first glance. This means that the estimated exit probability of an average indigenous firm increases by about 0.1 percentage point if the foreign presence increases by one percentage point.[12] If we consider the overall exit rate of German firms in our sample, which is 4.85%, an increase by 0.1 seems non-negligible.

As a way to further evaluate the magnitude of the spillover effect, we calculated the marginal effects along the distribution of foreign presence (Table 4). The pattern we note is that the marginal effect happens to be stable in the benchmark regressions, and that it increases in the high- and low-tech sector subsamples with increasing percentile of foreign presence.[13]

[Table 3 about here]

[Table 4 about here]

Moreover, due to the different size of the effect with differing international status of the firm, we decided to dig deeper into the issue by running regressions separately for exporters and importers to explore what is the difference in exit probabilities by trade status[14]: the results are almost the same both with respect to sign, statistical significance, and size of the marginal effect. That is, they are both negative, and statistically highly significant. This seems to point to the fact that the international

[11] A comparison between different samples has to be regarded with caution here since we look at marginal effects at the sample means and the reported effects refer to different mean values.

[12] Due to the non-linearity of our estimated model, the change in Y may depend on the relative unit size of X. However, in our case, the range of the foreign presence variable seems sufficient for obtaining reliable results.

[13] Results for the other subsamples are not reported as they do not provide additional information.

[14] Our dataset unfortunately does not allow distinguishing German MNEs from domestic market oriented firms among the exporter and importer samples.

behavior they adopt does not significantly influence their ability to survive competition in the domestic market. To put it another way, even if having relationships with foreign markets is positive for the survival probability, it is not relevant whether the firm carries out importing or exporting activities.

We carried out some robustness checks for these benchmark estimates to see whether the results change on altering the specification of the model or the way the main variable of interest is built. In the first place, we estimated a model in which we did not include the variable measuring productivity, finding robust results because the sign and significance of the coefficients were the same. As this variable should take up the effect of a possible spillover effect, this means that the horizontal spillover effect is not so important for firms, suggesting that it offsets only a minor part of the higher competitive pressure introduced by MNEs.[15] Secondly, we ran regressions building foreign presence using the share of foreign sales in the total sales in each sector. As we can see in Table 5, the sign and significance results are robust, confirming the crowding out effect. However, the size of the coefficient is different in East and West Germany with respect to the FDI measure in terms of employees. This same pattern is observed in Table 6 where we measure FDI using a third methodology, using the ratio of foreign firms to the total firms per sector. Even using this measure, we find that the results are mainly robust although the size of the coefficients are higher both with respect to the overall sample and the split between East and West Germany.

[Table 5 about here]

[Table 6 about here]

5.2 Differences by regional and sectoral R&D intensities

Some papers have investigated the role played by technological factors in explaining the differences in survival probabilities of firms: in this respect, Agarwal and Audretsch (2001) explain how the technological intensity of the industry and the life

[15] Results are not reported but available from the authors upon request.

cycle of the product can affect the relation between firm size and its survival. They find that when the industry has reached a mature stage, smaller firms do not necessarily suffer more from a competition effect. As a matter of fact, one of the industry determinants of firm survival which is seldom considered is the technological regime of which they are part. As our data do not allow us to fully measure the effect that R&D expenditure can exert on the exit probability, we are nevertheless able to account for the technology intensity of the sector to which they belong. For this reason, we ran regressions in Table 7 considering the difference between high-tech and low-tech sectors. We note that high-tech sectors display a negative sign, unlike low-tech sectors. This effect could be for two reasons: the first is that MNEs usually are endowed with a technological knowledge which is higher than that of local firms, and the second one is that firms in low-tech industries do not have enough ability to deal with such advanced technology. Instead, firms in the German high-tech sector can quite easily absorb that technology, contributing to counteract the negative crowding out effect and therefore remain in the market. We repeated the exercise carried out in the previous subsection, to evaluate the pattern of the marginal effect over the foreign presence distribution: the results (Table 4) show how the marginal effects in the high-tech sector always maintain their negative sign throughout the whole distribution despite its decreasing in size for higher percentiles. The reverse happens for low-tech sectors.

The same occurs when we consider differences between R&D intensive regions and low-R&D regions. We divided the sample by using the median value of R&D expenses by administrative region (*Länder*) and considering as high-R&D those regions with a value above the median.[16] We confirm the results found when splitting the sample between high- and low-tech sectors but with a difference: in this case, looking at the size of the marginal effects, the 'surviving' effect in high-R&D regions

[16] To get the data on firms' R&D spending, we used information from the German Cost Structure Survey, which is a representative random sample of around 18,000 firms from manufacturing, mining, and quarrying with at least 20 employees (for more information see Fritsch et al. (2004)). We aggregated the firm level information on in-house R&D expenses at the industry level. The descriptive statistics are in Table 2.

is lower than the crowding out effect in low-R&D regions.[17] Among the possible reasons for such results we can single out that foreign firms operating in those regions for which the sample is quite small can be R&D intensive, therefore inducing a higher technology gap effect. As a consequence, this could negatively influence the survival probabilities of local firms, which will not be able to handle that type of foreign knowledge due to their low absorbing capabilities.

[Table 7 about here]

5.3 Considering heterogeneous FDI

One of the reasons for which studies about the productivity spillover effect from FDI reach inconclusive results may be the fact that heterogeneities on the supply side, that is on the part of the MNEs, are not taken into consideration. Some recent attempts have been made to differentiate technology intensive affiliates (e.g., Marin and Sasidharan (2010)), or to take into account the country of origin of the affiliate (e.g., Du et al. (2012)). Introducing this type of heterogeneity can be useful for accounting for the FDI spillover potential which can affect to a great extent the possibility that local firms learn from FDI. If we adopt a more business oriented perspective, by getting in touch with a larger variety of technologies and management practices of MNEs coming from different countries, domestic firms are exposed to a more stimulating environment that can affect the abilities of firms to learn from different sources of knowledge. This element can prove of extreme importance also in the perspective of survival analysis. Ayyagari and Kosova (2010) utilize this level of disaggregation but limiting the analysis to the probability of entry of local firms, finding that the results depend on the country of origin. We carry out the same analysis but for the exit probability.

We measure the foreign presence by country of origin as the share of employees working for firms owned by units located in that country. In particular we look at the categories U.S., European, and other. Descriptive statistics can be found in Table 2, and Table 8 shows the regression results. The first part of Table 8 indicates

[17] Again it has to be mentioned that we compare marginal effects at different sample means.

that for the full sample, and disentangling between East and West Germany, there is not a substantial difference with respect to sign, significance, or magnitude of the coefficients. This means that merely introducing heterogeneity on the side of the MNEs does not allow us to pick up significantly different effects, that is, the crowding out effect is confirmed.

Instead, when we look at the difference between low- and high-tech industries, we notice that the FDI coming from the U.S. exerts a significant crowding out effect only when considering low-tech industries, but positively contributes to make the life of firms in high-tech sectors longer. Contrary to what is found by Anwar and Sun (2012), we notice that similarities in business and management practices favor the occurrence of a positive knowledge spillover effect, therefore smoothing the competition effect. Instead, U.S. firms can change the market structure towards a stiffer competitive pressure on local firms.

When considering the second type of hetereogneity on the side of local firms, that is, by taking into account the international status of the firm, we see that for importers, the crowding out effect is lower if we consider U.S. firms or other foreign MNEs.

Due to data constraints, we are not able to distinguish affiliates by individual R&D intensities, but we can introduce in our model another type of heterogeneity, that is, the difference between particular investor types. It seems self evident that it makes a difference whether a German manufacturing enterprise is owned by a foreign bank for financial purposes or another industrial company. In the latter case, the investment can be assumed to be part of an operating strategy while in the former it is more likely to be driven by portfolio investment considerations, even if the shares exceed 50%. In order to account for general differences between strategic and financial investments, we look separately at the impact of foreign presence through firms with a financial group head and with an industrial group head.[18] This is a novelty in the literature, as so far this distinction has never been used in empirical

[18] The category 'other' captures group heads such as natural persons, research institutes, states, and governments. FDI by other industrial companies make up by far the major share of the total foreign presence, as can be seen from Table 2.

studies.

We immediately notice a different pattern, that is, in the full sample (and most of the subsamples), financial investments do not contribute to the crowding out effect, unlike industrial FDI, although this seems to be driven by the East German sample. Quite interestingly, we also note that in the high-tech sector, the effect reverses: the reason is that, as shown in the previous subsection, firms in the high-tech sector are more technologically endowed to absorb foreign knowledge and survive. Instead, the negative sign of the coefficient for financial investment could be for two reasons: the first is a low spillover potential. Financial investment, in our analysis, comprises firms which were mainly bought by institutions for portfolio reasons and the group head does not play such an important role in their operations. The assumption of an internal transfer of competitive advantages from financial group heads to producing firms is much more restrictive than in the case of industrial FDI (exceptions may be credit access and managerial expertise). The second, which is nevertheless connected with the first, is that financially owned firms work efficiently anyway regardless of their owner and source their advantages from the German business environment, meaning they are not a 'new' element in the respective market structure and therefore not an element introducing additional competition.

[Table 8 about here]

5.4 Considering export and import market exits

The literature on the relation between trade and survival has not received enough attention so far, even though this research question may prove of extreme importance for matters of policy. Firms that stop importing or exporting usually act in this way mainly because their performance is not sufficient to compete in foreign markets. Indeed, it is well established in the literature that exporting positively contributes to productivity as a sort of learning by exporting effect is detected. It is also true that more productive firms tend to self-select into the export market. The same reasoning can be extended to the importing side: for example, Vogel and Wagner (2010) find that the importing activities of firms exerted a positive impact

on their productivity, since importing firms displayed a significant differential in productivity with respect to those firms that did not import. Therefore, we expect that firms ceasing to be exporters or importers may suffer from decreasing productivity. While some of the literature has explored whether exporting or importing activities affect the survival probabilities of firms in local markets (e.g., Wagner (2011); Lopez (2006)), our analytical perspective is a bit different as our research question revolves around the possibility that a firm may stop having an international activity, whether exporting or importing. Indeed, the empirical evidence related to the determinants of the export market dynamics gathered so far on this issue is extremely scarce: Harris and Li (2011) explore what determines the ability of new exporters to survive in export markets in the UK over the period 1997–2003. They mainly find that firm level variables such as size and foreign ownership as well as micro-finance factors (such as profitability) negatively influence the probability of exit. Alvarez and Lopez (2008) examine the same research question but for the probability of entry and exit from both import and export markets for the Chilean case between 1990 and 1999. They find that differences in firms' productivity is one of the main determinants of firm survival in international markets, while trade costs and different factor intensities among industries do not play a crucial role in influencing plant turnover. Nevertheless, the role played by FDI in this process is never examined.

Table 9 shows the results of estimating export and import market exits defined as firms which export/import in 2007 and stopped doing so in the following period. As to the determinants of survival in export markets, firstly, we find that control variables always appear with a negative sign. We notice that productivity both for exports and imports is now statistically significant at the 5% level. This stands for the fact that, as expected, firms with higher productivity will also be those firms that are able to survive in import and export markets. Nevertheless, the effect generated by foreign firms is quite different in the two cases: as to exporting activities, firms are able to survive tougher competition absorbing spillover effects coming from FDI, while the opposite occurs for importing firms, for which the probabilities of exit from the market are higher. This should stand for the fact that exporting firms are positively stimulated by foreign firms in their international activities. This can

in some way confirm a sort of export spillover effect for Germany: it means that foreign firms, by raising the productivity of the local firms, can also have beneficial effects on the exporting activities of those firms. Instead, the reason why FDI can lower the probabilities of local firms to survive in import markets may be the fact that firms may source inputs from foreign firms and no longer need to import them. This is only a tentative explanation, as we do not have data on which type of inputs they need and import.

While the result for the exporting firms is confirmed even when we split the sample into West and East Germany, in the import case, the effect turns negative when considering West Germany, therefore indicating a higher probability of survival.

[Table 9 about here]

6 Conclusions

The globalization process has involved a steady increase in the amount of firms that invest abroad through FDI. Despite this historical fact, studies that investigate what effects FDI can have in the dynamics of the local market are relatively scarce. The present paper tries to fill this gap: its research question is what is the effect of the presence of MNEs on the probability of exit of domestic firms of the host country in which they carry out the FDI. This line of research is relevant also from a policy perspective, as the policy instruments to encourage FDI as well as those to prevent the exit of firms from the market can overlap. Indeed, even though most of the literature has concentrated on the firm level and sectoral level determinants of turbulence in the population of firms, the role played by foreign firms has never been examined in the case of Germany. We therefore present the first empirical evidence on this issue, bearing in mind also the limitations of the paper. First and foremost we have to consider that cross-sectional data does not allow us to control for endogeneity.

Our research question can be considered of great interest also in that a deep knowledge of the demography of firms, which possessed high rates of turnover, can highlight the characteristics of the German economy just before the financial crisis

started. Our analysis produced some interesting contributions: the first is that we notice a crowding out effect when we take into consideration the full sample. Moreover, when we consider separately East and West Germany, the effect seems to be more pronounced in West Germany. The second interesting result we singled out is relative to the splitting of the sample into high-tech and low-tech sectors and regions: in both cases we can detect a negative effect of FDI on the probability of firm exit only when considering R&D intensive sectors and regions. This suggests the idea that local firms have greater absorptive capacities and therefore are more able to stay in the market by absorbing the spillover effect coming from the foreign presence. Therefore, this effect prevails over the crowding out effect. The third important result achieved is that when considering FDI heterogeneity, we find different results when distinguishing between FDI from different countries or with different types of owners. While in the former case, only European FDI do not display a crowding out effect, that is, when only low-tech industries are considered. Instead, industrial FDI always contributes to crowd out local industries, but not when high-tech sectors are examined. The opposite behavior is exhibited by financial investments.

The industrial organization literature has a long tradition in studying firm turnover issues by mainly referring to the idea that the market structure is one of the best predictors of different entry and exit patterns. However, the same attention has not been paid to the investigation of the determinants of entry and exit into international markets. This is true also for studies considering the effects foreign firms have on the ability of local markets to remain in international markets not only with exporting activities but also with importing activities. Therefore we also investigated how a foreign presence affects the probability of exits from export and import markets: we noticed a positive effect on the likelihood of import market exits, but a negative effect on the likelihood of export market exits. This seems to point in the direction of underlining the differences between firms that carry out exporting and importing activities.

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Table 1: Definition of covariates

Labour productivity	Annual turnover per employee in 1,000 EUR
Firm size	Annual mean over employed persons at the end of each month
Importer status	Indicator variable = 1 if the firm was charged an import turnover tax on inputs from intra-EU or extra-EU countries, 0 otherwise
Exporter status	Indicator variable = 1 if export intensity > 0, 0 otherwise
Firm age	Indicator variable = 1 if firms was established before 1996, 0 otherwise
Market concentration	Sum of squared market shares of all firms in a 2-digit industry ($\cdot$10,000)(Herfindahl Index)
Turnover	Annual turnover in 1,000 EUR

Notes: All variables were calculated from the monthly and annual reports of establishments from the manufacturing, mining, and quarrying sectors. Only information on the importer status stems from the German Turnover Tax Statistics Panel.

Table 2: Descriptive statistics (2007)

Continuous variables

Variable	*Level*	*Mean*	*Sd*	*P10*	*P25*	*P50*	*P75*	*P90*
Foreign presence (employees, %)	industry	17.60	7.23	12.13	12.73	17.74	22.66	26.91
European presence (employees, %)	industry	11.33	5.13	6.06	8.93	10.01	13.02	18.21
U.S. presence (employees, %)	industry	4.21	2.83	0.95	2.11	3.94	5.60	8.52
Industrial presence (employees, %)	industry	14.35	6.87	9.53	9.79	14.09	19.07	23.76
Financial presence (employees, %)	industry	0.98	0.92	0.20	0.39	0.73	1.19	1.81
Market concentration (HHI)	industry	159.34	443.39	12.76	23.08	32.78	63.61	428.48
R&D expenses (million EUR)	industry	2054.78	2906.34	31.22	206.78	678.89	4,538.94	4,923.79
Firm size (persons)	firm	155.23	1,239.44	25	34	55.08	114.75	260.50
Labor productivity (1,000 EUR)	firm	179.73	307.51	51.97	83.06	127.35	199.78	320.33
Export intensity (%)	firm	20.11	25.01	0	0	8.33	34.40	60.07

Binary variables

Variable	*Level*	*Number*	*Share (%)*
Firm exits	firm	1,802	4.70
Exporter only	firm	10,979	28.66
Importer only	firm	3,733	9.74
Two-way trader	firm	15,498	40.45
Firm age	firm	19,365	50.54
High-tech sector	firm	13,803	36.03

Note: The full sample covers 38,314 enterprises from the German manufacturing. 3,599 of which were foreign-controlled (9.39%)

Table 3: Exit probability estimates

	Full sample	*West Germany*	*East Germany*	*Exporters*	*Importers*
Foreign presence (employees, %)	0.0003***	0.001***	0.0004***	0.0003***	0.0003***
	(16.45)	(7.64)	(2.64)	(5.75)	(52.43)
Exporter only (indicator)	-0.007**	-0.006**	-0.007	-	-
	(2.58)	(2.10)	(0.97)		
Importer only (indicator)	-0.022***	-0.018***	-0.036***	-	-
	(7.24)	(4.69)	(5.58)		
Two-way trader (indicator)	-0.051***	-0.048***	-0.056***	-0.043***	-0.012***
	(15.64)	(13.83)	(7.75)	(16.55)	(4.20)
Firm size (persons)	-0.00003***	-0.00003***	-0.0001***	-0.00002**	-0.0001***
	(3.04)	(2.70)	(2.96)	(2.49)	(2.88)
Firm age (indicator)	-0.012***	-0.012***	-0.008	-0.014***	-0.003*
	(4.70)	(4.80)	(1.22)	(5.34)	(1.91)
Labor productivity (1,000 EUR)	-1.37e-06	1.63e-07	-0.00001	2.68e-06	-0.00001
	(0.29)	(0.03)	(0.79)	(0.55)	(1.14)
Market concentration	-6.82e-06***	-8.82e-06***	-0.00003***	-5.21e-06***	-8.72e-06***
	(30.40)	(3.39)	(6.75)	(3.17)	(41.30)
3-digit industry dummies	yes	yes	yes	yes	yes
Observations	34,509	28,396	5,810	23,024	16,734
McFadden's R^2	0.057	0.057	0.081	0.066	0.061

Note: Reported are marginal effects with |*z-values*| in parenthesis; The market concentration was calculated on the particular regional level for each subsample; Standard errors are adjusted for industry clusters; Significance at the 10% (*), 5% (**) and 1% (***) level.

Table 4: Marginal effects along the distribution of foreign presence

Sample	*Variable*	*P5*	*P10*	*P25*	*P50*	*P75*	*P90*	*P95*
Full sample	foreign presence	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
		(16.77)	(16.10)	(16.05)	(15.59)	(15.18)	(14.84)	(14.57)
High-tech sector	foreign presence	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0006	-0.0006
		(6.66)	(6.72)	(6.72)	(6.72)	(7.49)	(8.54)	(8.54)
Low-tech sector	foreign presence	0.0008	0.0009	0.0009	0.0009	0.0011	0.0012	0.0012
		(16.75)	(14.81)	(14.41)	(14.17)	(11.99)	(11.35)	(11.29)

Note: Reported are marginal effects with |*z-values*| in parenthesis; All foreign presence variables measured in terms of employees; For the variable values at percentiles see the descriptive statistics.

Table 5: Exit probabilities (foreign presence measured as sales)

	Full sample	*West Germany*	*East Germany*
Foreign presence (sales, %)	0.0003***	0.0003***	0.001***
	(16.45)	(12.17)	(10.14)
Exporter only (indicator)	-0.007**	-0.007**	-0.007
	(2.58)	(2.10)	(0.97)
Importer only (indicator)	-0.022***	-0.018***	-0.036***
	(7.24)	(4.69)	(5.58)
Two-way trader (indicator)	-0.051***	-0.048***	-0.056***
	(15.64)	(13.83)	(7.75)
Firm size (persons)	-0.00003***	-0.00003***	-0.0001***
	(3.04)	(2.70)	(2.96)
Firm age (indicator)	-0.012***	-0.012***	-0.008
	(4.70)	(4.80)	(1.22)
Labor productivity (1,000 EUR)	-1.37e-06	1.63e-07	-0.0001
	(0.29)	(0.03)	(0.79)
Market concentration (HHI)	-5.90e-06***	2.48e-06***	-0.00003***
	(23.03)	(9.74)	(34.17)
3-digit industry dummies	yes	yes	yes
Observations	34,509	28,396	5,810
McFadden's R^2	0.057	0.057	0.081

Note: Reported are marginal effects with |*z-values*| in parenthesis; The market concentration was calculated on the particular regional level for each subsample; Standard errors are adjusted for industry clusters; Significance at the 10% (*), 5% (**) and 1% (***) level.

Table 6: Exit probabilities (foreign presence measured as no. of foreign firms)

	Full sample	*West Germany*	*East Germany*
Foreign presence (no. of firms, %)	0.001***	0.001***	0.001***
	(16.45)	(7.64)	(2.64)
Exporter only (indicator)	-0.007**	-0.007**	-0.007
	(2.58)	(2.10)	(0.97)
Importer only (indicator)	-0.022***	-0.018***	-0.036***
	(7.24)	(4.69)	(5.58)
Two-way trader (indicator)	-0.051***	-0.048***	-0.056***
	(15.64)	(13.83)	(7.75)
Firm size (persons)	-0.00003***	-0.00003***	-0.0001***
	(3.04)	(2.70)	(2.96)
Firm age (indicator)	-0.012***	-0.012***	-0.008
	(4.70)	(4.80)	(1.22)
Labor productivity (1,000 EUR)	-1.37e-06	1.63e-07	-0.00001
	(0.29)	(0.03)	(0.79)
Market concentration (HHI)	-7.04e-06***	-8.45e-06***	-0.00003***
	(32.23)	(3.30)	(7.38)
3-digit industry dummies	yes	yes	yes
Observations	34,509	28,396	5,810
McFadden's R^2	0.057	0.057	0.081

Note: Reported are marginal effects with |*z-values*| in parenthesis; The market concentration was calculated on the particular regional level for each subsample; Standard errors are adjusted for industry clusters; Significance at the 10% (*), 5% (**) and 1% (***) level.

Table 7: Exit probabilities by regional and sectoral technological intensity

	High-R&D regions	*Low-R&D regions*	*High-tech industries*	*Low-tech industries*
Foreign presence (employees, %)	-0.0003***	0.001***	-0.001***	0.001***
	(6.56)	(12.70)	(6.64)	(13.40)
Exporter only (indicator)	-0.007*	-0.008	0.003	-0.011***
	(1.92)	(1.44)	(0.79)	(3.29)
Importer only (indicator)	-0.019***	-0.028***	-0.012*	-0.025***
	(4.62)	(4.72)	(1.91)	(7.40)
Two-way trader (indicator)	-0.048***	-0.053***	-0.047***	-0.047***
	(12.44)	(9.03)	(9.53)	(11.59)
Firm size (persons)	-0.00003**	-0.0001**	-0.00001**	-0.0001***
	(2.31)	(2.59)	(2.48)	(3.76)
Firm age (indicator)	-0.011***	-0.015***	-0.017***	-0.009**
	(3.71)	(3.45)	(5.66)	(2.58)
Labor productivity (1,000 EUR)	-2.19e-06	2.86e-06	8.42e-06	-8.38e-06
	(0.34)	(0.23)	(0.97)	(1.23)
Market concentration (HHI)	-6.47e-06***	-0.0001***	8.90e-06***	-0.00004***
	(15.01)	(22.36)	(29.74)	(13.80)
3-digit industry dummies	yes	yes	yes	yes
Observations	24,690	9,538	11,818	22,691
McFadden's R^2	0.058	0.068	0.073	0.054

Note: Reported are marginal effects with |*z-values*| in parenthesis; Standard errors are adjusted for industry clusters; The market concentration was calculated on the particular regional level for each subsample; High-tech industries include the medium and high-tech sectors according to the OECD sectoral approach; Significance at the 10% (*), 5% (**) and 1% (***) level.

Table 8: Exit probability by origin and type of FDI

Sample	N	*Europe*	*U.S.*	*Other*	*Industrial*	*Financial*	*Other*
Full sample	34,509	0.001***	0.001***	0.001***	0.0003***	-0.004***	-0.011***
		(16.45)	(16.45)	(7.02)	(16.45)	(19.78)	(75.13)
West Germany	28,396	0.001***	0.001***	0.002***	0.0005***	0.002***	-0.005***
		(22.01)	(7.64)	(7.64)	(7.64)	(6.29)	(6.85)
East Germany	5,810	0.001***	0.001***	0.002***	0.0004***	-0.02***	-0.013***
		(5.01)	(2.99)	(2.64)	(2.64)	(7.00)	(10.27)
High-tech industries	11,818	-0.0002**	-0.002***	-0.004***	-0.001***	0.0003	0.004***
		(2.13)	(6.45)	(6.45)	(6.64)	(0.65)	(6.45)
Low-tech industries	22,691	-0.002***	0.002***	0.003***	0.001***	-0.005***	-0.012***
		(23.69)	(13.40)	(13.40)	(13.40)	(16.81)	(17.14)
Only exporters	23,024	0.001***	0.001***	0.002***	0.0003***	-0.005***	-0.012***
		(5.75)	(35.71)	(5.75)	(5.75)	(4.53)	(81.58)
Only importers	16,734	0.001***	0.0001**	0.0002**	0.0000**	-0.0004	-0.005***
		(52.43)	(2.26)	(2.26)	(2.26)	(0.60)	(82.69)

Note: Reported are marginal effects of Model 1 estimates with |*z-values*| in parenthesis; All models include a full set of control variables and standard errors are adjusted for industry clusters as in the previous regressions; Significance at the 10% (*), 5% (**) and 1% (***) level.

Table 9: Export and import market exit probabilities

	Full sample	*West Germany*	*East Germany*
Export market exits	No. of exits = 770	No. of exits = 587	No. of exits = 183
Foreign presence (employees, %)	-0.001***	-0.001***	-0.005***
	(15.28)	(33.62)	(12.38)
Firm size (persons)	-0.0001**	-0.00003*	-0.0001
	(2.20)	(1.89)	(0.84)
Firm age (indicator)	-0.013***	-0.006***	-0.019*
	(5.50)	(3.33)	(1.79)
Labor productivity (1,000 EUR)	-0.00004**	-5.24e-06	-0.0001**
	(2.21)	(0.78)	(2.01)
Market concentration (HHI)	1.49e-06***	-3.20e-06***	0.00001***
	(4.14)	(3.44)	(8.25)
Observations	22,408	27,430	2,735
Import market exits	No. of exits = 1,443	No. of exits = 1,171	No. of exits = 272
Foreign presence (employees, %)	0.0004***	-0.009***	0.0002**
	(11.59)	(13.18)	(2.08)
Firm size (persons)	-0.00002	-0.00002	-0.0001
	(1.38)	(1.15)	(1.44)
Firm age (indicator)	-0.030***	-0.031***	-0.031**
	(6.67)	(6.74)	(2.40)
Labor productivity (1,000 EUR)	-0.0001**	-0.0001***	-9.16e-06
	(2.07)	(4.74)	(0.28)
Market concentration (HHI)	-0.00003***	0.0001***	-3.42e-06**
	(40.47)	(14.84)	(2.05)
Observations	16,974	13,993	2,555

Note: Reported are marginal effects with |*z-values*| in parenthesis; The market concentration was calculated on the particular regional level for each subsample; Standard errors are adjusted for industry clusters; All specifications include 3-digit industry controls; Significance at the 10% (*), 5% (**) and 1% (***) level.

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