International M&A: Evidence on Effects of Foreign Takeovers

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International M&A: Evidence on Effects of Foreign Takeovers

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Abstract

In this empirical paper I address the effects of international mergers and acquisitions (M&A) on the acquired firms. International direct investments in the home country are usually welcomed and considered to be beneficial for growth, employment, productivity and technological progress. This is mostly unquestioned for greenfield investments, i.e. the case when a foreign multinational firm sets up a new affiliate. But a majority of foreign direct investment (FDI) projects takes the form of mergers and acquisitions (M&A). This kind of inward FDI is much more critically debated. The focal point of this paper is the development of domestic German firms that are subject to a foreign takeover regarding employment and productivity.

For this purpose, I use a comprehensive German micro-level dataset which includes all industries as well as firms from all size categories and all German regions. The sample covers the years from 2000 to 2007. A propensity score matching approach combined with a difference-in-difference estimator is applied. Contrary to a naive comparison between foreign-owned firms and domestic firms or a comparison between firm characteristics before and after a foreign takeover, this econometric approach ensures that the *causal* effects are isolated.

The main results are the following: Foreign owned firms are larger and more productive than domestic ones. Mostly firms with below average productivity (*lemons*) as well as firms with a relatively high productivity (*cherries*) are acquired. Market development motives seem to play an important role for foreign acquisitions. Concerning the effects of foreign takeovers, a descriptive analysis cannot find unambiguous effects of foreign takeovers. The propensity score matching estimator confirms this finding and detects neither positive nor negative significant effects of foreign takeovers.

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1 Motivation

This paper analyzes the effects of inward FDI and foreign takeovers on domestic firms. Foreign direct investment in Germany is usually connected with positive expectations. Arndt et al. (2009) show that inward FDI has a positive impact on domestic capital and employment growth and fosters the distribution of modern technologies. Domestic firms can benefit from spill-over effects generated by inward FDI.

A major share of foreign direct investment in Germany takes the form of mergers and acquisitions (M&A). That is, a foreign (multinational) firm does not set up a novel production site ("greenfield FDI"). Instead, it takes control of an existing domestic firm. In 2006, there were only 362 foreign affiliates newly established in Germany, but there were 622 cases of mergers and acquisitions (UNCTAD 2008).

The general public and many policy makers often have very different views on these two forms of FDI. Usually, greenfield FDI is welcomed and considered beneficial for economic growth and employment. In contrast, mergers and acquisitions are often viewed with fears. If foreign multinational enterprises control domestic firms, this is often perceived as a threat to domestic employment. Fears of production relocation and the loss of control as well as fears of being at the discretion of globally acting, shareholder value oriented corporations prevail. The so called *Heuschreckendebatte,* in which a German minster called internationally active financial enterprises "locusts"[1] and a newly passed law, which enables the German government to veto single takeovers, serve as good examples.

I therefore analyze the effects of foreign takeovers on the firms subject to such acquisitions. I apply a matching estimator technique that has mostly been used in labor market economics. The analysis will be conducted on the micro-level to study the takeover effects in detail. The main research questions shaping this paper are:

- What proportion of firms in Germany is in foreign ownership? Are firms of different size categories and different kind of firms affected more than others?

- How do firms in foreign ownership differ from domestic enterprises?

- What is the effect of a foreign acquisition on the development of the domestic firm? What effects are observable regarding employment and productivity?

This paper includes six sections. After this motivation, in Section 2, I will present theoretical hypotheses, empirical evidence from the international literature and introduce the methodology. In Section 3, I will present first facts about the proportion of firms in foreign ownership and their special features in comparison to domestic firms. Section 4 will analyze the development of newly acquired firms after a takeover by the means of descriptive statistics. In Section 5 I will apply a matching estimator technique in order to estimate the causal effects of a foreign takeover on different firm-level key figures. Section 6 will conclude.

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[1] Referring to the biblical plagues.

2 Theoretical Hypotheses and Empirical Evidence

2.1 Direct vs. Spill-over Effects

Generally, two basic effects of inward FDI have to be taken into account. Firstly, in the case of M&A, there are direct effects on the acquired firms. These effects are being addressed in this paper. Secondly, there exist so called spill-over effects. These effects describe (mostly positive) external effects that influence domestic firms that are not subject to a foreign takeover but are in some relation to acquired firms. The basic idea behind spill-over effects is that foreign owned firms have a productivity advantage over domestic firms and that they may use more advanced technology and management techniques. This technology may spill over to domestic firms through different channels (Blomström and Kokko 1998). On the one hand, there may be intended technological transfers from a highly productive foreign MNE to its own domestic affiliate and its partners, for example in an alliance or a joint-venture. Intended technology transfers are not external effects, because their costs are internalized. However, in empirical approaches it is often difficult to distinguish between real spill-over (external) effects and intended transfers. On the other hand, superior technology may find its way to domestic firms by imitation of new products or by labor turnover. Product imitation may be a simple copying of the product or more complex reverse engineering. Labor turnover describes the fact that employees change their employer from time to time and may take tacit knowledge about products and management processes with them to a domestic firm. The spill-over effects may affect firms from the same industry (horizontal spill-over effects) as well as suppliers or buyers (vertical effects).[2]

Spill-over effects that lead to diffusion of new technology and an increase of productivity are welfare enhancing. So policy makers should have an interest in attracting inward FDI. However, this paper does not analyze spill-over effects, but only the direct effects of foreign takeovers on the firms acquired. In this way, I test one of the main underlying assumption for positive spill-over effects. This assumption is that foreign multinational enterprises transfer superior technology and management techniques to their newly acquired affiliates. Only if this is the case, this superior technology may spill over to domestic firms and enhance welfare.

2.2 Hypotheses

There is no elaborated theoretical framework for the research question posed in Section 1 (in contrast to the determinants of FDI) . Hence, I need to resort to hypotheses which are based mostly on previous empirical evidence. There are two questions in the main focus:

- Which firms are subject to a foreign takeover?

- What are the effects of a foreign takeover on the acquired firms?

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[2]In a broader sense, pecuniary effects that stem from a change of the market structure may also count as spill-over effects. If a highly productive foreign MNE enters the market, competition will rise and the demand (and the prices) for supplies as well as total industry output will change.

Which firms are Subject to a Foreign Takeover?

The productivity of the target firm is discussed as the main determinant for a foreign takeover. There are two hypotheses in the main focus (see, e.g., Bellak et al. 2006).

The first hypothesis states that mainly the most productive and most profitable firms are taken over. Foreign multinational enterprises are interested in the "best" firms or *cherries*. These are technologically advanced, possess superior management techniques and a large market share. All these features are of interest for the acquiring enterprise abroad.

In contrast, the second hypothesis is that it is mainly the most unproductive firms (*lemons*) which are taken over. These firms are badly managed and there is scope for an increase of productivity.

There are many more detailed motives for foreign takeovers in the M&A and management literature, such as efficiency increases, economies of scale and scope, cost advantages as well as benefits due to diversification and tax savings. However, these motives can be subsumed into one of the two main hypotheses stated above.

> *Hypothesis 1a: Highly productive firms are subject to a foreign takeover.*
> *Hypothesis 1b: Unproductive firms are subject to a foreign takeover.*
> *Hypothesis 2: Firms with a large market share are subject to a foreign takeover.*

What are the Effects of a Foreign Takeover?

In the case of foreign takeovers, there are often fears of negative employment effects. Barba Navaretti, Checci and Turrini (2003) argue that foreign multinational enterprises are less integrated into the local economic structure and less committed to local stakeholders, such as their employees, than domestic firms. Further, foreign MNEs may have a higher bargaining power. This could enable them to pursue a hire and fire policy. Bandick and Karpaty (2007) bring forward similar arguments for the case of Sweden.

However, there are also positive productivity effects that could compensate, or overcompensate, for the negative employment effects. The total effect is uncertain. The following paragraphs will address potential effects of foreign takeovers on productivity.

The first and most obvious positive effect on productivity is a **learning effect**. In Mattes (2010), I showed that multinational firms are more productive than domestic firms. These enterprises have a technological advantage and apply superior management techniques. If a foreign MNE acquires a domestic firm, the newly acquired firm has access to the MNE's knowledge capital. There may be a transfer of technology, of capable managers and of highly skilled employees. This should lead to an increase in productivity.

Further, there may be more channels for productivity effects that take place if a foreign MNE acquires a domestic firm (see Bellak et al. (2006)). These are:

- Effects due to a change of management,

- synergy effects, and

- market power effects.

Usually, a foreign takeover is connected with a complete change or at least a partial **replacement of the new affiliate's management**. This can have different consequences.

One hypothesis is that the fit between a firm and its management may be of good or bad quality. Different managers have different comparative advantages regarding how to run diverse companies. If there is a change in the firm, the technological level or the market environment, it may occur that the combination of management and firm is not optimal anymore, so that a new owner and a new management may improve productivity.

Further, there may be a so-called disciplining effect. A new management could be more strongly committed to the new foreign owner and be less committed to local or national stakeholders such as employees or politicians. These stakeholders may have various demands regarding a firm that oppose profit and efficiency maximization. If the influence of these stakeholders is reduced, the acquired firm may increase its productivity and profitability. This in turn may be accompanied by negative employment effects.

Differences in the political, social or legal system between the home country of the investing MNE and the domestic firm may play a role. For instance, MNEs from the USA could be more shareholder value-oriented than German firms and enforce a stronger orientation towards efficiency. Institutional effects like tax treaties between countries may have an influence, too.

These effects assume that at least one of the MNE's motives for the takeover is that the acquired firm is being run below its possibilities and that there is scope to increase its productivity.

The merger of two companies can lead to **synergy effects** which increase the productivity of the acquired firm. There are several ways this can take place. Firstly, theory and evidence suggests that multinational enterprises are more productive than other firms. Markusen (2002) argues that a high stock of knowledge capital is the reason for the MNE's high productivity. This knowledge capital consists of patents, brands, and advanced technological knowledge and superior management techniques. It can be used in any affiliate without, or with only very little, additional costs. This way, average costs decrease and productivity rises. Additionally, and in contrast to a learning effect, the combination of the MNE's knowledge capital and the domestic firms production technology may be especially favorable.

Further, the newly acquired firm is now part of an multinational enterprise with an international (and potentially global) production network. Hence, it can access this network and benefit from it. For example, it could exploit differences in factor prices between countries, like a vertical MNE, without the need to finance the fixed costs of its own direct investments. So it could source intermediate parts from abroad for lower prices and increase productivity in this way.

After all, there can also arise negative effects for productivity from a foreign takeover. Dissynergies could appear if two companies merge whose stocks of knowledge capital are not complementary, and where the new management does not fit better to the acquired firm. For example, it is easily imaginable that a foreign acquisition is not undertaken in order to increase productivity, but in order to generate growth in an international dimension (*empire building*). Usually managers of large firms earn more than those of small firms, so there could be an incentive to increase firm size or turnover and not efficiency.

The last category of productivity effects is the channel of **market power**. If a foreign MNE acquires a domestic firm, a potential competitor leaves the market. The new, merged firm has a higher market power that could enable it to enforce higher prices and increase output and profits. Measures for productivity rise as well.

> *Hypothesis 3: Acquired firms decrease their employment.*
> *Hypothesis 4a: Acquired firms increase their productivity.*

Related to the absorptive capacity discussion in the literature on spill-over effects, different firms may react differently to a foreign takeover. This leads us back to the distinction between *lemons* and *cherries*. Highly productive firms that are subject to a foreign takeover may not be able to profit as much from access to the acquiring firm's technology as relatively unproductive firms.

> *Hypothesis 4b: Acquired firms with a low initial productivity (lemons) increase their productivity after a foreign takeover more strongly than highly productive firms (cherries).*

2.3 Empirical Evidence

There are several studies with data from different countries available which examine the effects of a foreign takeover on the acquired firm. It is mostly the effects on employment and productivity which are in the main focus of these studies.

Regarding productivity, most studies come to the result that there are positive productivity effects for the acquired firms. Arnold and Javorcik (2005) find positive and high productivity effects for Indonesian panel data from 1983 to 1996. Fukao, Hamagata, Miyagawa and Tonogi (2007) for Japan, Girma, Thompson and Wright (2006) for the UK and Petkova (2008) for India, all conclude that there are positive productivity effects of foreign takeovers on the acquired firms. Bellak et al. (2006) comes to the same result for Austria, however less strongly. Arndt and Mattes (forthcoming) show that this result holds true for the special case of already highly productive MNEs in Germany.

Regarding employment and wages in the acquired firms there is a less homogeneous picture. Some studies conclude that there is an increase in average wages after a foreign takeover (see Girma and Görg 2007, Girma et al. 2006, Conyon et al. 2002). Few studies came to the result of negative employment effects (see, e.g. Huttunen 2007). Bandick and Karpaty (2007) find positive employment effects for Swedish firms.

2.4 The Empirical Approach

The Dataset: IAB Establishment Panel

This paper makes use of the IAB Establishment Panel. The basic population of the IAB Establishment Panel survey are all plants in Germany that have at least one employee subject to social insurance contribution. Many other firm-level datasets have restrictions concerning the industry, the size or other properties of the firms. The IAB Establishment Panel is built on a much broader basis and doesn't have any of these problems. Hence, with only very few exceptions, it allows deep analyses of the universe of all German firms. The sample size

is about 16,000 firms per year and it is stratified according to the size of the firms, the industry and the state (Bundesland) in which the firms are located. The ratio of surveys that are returned and can be evaluated is about 75%. This is much higher than in other comparable surveys. Most of the interviews are conducted at the firm site with an interviewer talking directly to the responsible persons. Hence, the dataset is highly representative, of high quality and more reliable than many (commercial) datasets, such as Amadeus, for example. The main focus of the survey is firm-level labor demand. Each year, there are additional topics included, of which some are repeated every second or third year. The key variable of interest is the ownership status (domestic or foreign) of the firms.

However, some methodological aspects need to be discussed. Firstly, the unit of observation in the survey is a plant or an establishment, which is a local production facility. This definition is not identical with the definition of a firm, which can include one or more plants. However, nearly 90% of all plants in the survey are also firms. Secondly, the protection of data privacy has to be taken into account. The dataset is anonymized only weakly. This means that basically only the name and exact location of the firm is not available in the dataset. Especially for large firms in small industries or states, this may not be sufficient to secure the firms' interest in data privacy. Therefore, I may not report descriptive results that are based on less than 20 firms. This is no problem for the econometric analysis, however. For more information regarding the dataset, its properties and its availability see Fischer et al. (2008).

For the purpose of this paper, I merge the surveys of the years 2000 to 2007 into a panel dataset. For the years 2000, 2004, and 2007, the survey includes data on the ownership status of the firms. The firms answer whether they are in Western German, Eastern German, public or foreign majority ownership or whether there is no majority ownership. Note, that this constitutes a difference to the usual measurement of FDI which defines a 10% share as the threshold for FDI. The information about majority ownership on the firm level allows me to examine the special features of firms in foreign ownership as compared to domestic firms.

Because of the panel structure of the dataset, it is also possible to trace domestic firms which are acquired at some point of time and become a foreign affiliate. So the development of firms after a foreign takeover and the effects of this takeover can be analyzed. However, the ownership information is only available for all firms in the years 2000, 2004 and 2007.[3] This means that the year of the takeover cannot be identified exactly. For the particular question, it seems to be sufficient to determine the interval 2001 to 2004 or 2005 to 2007 for the foreign takeover.

Compared to other datasets and it spite of this shortcoming, the IAB Establishment Panel is suitable for the research questions of this chapter. This is, because it includes a rich set of variables describing various firm-level characteristics that permits painting a detailed picture of heterogeneous firms and because of its high data quality. Comparable German datasets such as the MiDi dataset from the Deutsche Bundesbank do not include domestic firms. Mergers of the MiDi dataset with datasets on domestic firms seem to be not as reliable

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[3]Only if a firm enters the dataset in between these years, is the ownership data collected in the year of entry.

as the IAB Establishment Panel. Data access during research visits and by controlled remote data processing was granted by the research data center of the Institute for Employment Research in Nuremberg.

The Basic Problem of Selection

First studies examining the effects of foreign takeovers on the acquired firms started with a simple comparison between firms in foreign ownership and domestic firms. Most studies could identify statistically significant differences between these two groups of firms. These difference were also important in economic terms. For example, firms in foreign ownership pay higher wages, they are larger, more productive and show more innovative activities. In the literature, this is a widely accepted fact (see, e.g., Conyon et al. 2002, Girma et al. 2001, Doms and Jensen 1998).

However, such a simple analysis cannot reveal a causal relationship between the foreign takeover and its effects, because it cannot solve the underlying, basic problem of selection. The existence of selection means that it is not possible to assume that the sample of firms that are subject to a foreign takeover is drawn randomly from the total population of domestic firms. Instead, it is much more realistic that foreign MNEs look for target firms that meet certain criteria (for example *lemons* or *cherries*).

If this holds true and selection of target firms is not random, simple comparisons between foreign owned and domestic firms are biased. For instance, if it were only the most unproductive firms that are subject to a foreign takeover, a simple comparison would probably result in domestic firms being more productive than foreign-owned ones. However, from this simple comparison, one may not conclude that a foreign takeover has a negative effect on the productivity of the acquired firm. Conventional regression analysis is not robust against this problem of endogeneity and will also yield biased results.

The actual question of interest in this case is, whether a firm that has been taken over would have had a different development, if it had not been acquired by a foreign multinational enterprise. This so called counterfactual situation is - obviously - not observable. Either a firm is subject to a foreign takeover or it is not. However, with suitable econometric methods, it is possible to replicate this counterfactual situation. Therefore, in this paper, I apply a matching estimator approach. The basic idea is to find an appropriate control group for the acquired firms that makes unbiased comparisons possible.

Regarding this particular problem, it is not as easy to find a control group as, for example, in experiments. The main difference is that in an experiment it is possible to define two groups *before* the experiment is carried out. The first group serves as a control group, the second is the actual treatment group. The test objects or subjects are distributed randomly into both groups, so that there are - a priori - no systematic differences between the two groups. In the case of firms that are acquired by a foreign firm, it is not possible to define a control group in advance, because economists cannot control the behavior of firms active in M&A and need to resort to existing datasets. In the data there are observations of acquired firms and domestic firms and the distribution into these groups is not random. The idea of a matching estimator is to find one or more comparable domestic firms for each acquired firm. A control group is constructed from these so called *twins*. I will go more into technical detail in

Section 5.1.

Which Performance Indicators are of Interest?

Most studies about the effects of foreign takeovers analyze two different performance indicators. On the one hand, employment and wage rates are examined. The main focus of these analyses are absolute employment, employment growth, and the level of wages. On the other hand, it is the effects of foreign takeovers on productivity which are of interest. Productivity is in this context a measure for the efficiency and technological and organizational performance of firms. Basically, one needs to distinguish between labor productivity and total factor productivity (TFP). Labor productivity measures sales or value added per unit of labor input. On the one hand, this measure of productivity has the disadvantage that it doesn't account for different optimal capital intensities in different industries or other groups of firms. Yet it is often used in empirical studies because the requirements for the underlying dataset are less demanding and thus it is available in most cases. This eases comparisons between different studies and datasets. Additionally, in a regression context, it is possible to control for varying capital intensities in different industries by including industry dummy variables into the vector of regressors. That way, this major shortcoming can be mitigated. As a robustness check, in most cases I provide results for sales productivity (sales/employees) as well as for value added per employee.

Total factor productivity is a theoretical superior measure of productivity. Basically, TFP is the unexplained factor of a production function, that is the growth in output that is not explained by higher inputs of labor or capital. So it accounts for all input factors and measures their overall efficiency. In contrast to labor productivity, it is more reliable to compare firms from different industries. However, the requirements for the dataset are higher than for labor productivity, so that this measure is not always available. Unfortunately, the IAB Establishment Panel doesn't allow the computation of total factor productivity, because it doesn't include enough information on capital inputs.

Note, that it is not easily possible to disentangle the effects of a foreign takeover on employment and productivity. For example, a growth in productivity may lead to an increase in market share and thus to a growth of output and higher labor demand. So an initial negative effect of a foreign takeover on employment could be compensated or overcompensated for. Only the total effect is measured by this matching estimator approach.

3 Evidence on Firms in Foreign Ownership

In this section I will examine the level and patterns of foreign ownership of firms in Germany. First, I will give an overview of the level and share of foreign-owned firms for Germany as a whole, German states and different groups of firms. Then I will analyze the differences between foreign-owned and domestic firms.
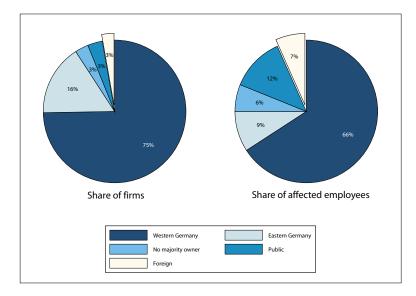
Figure 1: **Share of firms in foreign ownership and affected share of employees in 2007**

Table 1: **Ownership structure of firms in Germany**

Ownership	2000	2004	2007
Western German	73.5%	74.3%	74.9%
Eastern German	16.4%	15.6%	16.0%
Foreign	2.7%	3.0%	2.8%
Public	2.8%	2.9%	3.2%
No majority owner	4.6%	4.2%	3.2%

3.1 Share of Foreign-owned Firms

Share of firms in foreign ownership

The empirical analysis of the data shows that only a small share of firms is in foreign ownership. Figure 1 makes this clear. In 2007, only 3% of the firms were owned by foreign multinational enterprises. However, the share of employees who work in foreign-owned firms is more than twice as big and sums up to 7% (see Figure 1, right). Western German owners possessed nearly 3 of 4 German firms.

Table 1 gives an overview of the ownership structure of German firms in the course of time. There are no significant changes over time. All variations are within statistical uncertainty.
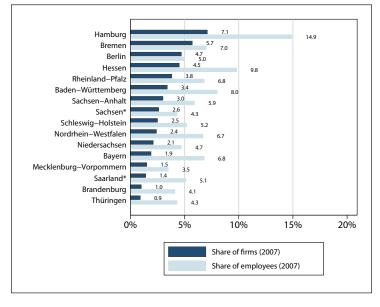
Figure 2: **Share of firms in foreign ownership and affected share of employees by German states**

Hamburg — Share of firms (2007): 7.1; Share of employees (2007): 14.9
Bremen — 5.7; 7.0
Berlin — 4.7; 5.0
Hessen — 4.5; 9.8
Rheinland–Pfalz — 3.8; 6.8
Baden–Württemberg — 3.4; 8.0
Sachsen–Anhalt — 3.0; 5.9
Sachsen* — 2.6; 4.3
Schleswig–Holstein — 2.5; 5.2
Nordrhein–Westfalen — 2.4; 6.7
Niedersachsen — 2.1; 4.7
Bayern — 1.9; 6.8
Mecklenburg–Vorpommern — 1.5; 3.5
Saarland* — 1.4; 5.1
Brandenburg — 1.0; 4.1
Thüringen — 0.9; 4.3

* data from 2004
Source: IAB Establishment Panel, 2004 and 2007, own calculations

Differences between German states

The share of firms in foreign ownership and the related share of employees in such firms differs significantly between German states (*Bundesländer*). A comparison of all German states shows that the city states Hamburg, Berlin, and Bremen have a relatively high share of foreign-owned firms. In contrast, the five Eastern German states have a significantly lower share. Similarly, as well as the shares of firms, the share of employees in these firms displays a high variance. In Hamburg, nearly 15% of all employees work in a foreign affiliate, in Hessen this share is about 10%, whereas in Baden-Württemberg, Bremen, Bayern and Nordrhein-Westfalen 7% of employees work in foreign-owned firms. These results go in line with Arndt et al. (2009), who also show using a full sample survey that only a small fraction of inward FDI goes to Eastern Germany.

Differences between size categories

An analysis of the share of firms in foreign ownership by different size categories shows that large firms are more often part of a foreign MNE than small firms. While the share of firms with less than 100 employees is less than 5%, the share of foreign-owned firms increases to more than 11% for larger firms with more than 250 employees. This makes clear that, although only 3% of all firms in Germany are foreign affiliates, a much larger share of employees works in these firms. This analysis is purely descriptive, so it cannot be resolved whether there is a causal relationship here, or in which direction it aims. On the one hand, it may be possible that foreign MNEs prefer to acquire large firms, on the other
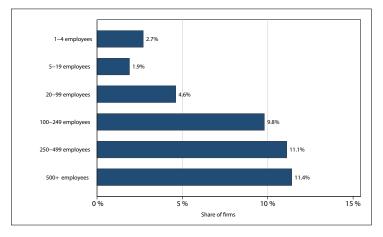
Figure 3: **Share of firms in foreign ownership by size categories**

hand, it may as well be possible that firms which are part of multinational enterprises grow faster than domestic ones.

Differences between industries

A disaggregation of the share of foreign-owned firms concerning industries is complicated by the obligation to observe data confidentiality. I may not report the share of foreign affiliates for many industries. A look at highly aggregated industries – on the 1-digit-level – shows that there is no relevant deviation from the total mean in manufacturing; both display a 3%-share of firms in foreign ownership. In business services the share of foreign-owned firms seems to be slightly below the average, in other services this share seems to be slightly higher. Further results may not be published because of data privacy restrictions.

3.2 Special Features of Foreign-owned Firms

The analysis of the ownership structure of German firms showed that only a small share of firms is in foreign ownership. However, this share is significantly higher in specific German states and in larger size categories. The subsequent question is: how do firms, that form a part of a foreign multinational enterprise, differ from domestic firms? Especially the size of the firms in terms of employees and the firms' productivity are of interest. Other relevant performance indicators are sales, export intensity, wages and the skill structure of the firms' employees.

Table 2 gives a simple descriptive comparison between firms in foreign ownership and domestic ones. It shows that firms which are part of a foreign MNE are on average larger, more productive and more export-oriented than domestic firms. If the number of employees and the number of employees in full-time-equivalents, as well as sales, are taken into account, foreign-owned firms are more than twice as big as domestic firms. Furthermore, displaying a share of 22% of exporters and an average export share of sales as high as 8%, these

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Table 2: **Comparison between firms in domestic and foreign ownership**

	Domestic ownership	Foreign ownership
Employees (total)	16.31	40.5
Employees (in full-time equivalents)	13.4	37.0
Sales (1000 Euro)	2 095	12 500
Share of exporters	10.4%	22.6%
Export intensity (exports/sales)	3.0%	8.1%
Sales productivity (1000 Euro)	128.1	226.2
Value added per employee (1000 Euro)	56.3	89.8
Average wage rate (Euro)	1584	1915
Share of unskilled employees	16.6%	22.3%

Source: IAB Establishment Panel 2000, 2004, 2007, own calculations

firms are more strongly oriented towards international markets. The measures for productivity (sales per employee and labor productivity as value added per employee) show that firms in foreign ownership possess more advanced technology and superior management techniques as compared to domestic firms. In addition, foreign-owned firms pay higher wages.

In this context, it is interesting that foreign-owned firms display a higher share of unskilled employees (22%) than domestic firms (17%). However, in the next subsection I will show that this is statistically not significant, if industry and size effects are controlled for.

Foreign Ownership Premium

When comparing firms in foreign and domestic ownership it has to be taken into account that the firms' characteristics do not solely depend on their ownership status. Other factors, like size or industry effects have to be taken into account. In order to verify, that the analysis above did not wrongly measure size and industry effects instead of the ownership status, I apply an econometric approach that controls for size and industry effects and isolates the ownership effect. I follow an empirical approach of Bernard et al. (2007) who used the same method to analyze the differences between exporters and non-exporters.

The basic idea of this approach is to regress several performance indicators of the firms on a dummy variable, that takes the value 1 for a foreign owned firm and the value 0 for a domestic firm. Additionally, I include the logarithm of the number of employees and industry dummies as control variables for firm size and industry effects.

The regression coefficient of the dummy variable for ownership status measures the partial correlation of ownership status and the respective performance measure. I call this relation the *foreign ownership premium*. In this way, the relative difference between firms in foreign and domestic ownership can be displayed in a convenient way. Additionally, the statistical significance of this difference can be gauged.

It is important to note that this approach doesn't permit constituting causal relationships between the ownership status and the firm performance indicators. It is simply the intensity and the direction of the relation that is analyzed, while size and industry effects are isolated. The regression is performed separately for

Table 3: **Foreign ownership premia**

Dependent variable	[1]	[2]	[3]
Employees	1.14***	1.212***	-
	213%	236%	-
Employees in full-time equivalents	1.25***	1.348***	-
	248%	285%	-
Sales	2.10***	1.880***	0.486***
	713%	555%	63%
Sales productivity	0.677***	0.591***	0.425***
	7%	81%	53%
Value added per employee	0.547***	0.506***	0.332***
	73%	66%	39%
Export intensity	19.281***	16.210***	13.218***
	19%	16%	13%
Share of exporters	0.365***	0.280***	0.200***
	37%	28%	20%
Average wage rate	0.355***	0.338***	0.134***
	43%	40%	14%
Share of unskilled employees	0.035***	0.024***	0.007
	4%	2%	1%
Controls for industry effects	no	yes	yes
Controls for size effects	no	no	yes

The first row for each dependent variable presents the coefficient of the dummy variable of foreign ownership from the regression model. *** indicates statistical significance on the 1% level on the basis of robust, clustered standard errors. The second row displays the exact difference between domestic and foreign-owned firms in percent.
Source: IAB Establishment Panel 2000, 2004, 2007, own calculations

each performance indicator of interest using ordinary least squares and standard errors that are robust against heteroscedasticity.

The foreign ownership premium is calculated in three different specifications. In column [1] of Table 3 the ownership is included as the only regressor. In column [2], I include industry dummies and in column [3] I additionally include firm size (i.e., the logarithm of the number of employees) as a control variable. In all columns I only report the results for the coefficient of the ownership variable and omit the industry and size variables. A t-Test controls for the statistical significance of the partial relationship. In addition to the regression coefficients I also present the corresponding difference between foreign-owned and domestic firms measured on a percentage basis.[4]

By and large, the foreign ownership premium approach displayed in Table 3 confirms the results from the simple descriptive comparison. In line with the earlier results, this approach shows that firms in foreign ownership are larger than domestic firms in terms of employees. This also holds true for size in terms of sales. However, regarding sales, the foreign ownership premium becomes

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[4] Although most performance indicators in this analysis are transformed to logarithms, an interpretation of the regression coefficient as a semi-elasticity is only possible for small values. To obtain the exact percentage value, it is necessary to transform the coefficient in the following way: $change(\%) = 100[\exp(\beta) - 1]$ with β being the regression coefficient.

smaller when industry and size effects are controlled for. That means that the pure descriptive approach overestimates the true relationship between ownership and sales.

Concerning productivity, it is also confirmed that firms which are part of a foreign multinational enterprise are more productive than domestic firms. Firms in foreign ownership have a higher labor productivity (measured as value added per employee) and higher sales per employee. Furthermore, firms in foreign ownership pay higher wages.

Firms in foreign ownership form a part of a multinational enterprise and its international production network. This is also reflected in a higher orientation towards international markets. Firms in foreign ownership are more often exporters than domestic firms and they have a significantly higher export share in total sales. On average, the foreign ownership premium is about 13 percentage points, if size and industry effects are controlled for.

The skill structure of the firms' employees differs only in a simple descriptive comparison between foreign and domestic firms. Although foreign-owned firms have a higher share of unskilled employees, the difference of about 4 percentage points is not highly relevant in economic terms. If size and industry effects are controlled for, the difference vanishes.

4   Development of Firms after a Foreign Takeover

In the last section, I compared foreign-owned and domestic firms in a static way. It showed that firms in foreign ownership play an important role in some German states and that the share of employees working in these firms is large. Foreign-owned firms are significantly larger than domestic firms and thus are of economic importance. Further, these firms are more productive and more export-oriented than domestic firms.

In this section, I change to a dynamic view and proceed to an analysis of how firms develop after they have been acquired by a foreign multinational enterprise. Hence, I restrict my analysis to the group of firms that are subject to a foreign takeover. For the ease of presentation, I will use the term *switcher* to firms that have been in domestic ownership in 2000 (2004) and changed their ownership status to foreign in the year 2004 (2007), i.e. that were subject to a foreign takeover or *switched* their ownership status.

Firstly, I will present the shares of switchers in all firms and by size categories. Subsequently, I will analyze the average effects of a foreign takeover on the acquired firms by means of descriptive statistics. Then I will address the issue of heterogeneity regarding the development after a foreign takeover. As will be shown, average effects cannot paint the complete picture. In the following Section 5 the matching estimator technique will be applied in order to reveal a causal relation between foreign takeovers and subsequent firm development.

Note that it is important to account for the restrictions of the dataset in this section. In particular, as described in Subsection 2.4, it is not possible to observe a change in ownership for every single period in the dataset, because the ownership variable is only available in 2000, 2004, and 2007 for the universe of all firms. Hence, the exact point in time when the firms is acquired cannot be observed for most firms.[5]

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[5]An exception are firms that entered the dataset in between these intervals. For those

Table 4: **Share of switchers by sectors**

	Takeover interval	Manufacturing	Services
Share of sectors with respect to	2000/2004	16%	84%
the subpopulation of switchers	2004/2007	10%	90%
Share of switchers	2000/2004	0.7%	1.1%
by sectors	2004/2007	0.3%	0.9%

Source: IAB Establishment Panel 2000 - 2007, own calculations

4.1 Share of Switchers

A first look at the data reveals that foreign takeovers are rare events. Between the years 2001 and 2004, foreign firms acquired a majority share of about 0.7% of German firms. The corresponding value for the second time interval from 2005 to 2007 that is observable in the dataset is 0.5%. Altogether, this makes 352 observed foreign takeovers in the dataset. This allows statistically reliable results. However, it is not possible to report results for particular industries or size categories of firms in all cases.

Table 4 shows that the share of acquired firms in the interval between 2001 and 2004 is slightly higher in the service sector (1.1%) than in manufacturing (0.7%). The interval from 2005 to 2007 shows a similar picture: in the service sector, 0.9% of firms were subject to a foreign takeover, in manufacturing the respective value is about 0.3%. Hence, the majority of switchers are firms in the service sector. In particular, the high number of switchers in the retail and wholesale trade industry contributes to this.

An analysis of the share of switchers in different size categories is impeded by data protection regulations. Therefore, Figure 4 only distinguishes between small firms with less than 100 employees and large firms with more than 100 employees. Most firms that have been subject to a foreign takeover belong to the smaller category of less than 100 employees. However, most firms in the population belong to this category, hence it is not possible to conclude that mostly small firms are acquired.

4.2 Development of Switchers

In this subsection I present the average development of domestic firms that are subject to a foreign takeover. Table 5 shows the development of firms after they have been acquired by a foreign multinational enterprise according to the two main performance indicators, total employment and productivity, as well as other firm characteristics. Once again, the presentation distinguishes between the two observable intervals 2001-2004 and 2005-2007. The table also presents the development of naive control groups which consist of all domestic firms which did not change their ownership status in the respective interval.

In Table 5 the development of firm characteristics is defined as the absolute change of a performance indicator, like labor productivity, between the last period in which the firm was observed as a purely domestic firm and the first period in which the firm reports being owned by a foreign multinational firm. For most switchers, this is the interval from 2000 to 2004 or 2004 to 2007. For firms

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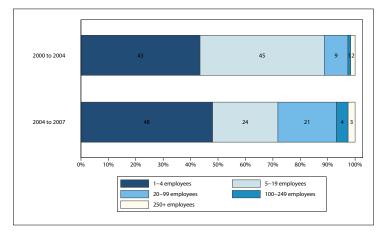firms the ownership status is known for the first observed period.

Figure 4: **Switchers by size categories**

Source: IAB Establishment Panel 2000-2007, own calculations

that were sampled in the dataset in later periods, this interval is shorter. The values of the control groups, that is the firms that stay in domestic ownership, correspond to the complete time span of 2000 to 2004 or 2004 to 2007.

Concerning the number of employees, the switchers display a slightly negative development in the interval from 2000 to 2004. However, the average number of employees increased in the time span from 2004 to 2007. A first, naive comparison with the domestic firms which did not change their ownership status shows that the switchers followed the same trend as the control group. Both groups of firms had a decrease in employment in the times of economic slowdown at the beginning of the decade and both groups displayed an increase in the following years. However, these two trends seem to be more pronounced for the switchers.

Labor productivity, measured as value added per employee, decreased in the group of the acquired firms in both intervals. Again, the trend is the same for both the firm subject to a foreign takeover and the control group, but it is more pronounced for the switchers. This holds true for the alternative measure of sales productivity and the interval from 2000 to 2004. However, the development of sales productivity differs for switchers and the control group in the time span from 2004 to 2007. The switchers display a positive change, the control group a small negative one.

With respect to participation in foreign markets and in comparison with the control group, switchers show a slightly negative development after a foreign takeover. This holds true for the share of exporters as well as for the share of sales that is earned by exporting to foreign markets. This seems to be surprising at first sight. However, in this descriptive analysis, it is not possible to reveal how a firm would have developed if it had not been acquired by a foreign company. This means that an acquired firm could have displayed an even worse development, if it had not been taken over. Hence, there could a positive effect of the foreign takeover even so.

To put it in a nutshell, this section showed that it is not possible to identify

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Table 5: **Development of switchers and control group**

| Takeover interval | 2000/2004 | | 2004/2007 | |
Change of...	control group	switchers	control group	switchers
Number of employees	-0.4	-3.1	0.2	1.6
Number of employees in full-time equivalents	-0.6	-2.7	0.1	1.6
Productivity as value added/employees (Euro)	-28 011	-52 071	-3 148	-20 610
Sales productivity (Euro)	-10 195	-19 188	-3 004	20 670
Share of exporters (percentage points)	0.2	-7.0	0.4	-3.7
Export intensity (percentage points)	0.1	-0.2	0.3	-1.5
Average wage rate (Euro)	96.2	222.0	-35.0	-40.0
Number of observations		190		163

Source: IAB Establishment Panel 2000 - 2007, own calculations

an unambiguous effect of foreign takeovers on the development of the acquired firms by means of descriptive statistics. On the one hand, a descriptive analysis cannot identify the direction of causality and on the other hand, it is not possible to isolate the effects of the takeover from other factors which influence the performance of firms.

4.3 Heterogeneous Development after Foreign Takeovers

The last subsection presented the average development of firms after a takeover by a foreign multinational firm. However, the presented numbers are average values that do not always give a good impression of the underlying distribution. Indeed, a more detailed analysis shows that firms develop in very different ways after a foreign takeover and that there is a high degree of variation that has to be taken into account.

In order to paint a more detailed picture of the development of switchers, this subsection presents boxplot graphs.[6] In Figure 5 the growth rates of different firm performance indicators are displayed for the group of switchers.[7] Note as a first result that the change in the number of employees is positive for the majority of switchers. About three quarters of the firms display a growth in employment after the foreign takeover. The range of the central 50% of firms goes from no change up to a growth of about 20%. If employment is measured in full-time equivalents, the variance is higher and we can observe about as many

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[6]Boxplot graphs permit a good overview over the properties of a distribution of a firm performance indicator. The box represents the middle or central 50% of observations. The left boundary of the box constitutes the 25th percentile, the right boundary analogously stands for the 75% quantile. The line in the middle represents the median value of the distribution. One of the main advantages of this way to illustrate data is that outliers do not bias the boxplot. Furthermore, it is possible to give an overview on the complete distribution. The arithmetic mean may lead to false impressions if there is a high degree of variation in the data.

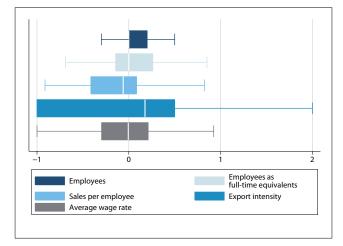[7]For this purpose, both time intervals, 2000 to 2004 and 2004 to 2007, are combined.

Figure 5: **Boxplots of growth rates after foreign takeover with respect to different performance indicators**

decreases in employment as increases.

Concerning sales productivity, a majority of the observations indicate a negative rate of change after a foreign takeover. This does not necessarily mean that there is a negative effect on average - few, but highly positive growth rates may overcompensate for many small, negative ones. For example, the last subsection showed that average change is positive for the second interval from 2004 to 2007.

The range of variation is much higher for the change of export intensity, that is the share of exports in total sales, than for other performance indicators. The central 50% of observations lie in the range of -100% (which is a stop of export activity) and just under +50%. The median and hence the majority of switchers display a positive development.

The median of the change in the average monthly wage rate lies just under 0 and the distribution around the median is relatively symmetrical.

This section presented a more detailed analysis of the development of switchers after a foreign takeover and accounted for the heterogeneity of this development. However, this analysis is not able to paint an unambiguous picture of the effects of a foreign takeover, too. It becomes clear that firms which are subject to a foreign takeover show neither a definitely positive nor a definitely negative development after the foreign acquisition. As stated in the last subsection, the effects of a foreign takeover cannot be revealed by purely descriptive means. Therefore, the next section will apply an econometric matching estimator approach in order to analyze these effects.

5 Causal Effects of Foreign Takeovers

5.1 The Method of Propensity Score Matching

In Section 4, I discussed the descriptive analysis of the development of companies in foreign ownership after they have been taken over. In the previous sections, I showed already that in order to calculate the causal effect of foreign takeovers it is not sufficient to compare firms in domestic ownership with firms in foreign ownership. Likewise the analysis of the development of the switchers after the change of ownership does not suffice to this end. Rather, the question of how a company which has been taken over would have had developed if it had not been taken over is of interest. Naturally, this counterfactual situation cannot be observed, since a given company has either been taken over, in which case its development in foreign ownership can be observed, or this company has not been taken over, in which case its development in domestic ownership can be observed. Thus, in this section I will emulate the counterfactual situation using an econometric approach, the matching estimator, and compare it to the actual development. See Caliendo (2006) for a comprehensive description of the methodology.

The matching estimator approach starts from the simple idea of comparing the performance of firms that have been taken over (the treated subpopulation) to the performance of firms that stayed in domestic ownership (the untreated subpopulation). Hence I define treatment as foreign takeover and define a treatment indicator w_t with $w_{t+v} = 1$ for the firms in domestic ownership in $t = 2000, 2004$ and foreign ownership in the next observed period $t + v = 2004, 2007$, thus having experienced a foreign takeover. I handle firms as untreated ($w_{t+v} = 0$) if they stay domestic during the observed time span from 2000 to 2004 or 2004 to 2007, respectively.

In an unfeasible experimental setting one would want to compare the performance y (productivity, employment) of the same firm with ($y_i|(w_{t+v} = 1) = y_{i1}$) and without treatment ($y_i|(w_{t+v} = 0) = y_{i0}$). This experiment would deliver the Average Treatment Effect on the Treated

$$ATT = E[y_{i1} - y_{i0}|w_{t+v} = 1] = E[y_{i1}|w_{t+v} = 1] - E[y_{i0}|w_{t+v} = 1].$$

In other words, this is the average effect of a foreign takeover on the performance of a firm that has undergone an ownership change. Unfortunately, we cannot observe y_{i1} and y_{i0} for any firm in our sample at the same time. $E[y_{i0}|w_{t+v} = 1]$ is not observable. Neither can we assume that treatment is distributed randomly among firms, that is, we have to assume that M&As are correlated with firm performance (e.g. cherry picking). Hence, unconditional and conditional expectations of firm performance are not equal, $E[y_{i0}|w_{t+v} = 1] \neq E[y_{i0}] = E[y_{i0}|w_{t+v} = 0]$ and $1/N \sum_{i=1}^{N}(y_{i1} - y_{i0})$ as a naive measure of the foreign takeover effect is biased.

At this point, the "conditional independence assumption" (CIA) is introduced.[8] It states that given a set of observable covariates X, foreign takeovers happen randomly, or in other words, conditional on the observable covariates

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[8]Synonyms are "selection on observables" or "ignorability of treatment" (given the observed covariates).

X, w and (y_{i1}, y_{i0}) are independent, and

$$E[y_{i0}|X, w_{t+v} = 1] = E[y_{i0}|X, w_{t+v} = 0] = E[y_{i0}|X]$$

(see e.g. Wooldridge, 2002, p. 607). X must contain all relevant variables for both, the foreign takeover and the outcome variable y, for the CIA to hold.[9]

Once we partial out the observables in X, w and (y_{i1}, y_{i0}) are uncorrelated. Then

$$ATT = E[y_{i1} - y_{i0}|X].$$

However, matching on a high number of firm characteristics creates a dimensionality problem and is not feasible. Rosenbaum and Rubin (1983)show that it is not necessary to match on all covariates. Instead, it is possible to aggregate the firm characteristics into a single score, the propensity score. The alternative but equivalent formulation is

$$ATT = E[y_{i1} - y_{i0}|p(X)]$$

where $p(X)$ is called the propensity score. $p(X) = Pr(w = 1|X)$ is the probability of a foreign takeover given the covariates X. For an estimate of ATT we would simply have to average treated and untreated firms with the same $p(X)$, respectively. To cope with the problem, that in general we will find no firms with exactly identical score $p(X)$, different matching strategies have been proposed in the literature (see, e.g., Caliendo 2006). I apply nearest neighbor matching with 10 nearest neighbors, where each treated firms (switcher) is assigned to 10 untreated twins with the most similar absolute value with respect to the propensity score, as far as the difference in propensity score is below a certain threshold. We also apply kernel matching, which assigns all firm from the control group as twins to a switcher, but weights these twins by the absolute difference with respect to the propensity score. Note, that I restrict all matches to observations of firms in the takeover interval and the same industry.

The standard matching estimator for the ATT is given by

$$\widehat{ATT}_M = \frac{1}{n_1} \sum_i \left\{ y_{i1,t+v} - \hat{E}[y_{i0,t+v}|w = 1, p(X)] \right\}$$

with n_1 as the number of treated firms.

The validity of the matching estimator approach depends crucially on the validity of the conditional independence assumption. This means that the observable covariates X contain all relevant variables that determine the foreign takeover and the outcome. However, there may be unobserved factors that matter as well. In order to account for time-invariant (unobserved) effects at least, I apply a difference-in-difference approach. This is, I don't compare the absolute value of an outcome variable y between the group of switchers and the assigned twins after the takeover. Instead, I compare the absolute change from the last observed period in domestic ownership and the first observation in foreign ownership $(y_{t+v} - y_t)$ between switchers and twins. The resulting difference-in-difference matching estimator is given by

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[9]The choice of these variables is not trivial and not to test for. Therefore, I will apply different specifications as robustness checks.

$$\widehat{ATT}_{DiD} = \frac{1}{n_1} \sum_i \left\{ [y_{i1,t+v} - y_{i1t}] - \hat{E}[y_{i0,t+v} - y_{i0t}|w = 1, p(X)] \right\}.$$

A further requirement for the validity of the propensity score matching estimator is that $0 < Pr(w = 1|X) < 1$, thus ruling out the perfect predictability of foreign takeovers and ensuring that the firms from the control group fall within the propensity score distribution of the acquired firms. This is the so called common support condition.

The firm performance indicators (outcome) in the case under consideration are the number of employees and the the productivity of the company. Put differently, I test whether the change to foreign ownership has caused a more positive development of the number of employees and productivity than in otherwise comparable firms which stayed in domestic ownership. Additionally, I examine the export intensity of the companies.

One of the main advantages of this approach in comparison to a regression framework is that it solves the endogeneity problem. In a regression framework the unsolved question regarding the direction of causality (Does high/low firm performance cause a foreign takeover or does a foreign takeover cause high/low firm performance?) leads to a bias. Further, the matching estimator approach doesn't assume a functional (linear) form. After matching all performance measures are allowed to vary freely. This is in contrast to a regression approach, where the dependent variable (e.g. employment) is estimated given other covariates which may be variables of interest themselves (e.g. productivity).

5.2 Estimation of Propensity Scores

The *propensity score* is a similarity index which aggregates the observed properties of a given company into a single value. For this purpose, we estimate for all companies the probability with which a given firm becomes the target of a foreign takeover using a Probit model. This probability then represents the propensity score. The dependent variable assumes the value 0 for all firms which were in domestic ownership in 2000 (2004) and were still predominantly in domestic hands by 2004 (2007). The variable assumes the value 1 for firms which were in domestic ownership in 2000 (2004) and had been taken over at the following observation in 2004 (2007). Companies which have been in foreign ownership throughout the observation period were not included in the sample.

In total, I estimated four variants of the model. Among those are two baseline models which contain the most important explanatory variables. One of the models additionally contains quadratic terms which account for non-linear effects. The two further models are extended models, which contain additional explanatory variables. Using four different models, we can test the robustness of the results with respect to changes in the model specification. The results of the Probit estimation can be found in Table 6:

On the one hand, the results of the Probit estimation are necessary for the generation of propensity score. On the other hand, they can also be interpreted in an economic context. In particular, they show which properties of firms render a foreign takeover likely. Using this, we can verify the hypotheses formulated in Section 2. The results of the model support - at least partly - the *cherries vs.*

Table 6: **Estimation of Propensity Scores (Probit model)**

	Baseline 1	Baseline 2	Extended 1	Extended 2
ln Sales productivity	-0.03***	-0.08***	-0.02*	-0.05***
	[0.01]	[0.02]	[0.01]	[0.01]
ln Sales productivity (squared)		0.00		0.00***
		[0.00]		[0.00]
ln Employees	-0.03***	-0.03***	-0.02**	-0.02**
	[0.01]	[0.01]	[0.01]	[0.01]
ln Sales	0.04***	0.04***	0.02***	0.02***
	[0.01]	[0.01]	[0.01]	[0.01]
Export intensity	0.00***	0.00***	0.00***	0.00***
	[0.00]	[0.00]	[0.00]	[0.00]
Export intensity (squared)		0.00**		0.00**
		[0.00]		[0.00]
Share of unskilled employees			0.01	0.00
			[0.00]	[0.00]
Works council (0/1)			-0.00	-0.00
			[0.00]	[0.00]
Profit situation			-0.00	-0.00
			[0.00]	[0.00]
Investing firm (0/1)			-0.00*	-0.00*
			[0.00]	[0.00]
Firm active in vocational training (0/1)			-0.01***	-0.01***
			[0.00]	[0.00]
Controls for...				
...legal form	no	no	yes	yes
...industry	yes	yes	yes	yes
...regional effects (Germans states)	yes	yes	yes	yes
Observations	12556	12556	12556	12556
Pseudo R^2	0.11	0.12	0.13	0.13

Marginal effects are reported. Robust standard errors in brackets. *, **, *** significant at the 10%, 5%, 1%-level.

Source: IAB Establishment Panel 2002-2007, own calculations

lemons theory. For example, sales productivity has a negative influence on the probability of a takeover. This supports Hypothesis 1b. However, if we include the square of sales productivity into the model, we observe a U-shaped effect at least in the extended model . This means, that the least productive, and, as well, the most productive companies, are being taken over with a higher probability than those companies with a medium productivity. This way, Hypothesis 1a is supported as well.

The number of employees has a negative influence on the probability of a takeover. The more employees a given firm has, the lower the probability to be subject to a foreign takeover.

The turnover and the export intensity, on the other hand, have a positive influence on the probability of a foreign takeover. This indicates that foreign multinational enterprises which acquire domestic firms are motivated by the development of new markets. This supports Hypothesis 2.

In the extended model additional control variables have been included. The qualification structure of the firms measured as the fraction of unqualified employees, the existence of a works council and firm profitability do not have a significant influence on the probability of a foreign takeover. The dummy variable, which indicates firms that take part in the training of specialized staff has a negative effect. The variable which represents investment has a weakly significant negative effect.

Moreover, the influence of further variables has been taken into account. I incorporated variables into the model which control for industry and regional (German states) effects and the effects of the firms' legal form.

5.3 Specification of Propensity Score Matching

Based on the propensity score estimated using Probit models, I perform *Propensity Score Matching* in three different specifications.

Firstly, I used the propensity score from the "Baseline 2" estimation because it contains a high number of available observations and accounts for non-linear effects. Using this propensity score, I assigned ten nearest neighbors (twins) to all switchers. This relative high number of twins is justified by the fact that the number of 352 observed switchers is relatively low compared to the size of the control group which contains about 15,000 firms. This way, the variance of the estimation of the arithmetic mean in the control group can be minimized. However, a high number of neighbors bears the risk of introducing a bias because some of the assigned neighbors may be bad matches with a relatively high difference regarding the propensity score (and hence differences in the real properties). I address this problem by applying a caliper of 0.005. This means that a nearest neighbor is assigned to a switcher only if the difference in the propensity scores is less than 0.005. In other words: if a firm from the control group (considering the propensity score) is a nearest neighbor to a switcher, it is only assigned as a twin, if its probability to become foreign-owned is not more than 0.5 percentage points higher or lower than the switcher's. Additionally, I assign twins only in the same industry and in the same interval (from 2000 to 2004 or from 2004 to 2007). This ensures that only comparable firms are assigned as twins.

The second specification estimated also makes use of the "Baseline 2" model as basis for the propensity score. However, I do not apply nearest neighbor

Table 7: **Specifications of Propensity Score Matching**

	Specification [1]	Specification [2]	Specification [3]
Propensity score	"baseline 2"	"baseline 2"	"extended 2"
Matching type	10 nearest neighbors	Gaussian kernel	10 nearest neighbors
Caliper	0.005	-	0.005
Perfect matching on	industry and interval	industry and interval	industry and interval

Source: Own presentation

matching in this setup. Instead, all firms from the control group are used as twins for the switchers. However, all twins are weighted according to their similarity to the switcher. Again, similarity is measured as the absolute difference in the propensity score. Very similar firms from the control group are assigned a high weighting, dissimilar firms (with a much higher or lower propensity score) get a small weighting. The kernel used to weight the firms is a Gaussian (normal) kernel. Again, only firms from the same industry and the same time interval as a given switcher are assigned as twins.

The third specification makes use of the propensity score obtained from the "Extended 2" estimation. In analogy to the first model, I apply nearest neighbor matching with 10 neighbors. Again, the maximal distance (caliper) between a switcher and an assigned neighbor is constrained to 0.005 (0.5 percentage points). As in the two previous specifications, only firms from the same industry and the same time interval as a given switcher are assigned as twins. All calculations are conducted with the statistical software package Stata 10.1 and the additional plug-in module *psmatch2* by Leuven and Sianesi (2003). Table 7 gives an overview of the three specifications.

5.4 Discussion and Tests of Necessary Assumptions

In this subsection, I will discuss the assumption that are necessary for the application of propensity score matching. A central condition for the validity of the method is the so-called conditional independence assumption. This assumption cannot be tested directly. For the validity of this assumption it is important that all variables that are relevant for the takeover decision can be observed and that unobserved effects (in the statistical analysis) are no crucial factor in this decision. In the case under consideration, it is plausible that all variables which are systematically relevant for the takeover decision can be observed. Hence, this assumption can be considered as met.

Besides the conditional independence assumption, for the validity of the propensity score matching approach, it is necessary that the twins which are assigned to switchers are in fact comparable firms. Therefore, Table 12 in the Appendix presents a comparison between the group of switchers and the assigned twins. This comparison is made for the three different specifications discussed in Section 5.3. For the comparison, three different criteria are considered. Firstly, the averages of the observed covariates are compared by means of a t-test. This comparison reveals that for all control variables, there are no significant difference between the two groups.[10]

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[10] A t-Test cannot reject that the difference between the two arithmetic means is 0 on

Table 8: **Balancing of matched samples**

	Sample	Pseudo R^2	LR chi^2	p-value
Specification [1]	All firms	0.11	294.04	0.00
	Matched	0.01	6.27	1.00
Specification [2]	All firms	0.11	294.04	0.00
	Matched	0.01	11.09	1.00
Specification [3]	All firms	0.13	327.84	0.00
	Matched	0.01	7.83	1.00

Source: IAB Establishment Panel 2000-2007, own calculations

As a second criterion we consider the Standardized Bias introduced by Rosenbaum and Rubin (1985) which is calculated as

$$SB = 100 \frac{(\bar{X}_1 - \bar{X}_0)}{\sqrt{0.5[V_1(X) + V_2(X)]}}$$

Here, $\bar{X}_1$ is the arithmetic mean of a given control variable calculated over all considered firms and $\bar{X}_0$ is the arithmetic mean of the twin group. $V(X)$ represents the respective variances. There is no fixed value which represents a reliable result in the literature. Rosenbaum and Rubin suggest that a value smaller than 20 should be reached, other authors request smaller values. Table 12 in the appendix shows that for all control variables a value smaller than 10 is obtained, for most variables the value is below 5. The mean standardized biases for the three models range from 2.18 to 3.20.

Sianesi (2004) suggests estimating the propensity score once more from a sample which exclusively contains the considered firms and their twins as a third criterion. Since these should not differ systematically from each other, the Probit estimation is expected to have no explanatory power. This is tested by the value of the pseudo-R2 of the regression. Furthermore, it is tested whether all explanatory variables together have a statistically significant explanatory power. Table 8 shows that the Probit estimation of the sample which contains exclusively the switchers and their corresponding twins indeed does not have any explanatory power since the pseudo-R2 assumes very small values and, in a Likelihood Ratio test it cannot be denied that all explanatory variables jointly have no influence.

5.5 Results: Effects of Foreign Takeovers on Acquired Firms

The last subsection discussed the assumptions which are necessary for a valid application of the propensity score matching approach. It showed that the assumptions can be considered as fulfilled. Hence, this subsection will present the results of the matching estimator approach. The following tables display the effects of a foreign takeover on employment, productivity and export intensity. In the focus of the interest is the *average treatment effect on the treated* (ATT). In the case under consideration, this is the average effect of a foreign takeover on

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common levels of significance.

Table 9: **ATT with respect to employment**

Specification	Sample	Switchers	Control group	Δ / ATT	Analytical s.e. t-value	Bootstrapping z-value
1	All firms	-0.98	-2.63	1.65	0.27	
1	Matched	-0.41	-15.68	11.53	1.89*	1.22
2	All firms	-0.98	-2.63	1.65	0.27	
2	Matched	-0.98	-10.14	9.16	1.44	0.97
3	All firms	-0.85	-2.34	1.50	0.24	
3	Matched	-2.63	-6.39	3.76	0.63	0.54

Bootstrapping with 200 replications. ***, **, * significant on the 1%, 5%, 10% level. Δ is the difference between switchers and all firms of the control group. ATT is the average treatment effect on the treated in the matched sample. s.e.: standard errors. Source: IAB Establishment Panel, 2000-2007, own calculations

a acquired firm in a difference-in-difference framework as presented in Section 5.1.

I apply a t-test to check whether the effect is statistically different from 0. However, a simple t-test does not take into account that the propensity score is an estimated value. Therefore, I additionally apply bootstrapping with 200 replications in order to gain robust test statistics.

Table 9 presents the results concerning employment for the 3 different specifications discussed in Section 5.3. The first row of the table draws a naive comparison between the acquired firms (the switchers) and all firms of the control group. The second row presents the comparison between switchers and comparable firms, that is their assigned twins from the control group. The difference between the arithmetic mean of the switchers and the mean from the respective group of twins is the ATT, the average effect of a foreign takeover on the acquired firms. The point estimate of the ATT is in the range of about +4 to +11, depending on the underlying specification. However, the effect is not statistically significant. A t-test cannot reject the hypothesis that the true value is 0 on a sufficient level of significance. This holds true for all 3 different specifications and for employment in full-time equivalents as an alternative measure of employment. That means that the matching estimator approach can detect neither a positive nor a negative effect of a foreign takeover on the acquired firms. Therefore, Hypothesis 3 that suggested a negative effect of foreign takeovers on the acquired firms (in Section 2) cannot be supported.

Table 10 presents the results of the 3 different specifications regarding the effects of foreign takeovers on productivity. The productivity measure presented in this table is value added per employee. Again, the results of all 3 specifications show that there is no statistically significant effect of a foreign takeover on the acquired firms. Though the point estimates suggest that acquired firms perform better than their twins, a t-test cannot reject that the true value of the ATT is 0. An alternative specification with sales productivity instead of value added per employee as measure for productivity comes to the same result. Again, Hypothesis 4a (a positive effect of foreign takeovers on the productivity of acquired firms) suggested in Section 2 cannot be supported.

Finally, Table 10 presents the impact of a foreign takeover on the acquired

Table 10: **ATT with respect to productivity**

Specification	Sample	Switchers	Control group	Δ / ATT	Analytical s. e. t-value	Bootstrapping z-value
1	All firms	-4804,98	-4948,66	143,68	0,01	
1	Matched	-5714,50	-15315,49	9600,98	1,11	0,84
2	All firms	-4804,98	-4948,66	143,68	0,01	
2	Matched	-4804,98	-10681,25	5876,27	0,72	0,62
3	All firms	-7459,94	-4932,33	-2527,60	-0,23	
3	Matched	-8267,20	-17759,17	9491,97	0,85	0,76

Bootstrapping with 200 replications. ***, **, * significant on the 1%, 5%, 10% level.
Δ is the difference between switchers and all firms of the control group. ATT is the
average treatment effect on the treated in the matched sample. s.e.: standard errors.
Source: IAB Establishment Panel, 2000-2007, own calculations

Table 11: **ATT with respect to export intensity**

Specification	Sample	Switchers	Control group	Δ / ATT	Analytical s. e. t-value	Bootstrapping z-value
1	All firms	2.84	0.54	2.30	3.87***	
1	Matched	2.86	0.19	2.67	2.42**	2.46**
2	All firms	2.84	0.54	2.30	3.87***	
2	Matched	2.84	0.16	2.68	2.60***	2.65***
3	All firms	2.76	0.54	2.21	3.59***	
3	Matched	2.73	0.34	2.39	2.04**	1.92*

Bootstrapping with 200 replications. ***, **, * significant on the 1%, 5%, 10% level.
Δ is the difference between switchers and all firms of the control group. ATT is the
average treatment effect on the treated in the matched sample. s.e.: standard errors.
Source: IAB Establishment Panel, 2000-2007, own calculations

firms regarding export intensity. In contrast to employment and productivity,
the matching estimator approach comes to the result that a foreign takeover
leads to an increase in export intensity of the acquired firms. Export intensity
is defined as the share of total sales which is earned on foreign markets by
export activity. All 3 different specifications of the model support this result.
Note that the matching approach comes to a different result compared to the
simple descriptive analysis presented in Section 4. However, though the effect is
statistically significant, it has a magnitude of only about 2.5 percentage points,
so its economic significance is limited.

All in all, the results of the propensity score matching approach show that the
effects of a foreign takeover on the acquired firms are very limited. If unobserved
heterogeneity is controlled for no effects on employment or productivity can
be found. This means that in the short run, neither fears of a reduction of
employment nor hopes for an increase in productivity are justified. However,
the integration of a domestic firm into the international production network of
a foreign multinational enterprise leads to an increase of its export intensity.

Heterogeneous Effects on Different Firms

Related to the absorptive capacity discussion in the literature on spill-over effects, different firms may react differently to a foreign takeover. This leads us back to the distinction between *lemons* and *cherries*. Highly productive firms that are subject to a foreign takeover may not be able to profit as much from access to the acquiring firm's technology as relatively unproductive firms. Small firms may be affected differently than large companies. This was proposed as Hypothesis 4b in Section 2.

Therefore, I repeated the estimation of the ATT regarding employment, productivity and export intensity on split samples. On the one hand, the sample was split at median employment size, such that the ATT was separately estimated for the 50% smallest firms and the 50% largest firms. On the other hand, the same approach was conducted regarding productivity. The ATT was estimated for the most productive half of the sample (*the cherries*) and for the 50% of firms with the lowest productivity (*the lemons*).

However, the results are qualitatively the same as for the complete sample. There is no significant effect of a foreign takeover on employment or productivity, neither for small or large firms, nor for cherries or lemons. Therefore, Hypothesis 4b cannot be supported as well.

6 Conclusions

This paper examined the effects of a foreign takeover on the acquired domestic firms. From a theoretical point of view there are positive as well as negative effects possible. Hence, theoretical considerations do not permit unambiguous predictions. To the best of my knowledge, there exist no empirical studies which analyze the same firm performance indicators for Germany. Existing empirical studies using data from other countries mostly come to the result that there are positive productivity effects, whereas evidence on employment is ambiguous.

In order to gain deeper insight into the case of Germany, I analyzed the data of the IAB Establishment Panel using the surveys in the time span from 2000 to 2007. On the one hand, I conducted a descriptive analysis to gain an overview of the number, distribution by industry, by Germans states, and of the patterns, of foreign takeovers. On the other hand, I applied a propensity score matching approach to obtain results on the causal effects of foreign takeovers. The level of the analysis is the production site.

The descriptive analysis shows that only about 3% of the firms in Germany are in foreign ownership. However, in some German states, in particular the urban states Berlin, Hamburg, and Bremen, as well as in Hessen, Rheinland-Pfalz and Baden-Württemberg, this share is higher. Firms in foreign ownership are of high economic relevance, because they differ in some key aspects from the average domestic firm. Firstly, they are considerably larger than domestic firms in terms of employees and turnover. About 7% of all employees work in firms in foreign ownership. Secondly, these firms are more productive, even if size and industry effects are controlled for. Thirdly, firms in foreign ownership are more strongly oriented towards export markets.

In the time span under consideration, only a small share of less than 1% of all firms was subject to a foreign takeover. An econometric analysis supported the

hypothesis that mostly firms with below average productivity (*lemons*) as well as firms with a relatively high productivity (*cherries*) are acquired. By contrast, less firms with an average productivity become foreign owned. Small firms have a higher probability to become acquired by a foreign multinational firm. Export intensity and the volume of sales have a positive effect on this probability, too. This suggests that foreign multinational firms may have market development motives for their acquisitions.

The propensity score matching approach comes to the result that the effects of foreign takeovers on the acquired firms are rather small. If unobserved heterogeneity is controlled for, no statistically significant effects can be found for employment and productivity. This suggests that - in the short run - neither fears of employment reductions and massive layoffs, nor hopes for increases of productivity, are justified. Regarding export intensity, I find statistically significant, positive effects of a foreign takeover. The magnitude of the effect is, however, relatively low.

Yet again, in the long run, that is several years after a foreign takeover, there may exist relevant effects. But in the context of this paper, it ist not possible to examine these long run effects. On the one hand, the observed time span and the specific data structure proved to impede such an analysis, and on the other hand, the chosen methodological framework may not be suitable for such a long-term analysis.

References

Arndt, C. and A. Mattes (forthcoming) "The Impact of Foreign Ownership on the Performance of German Multinational Firms", IAW Discussion Paper, Insitute for Applied Economic Research.

Arndt, C., A. Mattes, J. Spies, and C. M. Buch (2009) "Struktur, Determinanten und Auswirkungen ausländischer Direktinvestitionen in deutschen Bundesländern", IAW Policy Report 1, Institute for Applied Economic Research.

Arnold, J. M. and B. S. Javorcik (2005) "Gifted Kids or Pushy Parents? Foreign Acquisitions and Plant Performance in Indonesia", World Bank Policy Research Working Paper 3597, World Bank.

Bandick, R. and P. Karpaty (2007) "Foreign Acquisitions and Employment Effects in Swedish Manufacturing", Working Paper 10, Örebro University.

Barba-Navaretti, G., D. Checci, and A. Turrini (2003) "Adjusting Labour Demand: Multinational vs. National Firms - A Cross-European Analysis", *Journal of the European Economic Association*, Vol. 1, pp. 708–719.

Bellak, C., M. Pfaffermayr, and M. Wild (2006) "Firm Performance after Ownership Change: A Matching Estimator Approach", *Applied Economics Quarterly*, Vol. 52, No. 1, pp. 29–54.

Bernard, A. B., J. B. Jensen, S. Redding, and P. Schott (2007) "Firms in International Trade", *Journal of Economic Perspectives*, Vol. 21, No. 3, pp. 105–130.

Blomström, M. and A. Kokko (1998) "Multinational Corporations and Spillovers", *Journal of Economic surveys*, Vol. 12, No. 3, pp. 247–277.

Caliendo, M. (2006) *Microeconometric Evaluation of Labour Market Policies*, Berlin: Springer.

Conyon, M. J., S. Girma, S. Thompson, and P. W. Wright (2002) "The Productivity and Wage Effects of Foreign Acquisition in the United Kingdom", *The Journal of Industrial Economics*, Vol. L, No. 1, pp. 85–102.

Doms, M. and J. Jensen (1998) *Geography and Ownership as Bases for Economic Accounting*, Chap. Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States, pp. 235–255, Chicago.

Fischer, G., F. Janik, D. Müller, and A. Schmucker (2008) "Das IAB-Betriebspanel - von der Stichprobe über die Erhebung bis zur Hochrechnung", FDZ Methodenreport 01/2008, Institut für Arbeitsmarkt- und Berufsforschung.

Fukao, K., S. Hamagata, T. Miyagawa, and K. Tonogi (2007) "Intangible Investment in Japan: Measurement and Contribution to Economic Growth", RIETI Discussion Paper Series 07-E-034, Research Institute of Economy, Trade and Industry.

Girma, S. and H. Gï¿œrg (2007) "Evaluating the Foreign Ownership Wage Premium Using a Difference-in-Differences Matching Approach", *Journal of International Economics*, Vol. 72, No. 1, pp. 97–112.

Girma, S., D. Greenaway, and K. Wakelin (2001) "Who Benefits from Foreign Direct Investment in the UK?", *Scottish Journal of Political Economy*, Vol. 48, No. 2, pp. 119–131.

Girma, S., S. Thompson, and P. Wright (2006) "International Acquisitions, Domestic Competition and Firm Performance", *International Journal of the Economics of Business*, Vol. 13, No. 3, pp. 335–349.

Huttunen, K. (2007) "The Effect of Foreign Acquisition on Employment and Wages: Evidence from Finnish Establishments", *The Review of Economics and Statistics*, Vol. 89, No. 3, pp. 497–509.

Leuven, E. and B. Sianesi (2003) "PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing", EconPapers Version 1.2.3.

Markusen, J. (2002) *Multinational firms and the theory of international trade*: The MIT Press.

Mattes, A. (2010) "The Impact of Horizontal and Vertical FDI on Labor Demand for Different Skill Groups", IAW Discussion Paper 59, Institute for Applied Economic Research.

Petkova, N. (2008) "Does Foreign Ownership Lead to Higher Firm Productivity", mimeo.

Rosenbaum, P. R. and D. B. Rubin (1983) "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika*, Vol. 70, No. 1, pp. 41–55.

Sianesi, B. (2004) "An evaluation of the Swedish System of Active Labor Market Programs in the 1990s", *Review of Economics and Statistics*, Vol. 86, No. 1, pp. 133–155.

United Nations Conference on Trade and Development (2008) *World Investment Report - Transnational Corporations and the Infrastructure Challenge*: United Nations.

Wooldridge, J. M. (2002) *Econometric Analysis of Cross Section and Panel Data*: MIT Press, Cambridge MA.

Appendix

Table 12: **Balancing of matching specifications**

Variable	Sample	Specification [1] arithmetic mean switchers	control group	p>|t|	SB	Specification [2] arithmetic mean switchers	control group	p>|t|	SB	Specification [3] arithmetic mean switchers	control group	p>|t|	SB
ln Productivity	all firms	11.86	11.41	0.000	45.9	11.86	11.41	0.000	45.9	11.90	11.41	0.000	50.5
	matched sample	11.83	11.81	0.830	1.9	11.86	11.77	0.307	9.1	11.86	11.84	0.769	2.7
ln Productivity (squared)	all firms	141.87	130.94	0.000	47.5	141.87	130.94	0.000	47.5	142.64	130.91	0.000	51.6
	matched sample	140.97	140.31	0.750	2.9	141.87	139.54	0.265	10.1	141.75	140.96	0.704	3.5
ln Employees	all firms	4.11	2.99	0.000	63.6	4.11	2.99	0.000	63.6	4.15	2.98	0.000	66.8
	matched sample	4.07	4.17	0.520	-5.9	4.11	4.06	0.759	2.8	4.10	4.25	0.375	-8.3
ln Sales	all firms	15.88	14.25	0.000	71.4	15.88	14.25	0.000	71.4	15.95	14.24	0.000	75.8
	matched sample	15.80	15.88	0.700	-3.5	15.88	15.72	0.455	6.8	15.87	15.99	0.573	-5.2
Export / Sales	all firms	18.76	5.65	0.000	59.9	18.76	5.65	0.000	59.9	19.17	5.68	0.000	61.4
	matched sample	18.38	19.28	0.690	-4.1	18.76	18.57	0.931	0.9	18.61	19.77	0.623	-5.3
Export / Sales (squared)	all firms	1055.30	283.76	0.000	47.2	1055.30	283.76	0.000	47.2	1076.10	285.83	0.000	48.0
	matched sample	1032.80	1044.70	0.940	-0.7	1055.30	1027.40	0.869	1.7	1043.00	1085.40	0.813	-2.6
	all firms	mean SB 20.69	largest SB 71.39			mean SB 20.69	largest SB 71.39			mean SB 21.10	largest SB 75.78		
	matched sample	2.18	6.16			3.20	12.10			2.87	8.47		

Source: IAB Establishment Panel 2000-2007, own calculations

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