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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2016: Demographischer Wandel -
Session: Trade and Employment, No. D19-V2

Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

Suggested Citation: Schäffler, Johannes (2016) : German Direct Investments in the Czech Republic –
Employment Effects on German Multinational Enterprises, Beiträge zur Jahrestagung des Vereins
für Socialpolitik 2016: Demographischer Wandel - Session: Trade and Employment, No. D19-V2,
ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum
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German direct investments in the Czech Republic – Employment effects on German multinational enterprises

Johannes Schäffler^a

June 2016

Preliminary version, please do not cite.

Abstract

Do investments in the Czech Republic lead to employment growth or employment losses in the German firms involved? To address this question, a unique database about German firms with foreign direct investments (FDI) in the Czech Republic and firms without FDI in any country has been established. By developing a new method for linking firm-level data with establishment-level data of the Institute for Employment Research (IAB), this database is now linked with the IAB employment data. As the exact date of the investments in the Czech Republic is known, the employment development of firms with Czech affiliates and firms without FDI is compared for the same time periods. The analyses show that these groups actually develop differently. One year after the investment, the employment of multinational enterprises (MNEs) in the home country shrinks relative to the employment of the reference group. The negative trend continues for some years. However, not all types of jobs are affected negatively. The negative effects refer to medium and low-skilled workers only, whereby the demand for high-skilled workers even increases after the investment.

JEL classification: F15; F23; F66

Keywords: Economic integration, multinational firms, foreign direct investment, international trade, labor demand, skill groups, Germany, Czech Republic

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Introduction

The fall of the Iron Curtain in 1989, the enlargement of the European Union (EU) in 2004 and the liberalization of trade and factor flows have offered new business opportunities for companies based in the EU. Since the 1990s, Central and Eastern European Countries (CEEC) were one of the favourite destinations for international investments. This is not surprising as these markets are attractive for both primary motives for investing abroad. On the one hand, cost savings drive investors to Eastern Europe, where wages are still considerably lower than in Western Europe, attracting multinational enterprises (MNE) to relocate activities to cheaper sites in the east of the continent. On the other hand, the rising purchasing power in the CEEC makes them an attractive candidate for the opening up of new markets. German firms have a particular advantage because they are located close to these regions. Despite the obvious importance of this development for European countries' economies and societies, little is known about its effects, particularly not on its impact on the old EU countries. Whether public fears concerning the relocation of jobs and the deterioration of the position in competition of manufacturing industries are really justified has so far not been fully assessed. Although previous studies usually find positive or no significant effects of foreign direct investments (FDI) on MNEs' domestic labor demand, even if they differentiate in terms of target regions such as the CEEC. However, they rely on selective FDI databases, which lack small firms and/or affiliates (Pflüger et al. 2013). The contribution of this paper is the exploitation of a unique database on German FDI in the Czech Republic - the main target for German investors among the CEEC in recent decades - covering the total population of German affiliates and the corresponding German MNEs. It is based on the full Czech Commercial Register, including the dates of investment, and is therefore not subject to selectivity issues as are other studies. Because it is linked to the employment data of the German Federal Employment Agency (BA), the merged database has a longitudinal dimension, which facilitates the identification of the effects on the German parent companies. Firms without FDI in any country linked to the BA establishment data in the same manner serve as reference. The effects of FDI will be investigated by comparing these two groups regarding their employment trends. Although the analysis is restricted to a two-country relationship, it is based on the first database for Germany that is not selective in terms of the size of the parent companies or affiliates. Therefore, it allows reliable conclusions on the impact of FDI, at least for the German-Czech case.

A descriptive representation of the development of firm employment, including a differentiation in skills is presented, along with equations for firms' dynamic conditional labor demand in the short run. The key finding is that German MNEs reduce their employment level after the

investment. This leads to negative effects when they are compared to firms without FDI. These negative effects are driven by the decreasing demand for low and medium-skilled workers, and they are stronger for FDI in the Czech manufacturing industries. In contrast, MNEs' demand for highly skilled workers increases until shortly after the investment. The findings justify public concerns about offshoring and imply the risk of negative effects of investments to cheap labor countries on jobs for low-skilled and medium-skilled employees. However, it shows that a well-educated workforce can benefit from FDI even in case of great opportunities for cost-reduction investments.

The remainder of this article is structured as follows: Section 2 reviews the recent literature. Section 3 describes the data and shows descriptive statistics. Section 4 presents the econometric model, and Section 5 presents its application and the results.

Related literature

With the strong growth of FDI, a detailed investigation of its labor market effects is particularly important. Do foreign direct investments lead to job losses or to job growth on the domestic side? Which categories of jobs are affected? These are crucial questions for Germany and other advanced economies. By approaching this topic through theory, it is often distinguished between two types of FDI: horizontal and vertical FDI (Pflüger et al. 2013). Vertical FDI is often supposed to affect the domestic workforce negatively. However, reducing firm's production costs by exploiting comparative advantages and shifting part of its domestic jobs to a foreign affiliate can boost productivity and therefore increase demand for all tasks maintained in the home country (Grossman and Rossi-Hansberg 2008; Groizard et al. 2014). Similarly, there is no clear prediction in the case of horizontal FDI. In case of horizontal or market-motivated investments, the investing firm enlarges its market and thus needs more headquarters services, such as research and development, public relations, branding activities, the development of managerial activities or controlling (Markusen 2002). If at least a part of these headquarter services is conducted in the parent company, the demand of the investing company for employees that can conduct these tasks (which are more likely to be skill-intensive) increases. However, if the parent company is establishing manufacturing facilities in a foreign country to save transport costs and to serve the new market with an on-site plant, this market-motivated investment could also reduce the size of its domestic workforce when it replaces former exports in the foreign market. Various activities within the company can thus be affected differently. Here, the division of tasks within the corporate group is crucial. When

German parent companies relocate low-skilled, labor-intensive production, such as assembling, from the home base to a country with lower labor costs, workers having executed these jobs formerly become displaced. In contrast, jobs remaining in the home country can benefit from higher productivity and increasing worldwide sales. In this case, less skilled workers are more likely to be negatively affected than highly qualified employees, who in turn might benefit from rising sales.

Although underlying investment motives affect the type of impact on firms' domestic employment, even the classification into horizontal and vertical FDI provides no clear predictions about the employment effects. It is, therefore, particularly important to address this empirically. There are several empirical works based on firm-level, sectoral or regional data analyzing the effects of outward FDI on domestic employment. They find mostly a positive or at least no negative effect on total employment (see Crinò (2009) and Pflüger et al. (2013) for a comprehensive survey). Focusing on studies that compare MNEs with firms without FDI, there are also usually no negative effects, but rather positive effects of FDI on the employment at home: see Barba Navaretti et al. (2010) and Castellani et al. (2008) for Italian MNEs, Barba Navaretti et al. (2010) and Hijzen et al. (2011) for French MNEs, Hijzen et al. (2007) for the case of Japan, and Becker and Muendler (2008), Wagner (2011) and Kleinert and Toubal (2007) for Germany. It should be noted that most of this studies are restricted to MNEs that become multinational for the first time.¹ A study that reports negative effects on the domestic employment of MNEs is from Debaere et al. (2010). They find that Korean firms with their first investment in less advanced countries have smaller employment growth than domestic firms without FDI. For the three-year period following the investment, they estimate a 2% lower annual growth for Korean MNEs. In contrast, investments to more advanced countries do not lower the employment growth of Korean multinationals. Similar results are derived by Jäckle and Wamser (2010). In the three years after having invested abroad for the first time, German MNEs have a 4% lower employment growth than firms without FDI. As far as the skill composition is concerned, most studies provide evidence for skill-upgrading in the course of FDI: see for example Head and Ries (2002) for the case of Japan, Hansson (2005) for the case of Sweden, and Becker et al. (2013) and Wagner (2011) for the case of Germany. The study of Becker et al. (2013) includes also the task classification from Autor et al. 2003. They find an educational upgrading as well as an increasing share of non-routine tasks of German multinational firms after expanding their workforce in affiliates abroad. In the case of Italian multinationals, Castellani et al. (2008) identify skill upgrading only when they invest in the CEEC. In this context, the work by Marin (2004 and 2011) should be mentioned. She refers to

¹This applies to Barba Navaretti et al. (2010), Castellani et al. (2008), Hijzen et al. (2011), Kleinert and Toubal (2007), Hijzen et al. (2007), Jäckle and Wamser (2010) and Debaere et al. (2010).

a survey among 660 German and Austrian investors in Eastern Europe. In contrast to other studies, she argues that German and Austrian multinationals are shifting high-skilled jobs and not low-skilled jobs to Eastern Europe, as she detects a great difference between the share of high-skilled employment of the parent companies and their Eastern European affiliates. However, there are basic differences in the education systems between these countries that have to be considered. In particular, the dual education system, which is much less established in Eastern European countries lacking practical education within firms, might play a role here.

However, there is so far no study that exploits a comprehensive and unbiased database. Each of the above-mentioned papers uses databases that underrepresent small and medium-sized firms, or the underlying sources and the representativeness of the sample are unclear. The same applies to studies on German FDI. A standard problem of all studies that use the MiDi database from the German Federal Bank is that they cover only investments in foreign affiliates with a balance sheet of more than €3 million and at least a ten percent ownership share of the German investor. In the past, the thresholds were even higher (Pflüger et al. 2013). The Bureau van Dijk databases, such as Amadeus, Markus, Orbis and Dafne, are also confined to rather large companies. Before launching the *Elektronische Bundesanzeiger* in 2007, commercial data providers always had much more information about larger firms because information about their investments is published in business reports more often than is that of medium-sized or small firms. To see the difference, in 2011, the databases of Bureau van Dijk as well as the MiDi database contained approximately 1,000 Czech companies with a German owner. In contrast, the ReLOC database contains approximately 3,800 Czech companies having a German owner and includes many more small and medium-sized firms. The reason for this is the direct exploitation of administrative data sources such as the Czech commercial register (Hecht et al. 2013b).

Moreover, there are other sources for possible biases: in their studies, Becker and Muendler (2008) and Becker et al. (2013) identify only the headquarters of each company in the data of the BA. They do not solve the problem that the data from the BA is available at the establishment level and not at the firm level. If the employment of headquarters and their further establishments develop differently, the results become biased. This might be all the more relevant in case of large firms and therefore in the context of multinationals.

Data and descriptives

The database used for this analysis is a product of the IAB project ReLOC. It includes about 3,400 German companies with affiliates in the Czech Republic in 2010. To derive a large and comprehensive database on FDI, the Czech Commercial Register was exploited, and any actively operating firm with a German owner was identified. The owners' names and addresses were used for a record linkage procedure that is described in Schäffler (2014) in detail. It must be considered that the BA data includes no firm identifier. Therefore, it was necessary to apply a record linkage method that identifies any establishment belonging to one of the ReLOC firms. On the basis of preprocessed names and addresses of establishments and firms, the record linkage was implemented as follows: first, the names and addresses of the ReLOC companies and the BA establishments were used for the linkage. Second, only firm and establishment names were used to identify any establishment belonging to one of the ReLOC firms. This is possible, as the BA data includes for each establishment the associated firm name. The linkage with the establishment-level data of the BA resulted in 85% of the ReLOC companies in at least one assigned establishment. 30% of these firms consist of more than one establishment. Therefore, the share of multi-site establishments in this sample is relatively high. The same procedure was implemented for a reference group that consists of approximately 9,500 firms without FDI in any country. This database was provided by the survey institute TNS Infratest, which conducted the ReLOC survey (see Hecht et al. 2013b for further details). It is based on all firms listed in the German Commercial Register. The information whether a firm has a foreign affiliate refers to August 2010 and is retrieved from a commercial data provider using the same sources as Creditreform, Bureau van Dijke and Hoppenstedt, for example. It can be expected that for the vast majority the information about the non-existence of a foreign affiliate is valid also in the past. This is confirmed by the ReLOC survey, where 94% of the responding firms from the reference group indicated that they have never had a foreign affiliate (Hecht et al. 2013a). Of course, due to the lack of a comprehensive FDI database the existence of a foreign affiliate can not be ruled out completely. But in general, the share of multinationals in the total economy is still very small. According to the IAB Establishment Panel survey from 2010 (see variable r84a), only about 6% of German plants are involved in FDI.² In addition, when drawing the sample of reference firms, small firms were undersampled and medium-sized and large firms oversampled. We thus also benefit from the fact that commercial databases are reliable for large firms (Hecht et al. 2013b).

² Note that the IAB Establishment Panel covers medium-sized and large plants (and thus also medium-sized and large firms) far above average (see Fischer et al. 2008, for example).

The data linkage results in 81,524 establishment ids – 51,539 assigned to ReLOC firms and 29,985 to the reference group, which are given since the start of the notification process (January 1, 1973). These establishments are merged with the Employment History (BeH) and the Establishment History Panel (BHP) from 1985 to 2010.³ Both IAB databases are based on worker and plant characteristics that come from the notification process of the social security system. The BeH covers the total population of employees liable to social security contributions and since 1998, also employees in marginal part-time employment. The records include individual characteristics such as education and wages. The wage data are censored at the upper earnings limits of the compulsory social security system (e.g., 66,000 Euro in Western Germany, 2010). To address this, an imputation procedure suggested by Card et al. (2013) to correct the topcoded values is applied. Regarding the skill characteristics, which are sometimes reported mistaken or missing, the imputation algorithm suggested by Fitzenberger et al. (2006) is used (Imputation Procedure 3). Firm-level information on employment and wages is then derived by aggregating individual-level information. The BHP contributes further plant characteristics such as the main industry, the location and the date of foundation. It includes for each year any establishment with at least one employee liable for social security contributions, and since 1998, any establishment with at least one employee in marginal part-time employment as of June 30 (Gruhl et al. 2012). For firms with more than one establishment, a possible approach to derive company-level information is to choose the region and industry that covers the highest proportion of firm employment.

East German establishments are included in the IAB data since 1991. However, due to the time needed for the introduction of the employment notification procedure in eastern Germany, they can not be assumed to be recorded sufficiently complete before 1993 (Gruhl et al. 2012). Due the sell-off of East German firms through the Treuhand and various motives, which played a decisive role for investors particularly coming from West Germany, aggregating establishments across both former separated regions also includes employment shifts that are not driven by an increasing demand for labor but by an access to funds or low-priced real estates, for example. Therefore, for the following analysis, Eastern German plants are excluded as the analysis starts many years before the reliable coverage of East German establishments and due to the very specific circumstances of the former communist economy and its economic units. This means that for each firm only its locations in West Germany are taken into consideration, which affects mainly companies with their headquarters in East Germany, but also some multi-site companies from West Germany that set up East German locations. Moreover, for the latter, the foundation of East German plants could be even

³ The BeH was prepared by Linda Borrs, whom I would like to thank at this point.

regarded as an investment similar to that in the Czech Republic. In general, the engagement of East German investors in the Czech Republic is very low and compared to West Germany far below average (see Schäffler et al. 2016). Only about 10% of the German affiliates in the Czech Republic have an owner from East Germany.

In the final sample, with an observation period from 1985 until 2010, there are about 6,800 firms from the reference group and 2,500 MNEs that appear at least once. Figure 1 shows the investment dates of the German multinationals. For the black line, each MNE counts only once. For firms that own at least two affiliates, the earliest investment is selected. Regarding the gray line, all investments are counted. It reveals that there are two peaks that are close to important cornerstones in the history of the Czech Republic. In January 1993, Czechoslovakia was split up into the sovereign states the Czech Republic and Slovakia. In this initial period, yearly entrances of German MNEs were still increasing. Since 1995, German investments have been declining, but they rose again in the period of the accession to the European Union, which occurred in May 2004. After that, they again decreased, whereas the number of investments since 2009 is underestimated due to some time lag in reporting.

Figure 1: Year of investment



Source: ReLOC database; author's own calculations.

Table 1 reports summary statistics for the sample of firms with FDI in the Czech Republic and the reference group. For the MNE sample, the values are calculated for the first observation when they become multinational. For instance, when the date of investment is May 20, 2001, firm characteristics are based on June 30, 2001. Because the actual investment date is not recorded or not unambiguously identifiable in the Czech commercial register in some cases,

the number of observations is below 2,500.⁴ For firms from the reference group, any observation from 1990 to 2010 is included.

On average, firms without FDI are clearly smaller than firms from the MNE sample. Moreover, MNEs pay slightly higher wages and employ a higher share of employees with tertiary education and a lower share of medium-skilled and low-skilled workers. Low-skilled employees are those without vocational training or a high school degree. Medium-skilled employees have a vocational qualification or high school degree. Employees with a degree from a university or a technical college are classified as high-skilled. Regarding the industry affiliation, the groups do not differ remarkably.

Table 1: Basic firm characteristics

Variable	Reference (n=6,800)		MNE (n=2,145)	
	Mean	Std.	Mean	Std.
Number of total employed	186.616	417.471	672.356	5803.530
Number of full-time equivalents	172.244	365.764	646.255	5592.920
Number of full-time employed	156.320	317.669	613.021	5340.564
Average daily gross wage	83.378	36.822	96.382	43.466
Average wage high-skilled	149.768	71.540	160.452	63.744
Average wage medium-skilled	81.840	29.834	91.270	36.013
Average wage low-skilled	55.055	23.689	61.707	29.921
Share of high-skilled	0.087	0.153	0.135	0.189
Share of medium-skilled	0.758	0.199	0.727	0.207
Share of low-skilled	0.141	0.160	0.124	0.148
Share of manufacturing firms	0.430	0.495	0.459	0.498
Share of service firms	0.459	0.498	0.434	0.496

Source: ReLOC database; author's own calculations. Note: Wages and skill-specific shares are calculated on the basis of full time employees.

Although the mean number of employees in MNEs is relatively high, compared to the MiDi database, it is small. To see the difference, for the sample of multinationals of Becker and Muendler (2008), average employment is approximately 2,600. As already mentioned, the MiDi database includes larger FDI projects only. This is of special relevance here because of being close, in distance, to the Czech Republic. For that reason, the transaction and information

⁴ There are some cases where the MNE doesn't occur in the IAB data before or in the year of the investment. The reason is that the ReLOC sample refers to investors in 2010 only. This gives rise to specific cases that can't be treated properly and, therefore, should be excluded: Before the firm in the MNE sample was recorded as owner in the Czech Commercial register, another investor that is affiliated with the recent one was already registered in the Czech Commercial Register, whereas the recent owner didn't exist when the predeceasing investor conducted the investment. Especially in this case, the proper observation unit is the whole corporate group, which is not available. Therefore, the MNE sample is restricted to those firms that had already occurred in the IAB data before or in the year of the investment.

costs are lower, and thus smaller firms can also afford to set up foreign affiliates. This assessment is supported by Buch et al. (2005), who find that foreign affiliates of German companies are remarkably small in the CEEC. They interpret this finding as evidence that small and medium-sized German firms take particular advantage of these nearby investment locations.

The great difference in firm size is considerably smaller when firms with more than 1,701 full-time employees -the 99% percentile of the reference group - are dropped (see Table 2). This is because of the exclusion of some exceedingly large multinationals. Other firm characteristics barely change. The fact that there is not too much difference left comes also from a previous sample adjustment of the reference group. To ensure that there are enough firms that are basically comparable to MNEs, small firms were undersampled and medium-sized and large firms oversampled (Hecht et al. 2013b).⁵

Table 2: Basic firm characteristics without exceedingly large firms

Variable	Reference (n=6,732)		MNE (n=2,035)	
	Mean	Std.	Mean	Std.
Number of total employed	162.467	231.717	176.652	287.790
Number of full-time equivalents	149.890	202.784	169.247	271.488
Number of full-time employed	136.259	184.744	160.596	258.945
Average daily gross wage	83.110	36.635	95.435	43.757
Average wage high-skilled	149.160	71.438	157.981	63.806
Average wage medium-skilled	81.647	29.750	90.553	36.500
Average wage low-skilled	54.818	23.565	60.793	30.547
Share of high-skilled	0.087	0.154	0.135	0.192
Share of medium-skilled	0.759	0.200	0.728	0.210
Share of low-skilled	0.141	0.160	0.122	0.150
Share of manufacturing firms	0.429	0.495	0.445	0.497
Share of service firms	0.460	0.498	0.447	0.497

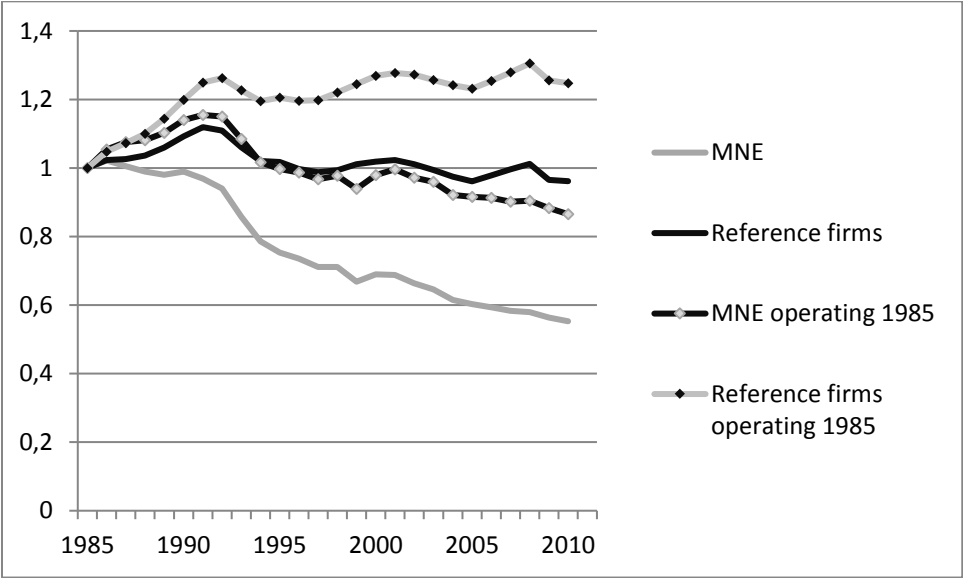
Source: ReLOC database; author's own calculations. Note: Wages and skill-specific shares are calculated on the basis of full time employees.

Figure 2 displays the development of average firm size since 1985 for both groups. Until the early 1990s, multinational firms' employment remained quite stable, but subsequently, it fell. Regarding the reference group, firm employment grew until the peak of the economic boom in 1992. After that, it decreased slightly, reaching again its initial level of 1985. However, these numbers must be interpreted carefully, as not all firms already operated in 1985 and new

⁵ To be certain that this did not induce a selection bias, in a robustness check, all firms that belong to the class that was oversampled (>199 employees in 2010), in particular, were excluded from the empirical analysis. The results presented later do not change considerably.

established firms lower the average firm size. Yet, when including only firms that already operated in 1985, the conclusions are basically the same. After the employment followed a similar development for some years, that of the reference group increased slightly, reaching in 2010 its level of 1991, while that of the MNE group declined. Accordingly, since the 1990s, there appears a clear difference in the trend of firms with investments in the Czech Republic and firms without FDI.

Figure 2: Employment development of MNEs and non-MNEs



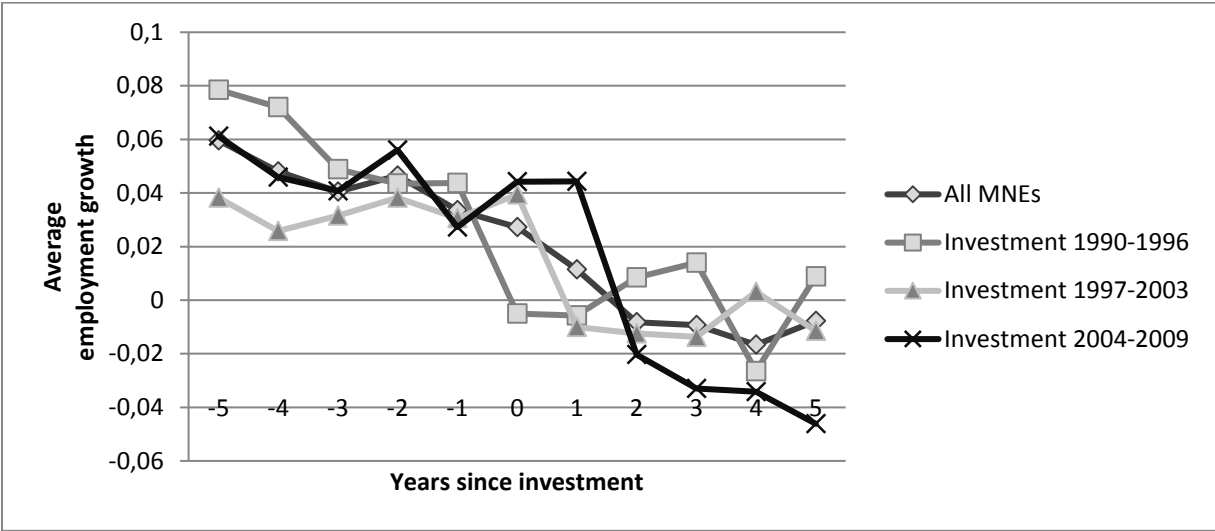
Source: ReLOC database; author's own calculations.

The employment trend of German firms without FDI reflects the general business cycle with minor differences, as labor demand responds with some time lag to GDP. It illustrates the boom in the early 1990s, the recession in 1993, and the subsequent period with a relatively stable growth ending in a peak in 2000. The next cycle had his climax shortly before the current economic crises, which started in 2008.

Turning toward the MNEs and their evolution close to the investment, we can state that they increased their employment prior to the investment (see Figure 3).⁶

⁶ The growth rates are calculated on the basis of full-time employees, but there are no notable differences when part-time and minor employment is considered. To ease the interpretation by constructing positive and negative growth equally, the average of the values in t and t-1 are in the denominator. The range of values lies between -2 and 2, instead of -1 and +∞, and creates symmetry around zero (Davis et al. 1996: 190).

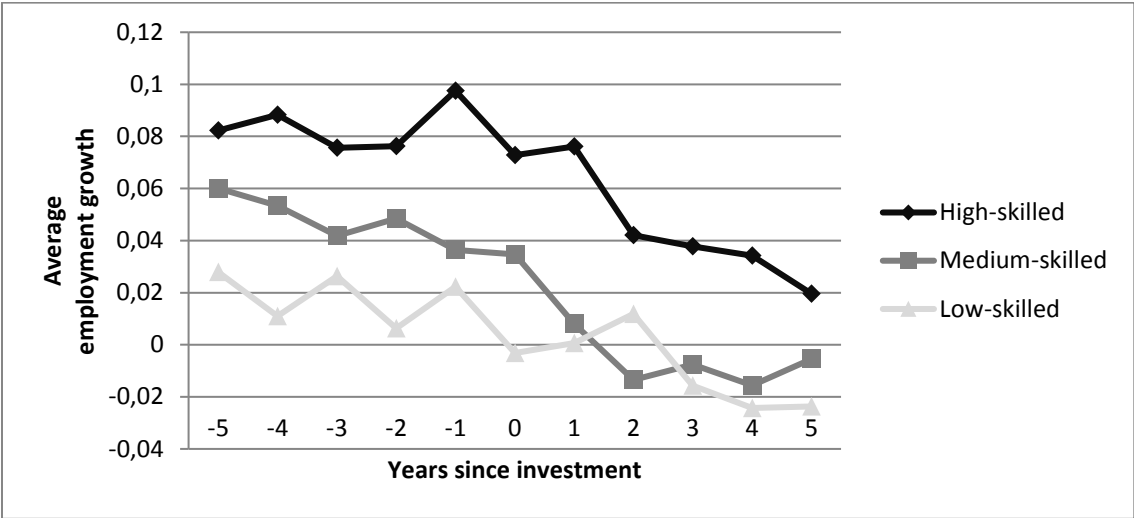
Figure 3: Employment growth of MNEs



Source: ReLOC database; author's own calculations.

It is striking that the employment growth changes fundamentally shortly after the investment. On average (each firm gets the same weight whether large or small), it even becomes negative two years after the investment. This pattern holds for any cohort with minor differences. For example, firms that invested between 1990 and 1996 experience this slump in the year of investment and thus one year earlier than the subsequent cohort and two years earlier than the latest cohort. Differences regarding the magnitude of growth rates might be explained by business cycles. The German economy grew relatively strongly in the late 1980s and in the early 1990s, while later on, until 2003, growth rates were modest by contrast. Part of the employment losses of the last cohort are caused by the economic crisis. The average growth rate for all observations since the investment – this includes also the one from the year of investment - is nearly zero (0.06%). Starting one year after the investment yields mean growth below zero (-0.5%). However, this pattern does not apply for each skill group in the same manner (see Figure 4). There are remarkable differences in the employment trends. For all skill groups, the number of employees increased before the investment. However, afterwards, jobs for medium-skilled and low-skilled workers decreased, while the growth rate for high-skilled employment remained clearly positive. The average over all observations since the investment reveals employment losses for low-skilled workers (-0.8%), but not for medium-skilled workers (0.1%) as their stock still increased in the year of investment. By starting one year after the investment, mean growth of medium-skilled employment was also negative (-0.6%).

Figure 4: Employment growth of MNEs - Skills



Source: ReLOC database; author's own calculations.

To summarize, with the beginning of German-Czech investment relations, those firms being involved exhibited a worse employment development compared to a group of firms without FDI. The reduction after the investment occurred for low-skilled and medium-skilled employment. At this point it should be noted again that the ReLOC sample represents a positive selection of German firms with investments in the Czech Republic because it is based on investors that had an affiliate in 2010. MNEs that had invested in the past but had been liquidated or closed down their Czech affiliate in the meanwhile are not part of this sample. Therefore, it is necessary to use a comparison group consisting of firms operating in 2010 as well. Whether the conclusions also apply in a multivariate setting that allows one to control for other firm characteristics will be the subject of the next chapter.

Econometric analysis

Following the standard approach in the literature firm's dynamic conditional labor demand in the short run is estimated assuming capital stock and output to be quasi-fixed. The labor demand is derived from the decision-making process of a firm, which depends on firm's expectations. It is assumed that companies want to maximize their profits. Therefore, initially the revenue function is derived. The dynamic model follows Kölling (1998) whose presentation is based on that of Sargent (1978) and Nickell (1986). Starting with the production function of a firm,

$$F(N_t) = a_1 N_t - 0.5 a_2 N_t^2 \quad (1)$$

with N_t as firm employment. N_t is the only factor of production which can be changed. Other factors, such as the capital stock, are assumed to be quasi-fixed. If a firm is in a situation where the employment input deviates from the optimal level, due to production or wage shocks, for example, it needs time and material expenses to approach in the long-run the profit-maximizing level. The costs of adaptation are described by the convex function (Sargent 1978):

$$C_t = \frac{c}{2} (N_t - N_{t-1})^2 \quad (2)$$

The costs for adjustment increase more than proportionally with the difference between N_t and N_{t-1} . Under these assumptions firms maximize the following profit (Nickel 1986; Sargent 1978):

$$\Pi = \sum_{t=0}^{\infty} b^t \left\{ a_1 N_t - 0.5 a_2 N_t^2 - w_t N_t - \frac{c}{2} (N_t - N_{t-1})^2 \right\}, \quad (3)$$

$0 < b < 1$.

Π represents the profit of a firm with b as the discount factor for future values. Following the standard model with rational expectations (Sargent 1978), the structure of the equation to be estimated is

$$N_t = \mu_1 N_{t-1} + (1 - \mu_1) \frac{(1 - b\mu_1)}{(1 - \rho_w b\mu_1)} N_t^* + (1 - b\mu_1) \theta_t \quad (4)$$

with θ_t as error from the expectation formation, μ_1 as solution of the characteristic polynomial of the Euler equation, ρ_w as parameter of the autoregressive process of the expectation formation ($0 < \mu_1 < 1$, $0 < \rho_w < 1$) and N_t^* as the optimal level of employment. This results in the equation

$$N_t = \alpha_1 N_{t-1} + \alpha_2 N_t^* + v_t, \quad (5)$$

$0 < \alpha_1 < 1, 0 < \alpha_2 < 1$ und $\alpha_1 + \alpha_2 < 1$.

To bring the equation into a form that can actually be estimated, it is necessary to make assumptions on the long-run (optimal) level of employment N^* . Using a Cobb-Douglas production function, the long-run labor demand is

$$\frac{\partial F(N,K)}{\partial N} = \alpha \frac{F}{N} \quad (6)$$

$$\rightarrow N^* = \alpha \frac{pF}{w}$$

with $F(\cdot)$ as production function, K as capital stock, w as nominal wage, p as the price level and α as partial elasticity of production from the Cobb-Douglas production function.

Formulating (5) in logarithm and replacing N^* results in:

$$\ln(N_t) = \alpha_1 \ln(N_{t-1}) + \beta_0 + \beta_1 \ln(\text{sales}_t) + \beta_2 \ln(w_t) + v_t, \quad (7)$$

which is the basis for subsequent regressions with the restriction that the ReLOC data does not provide information on firm sales. Accordingly, the employment of firm i in year t is regressed on its lagged value ($t-1$) and the average wage (in t and $t-1$), both transformed in natural logs.

$$\ln(N_{it}) = \beta_0 + \beta_1 * \ln(N_{it-1}) + \beta_2 * \ln(w_{it}) + \beta_3 \ln(w_{it-1}) + \sum_{j=0}^n \eta_j * X_{it-j} + \quad (8)$$

$$\sum_{j=1}^{11} \gamma_j * \text{inv}_{-j} + v_{it}$$

X represents further firm controls. For a better comparability of firms, the share of high-skilled employees and routine intensive occupations in $t-1$ and firm age is included. Likewise in Dauth et al. (2014), routine intensive occupations are represented by basic activities in the taxonomy of Blossfeld (1987). This includes unskilled manual occupations, unskilled services and unskilled commercial and administrative occupations. Firm age is calculated as number of days since first occurrence in the BHP. This characteristic is left-censored as the BHP starts on June 30, 1975. For firms with at least one establishment that has existed since the beginning, a dummy named *BHP_1975* obtains the value 1, while the age variable is set to zero. Furthermore, dummies for year, region, industry and legal form are incorporated. The regional dummies refer on spatial planning regions, a functional aggregation of districts to 96 regions based on commuting linkages. On the basis of the company names, six dummies are created that control for the legal form. They correspond to the classification that is used for the IAB Establishment Panel (Städele and Müller 2006). The six categories are: 1. sole proprietorship; 2. partnership (*KG, OHG, GbR*); 3. private limited liability company (*GmbH*) or private limited liability company & Co. limited partnership (*GmbH & Co. KG*); 4. stock corporation (*AG, KGaA*); 5. statutory corporation, foundation; 6. others, such as incorporated cooperative (*eG*) and registered association (*e.V.*). Statutory corporations and foundations are not represented in the ReLOC data, so that four dummies are required. Industry dummies are

based on the 31 subsections of the WZ 93 classification (see Statistisches Bundesamt 2002). To derive a uniform industry classification during the observation period, the extrapolation of industry codes provided by Eberle et al. (2011) is used.

Each variable is calculated at the firm level. In case of two or more establishments per firm, the number of employees is totaled. For firm wage, averages are calculated. For firms with more than one establishment, the region and industry that covers the highest proportion of firm employment is chosen.

The main interest is on dummies indicating the years since or until the investment (*inv_j*). These investment dummies are designed to cover an observation period of eleven years, starting five years before and ending five years after the investment. In case of investors with more than one Czech affiliate and different investment dates, this refers to the first investment, which applies to 235 cases. The observation period is chosen in this way because part of the effects might not arise directly after the investment, but some years later. Of course, there might always be an incentive to relocate jobs, even when the investment occurred a long time ago. However, the longer the observation period after the investment, the stronger the representation of firms that have invested in the early transition years. For example, a dummy indicating that a firm had invested ten years ago starts up only for firms with investments before 2001. Furthermore, the initial effect of the investment vanishes over time, while the risk for picking up developments that are not influenced by the investment itself increases. Therefore, the length of the observation period is restricted. This applies to the period before the investment too. Mapping the preceding trend is useful for understanding that afterwards and for obtaining a complete picture. Planning to invest abroad could induce adjustments in advance. In addition to this period of eleven years, no observation of the MNE group is considered in the following estimations. Consequently, for observations of the MNE group, there is always one investment dummy that obtains the value 1. In contrast, only firms without any kind of FDI (in 2010) serve as reference. For them, the investment dummies are always set to zero. Thus, the coefficient of each investment dummy indicates c. p. the percentage difference regarding the employment level between the MNE and the reference group in the respective period.

Information about capital stock or firm output is not available. Both characteristics are part of firms' labor demand, but in the short run, they can be assumed constant. If there is further unobservable firm heterogeneity that influences the employment level in t , at least part of it will be caught by its lagged value. In addition, due to the approach of comparing MNEs with firms from a suitable reference group, the results are only biased when unobserved determinants of

firm-specific labor demand, such as capital or total factor productivity, change diversely across both groups within one year given the other control variates. To exploit the unique database and to evaluate the effects of the investment based on the total population of German affiliates as clear as possible, different estimation methods are applied: pooled OLS, fixed effects with and without lagged dependent variable and the system GMM estimator (see Blundell and Bond 1998). Some comparable studies use propensity score matching or combine propensity score matching with diff-in-diff estimations (see Barba Navaretti et al. 2010 and Debaere et al. 2010). According to Angrist and Pischke (2009), the differences between matching and regression are unlikely to be of major empirical relevance when the treatment is binary. Regression can be seen as a type of propensity-score weighting, so the difference is mostly in the implementation. Both methods are control strategies where the conditions for causality are based on the same assumptions. What distinguishes this approach is confounding on the pre-year characteristics. In the case of matching and diff-in-diff regressions, the construction of the control group is based on pre-treatment characteristics. Therefore, it must be assumed that unobservable characteristics are time constant for the respective estimation period. The ReLOC database, however, does not include firms' capital stock, for example, which is an important explanatory variable. Assuming it to be constant for many years might be too strong. Moreover, firms need to respond at any time on changing conditions. Therefore, it seems to be most appropriate to build estimations on changes from one year to another. To assure that there is no problem with the common support assumption, in robustness checks, exceedingly large firms are dropped.

Table 3 reports the estimation results of pooled OLS. Apart from the investment dummies, all explanatory variables have the expected signs and are in the expected range. The coefficient of lagged employment is close to 1, indicating a highly persistent employment level of German firms. Therefore, moving the lagged dependent variable to the left side of the equation would yield almost identical results for all other explanatory variables. As a consequence, the coefficients of the investment dummies can be also interpreted as differences in employment growth. The wage in t representing the costs of employment affects firms' labor demand negatively. By including recent employment costs, the wage in $t-1$ becomes a measure for productivity and impacts future labor demand positively. Turning toward the eleven investment dummies (see column 2), in comparison to the reference group, MNEs' employment rises before the investment, but falls afterwards.⁷ The positive development prior to the investment points to self-selection of the most productive firms into investment. This is in line with

⁷ The dummy *investment in this year* takes on the value 1, if the investment is less than one year ago. For instance, when the date of investment is March 1, 2001, firm characteristics are based on June 30, 2001. In the subsequent year (June 30, 2002), the dummy *investment 1 year ago* takes on the value 1, and so on.

theoretical considerations by Helpman et al. (2004), who show that only the most productive firms conduct FDI. Assuming a monotonic relationship between productivity and firm size (as, for example, conducted by Antras and Helpman 2004), there is a positive correlation between firm size and the decision to invest abroad. Hence, MNEs are not only basically larger at the date of investment but still increase their employment five years before their foreign engagement. Despite these plausible arguments for a selection effect, there is also an alternative explanation. Maybe multinational firms back up their domestic workforce because they need more headquarters services already in advance for planning and building up their foreign subsidiary. The further rise two years before the investment might indicate that, however, it is rather small and the coefficients are not significant. In this case of German FDI, the preceding growth is not lasting. Instead, the investment marks a turning point. One year after the investment, the labor demand of German multinationals is below that of the reference group. During the five years after the investment, the estimated differences between MNEs and non-MNEs range from -1.5% to -3.1%. In an alternative specification, the dummies indicating the period before the investment and those indicating the period after are replaced by one dummy to calculate the average difference (Table 3, column 1). A difference of 2.3% per year indicates a total loss of 11.5% after 5 years. Accordingly, there is clear evidence for a negative trend after the investment. What is striking is the similarity with the results in the study from Debaere et al. (2010) about Korean MNEs. They find, for a period of three years since the investment, a 2% lower annual growth for multinationals compared to firms without FDI, when they set up affiliates in less developed countries, which is a similar situation like in the case of German investments in the Czech Republic.

When adding investment dummies, such as *inv_since_6* and *inv_since_7*, the coefficients' signs are still negative, but they are not significant. Being aware that the ReLOC database includes no information about investments in other countries, we can at least suppose that negative effects occur up to five years after the investment. After that, there are no further job losses. It is often argued that efficiency-seeking investments might lead to positive effects in the long run, as it takes some time until gains in efficiency and competitiveness are realized (Barba Navaretti et al. 2010). In line with this, some studies find evidence for a positive impact in case of FDI in low-income countries that arises after some time lag (Barba Navaretti et al. 2010, Hijzen et al. 2011). In this case of German direct investments in the Czech Republic, there is no evidence for a positive impact on total firm employment in the long run. Even the extension of the observation period until ten years reveals no positive significant coefficient of the investment dummies.

So far, the estimation method is pooled OLS with lagged dependent variable. In the following, fixed effects estimations are applied. When the lagged dependent variable is excluded from the fixed effects estimations, both models are not nested and they use alternative identifying assumptions (Angrist and Pischke 2009). In the case of the lagged dependent variable model, one assumes that an omitted variable bias comes not from a time-invariant unit-level factor, but from time-varying pre-treatment trends. On the other hand, conditioning on fixed effects controls for all unit-specific factors that are constant over time, whether observable or unobservable. In subsequent fixed-effect estimations without a lagged dependent variable, the last observation before the investment will serve as reference to estimate the differences in changes over time across both groups. For this purpose, the observation period for MNEs is now restricted to six years and only those MNEs are included that occur already one year before the investment in the IAB data with at least one full-time employee. Consequently, the reference firms are included from 1989 to 2010 because the first investment occurred in 1990. The coefficients of the investment dummies are different from those in Table 3. In specifications without the lagged dependent variable, they picture the deviation from the last observation before the investment relative to the reference group. The estimations indicate a relative loss of 5.2% five years after the investment (in case the MNE still has at least one full-time employee) (see Table 4, column 1). However, as the previous analysis revealed the turning into a negative trend indicating a substantial change in firm behavior one year after the investment, it could be argued that MNEs react with some time lag. In this case, the samples need to be adjusted accordingly. For MNEs, the within estimations starts with the investment year as reference, while the reference sample starts 1990. As expected, the coefficients of the investment dummies become larger, indicating a loss of 6.4% after five years (see Table 5, column 1).

However, past values of firm employment determine its recent level and are time-varying confounders that cannot be subsumed in a time-constant fixed effect. Hence, the estimation is conducted combining fixed effects and the lagged dependent variable model. Again, the results are similar to those in Table 3, whereas the negative coefficients of the investment dummies tend to be larger in magnitude (see Table 4, column 2, Table 5, column 2 and Table 6). At the same time, the positive coefficients of the investment dummies are smaller. Accordingly, the estimations in Table 6 that also take into account the period before the investment do not support the former findings of an overall positive trend before the investment.⁸ Asymptotically, in the case of pooled OLS, the coefficient of the lagged dependent variable is biased upwards, and in the case of fixed effects estimation, it is biased downwards (Nickell 1981). The same

⁸ Compared to the pooled OLS regressions that do not calculate fixed effects, the observation period starts one year earlier to identify the coefficients for each of the eleven investment dummies.

applies to the investment dummies when their coefficient is below zero. This relationship is interchanged when the coefficient is above zero (Harris et al. 2008). This means that the coefficients of the investment dummies from pooled OLS and fixed effects estimations (with a lagged dependent variable) indicate an upper and lower bound for reliable results. Another estimation method for dynamic equations, such as for labor demand, is the Generalized Method of Moments (GMM). It addresses the problem that explanatory variables, such as the lagged dependent variable, are correlated with the error term, if there is a fixed effect. The basic idea is to instrument them with some of their earlier lags (t-2 or deeper). In case the dependent variable is close to a random walk, the application of the system GMM estimator (Blundell and Bond 1998) is suggested. It combines moment conditions for the model in first differences with moment conditions for the model in levels. In the first specification (see Table 7, column 1), the coefficient of the lagged employment is within the range of OLS and the within estimator. The same applies to the coefficients of the investment dummies. The slightly positive trend for multinationals prior to the investment disappears. To address the rejection of the null hypothesis of second order correlation of the errors at the 5% significance level (p-value: 0.015), another specification is estimated including also the second lag of firm employment as explanatory variable (see Table 7, column 2). Here, the null hypothesis is not rejected (p-value: 0.219), but the coefficients of the investment dummies and lagged employment are now outside the expected range. The result of the Hansen test points to a reasonable explanation, as it indicates that the instruments, as a group, don't appear exogenous (p-value: 0.001). If there is a firm-specific fixed effect, such as managerial skills or the level of innovation, it is likely to be correlated with the decision to invest, and, as a consequence, with the investment dummies.

Therefore, in the following, the basic estimation method is pooled OLS. Unlike the within estimator without a lagged dependent variable, OLS reveals short-term dynamics and, compared to within estimations with lagged dependent variable, tends to indicate a lower bound for negative effects. Instrumental variable estimation methods such as the dynamic system GMM estimator require exogeneous instruments. As we have seen, in this case, this is a strong assumption which is violated when the decision to invest is endogenous. Yet, each estimation method leads to the same conclusions, as there is always a clear negative trend after the investment.

Robustness checks

Continuing with robustness checks regarding the specification of the sample and the dependent variable, first, firm variables are calculated on the basis of all establishments, whether from East Germany or West Germany (see Table 8).

Second, instead of full-time employment, the number of full-time equivalents is used as dependent variable (see Table 9). The IAB data includes information on individual working time status, but not on the number of working hours. The different options are full-time, minor part-time (less than 18 hours) and major part-time (between 18 and 39 hours). Following Dauth (2014), full-time equivalents are calculated by weighting minor part-time with 16/39 and major part-time with 24/39.

Third, exceedingly large firms are dropped (see Table 10). In doing so, the 99% percentile of the maximum size of the reference firms during the observation period, which is 1,701 full-time employees, is the threshold. Each firm from the reference and MNE group exceeding this value at least once during the observation period is excluded. This applies to 110 MNEs and 68 reference firms. The great difference in firm size becomes considerably smaller (see Table 2).

Fifth, the MNE sample is split into three cohorts of equal length and with a similar number of MNEs: investments between 1990 and 1996 (641 MNEs), investments between 1997 and 2003 (657 MNEs) and finally, investments since 2004 (803 MNEs) (see Table 11 to 13). It could be supposed that first movers and latecomers had been affected differently because they faced other challenges when they established their affiliates in the Czech Republic. In addition, an over time shrinking wage and purchasing power gap is likely to come along with a higher importance of market-seeking and a lower importance of efficiency-seeking motives. The fragmentation into different cohorts considers also the specific development during the financial crisis, in which the number of those employed in Germany declined after 2008. Estimations for the first two cohorts are not affected by this shock because their observation periods end between June 30, 2001 and June 30, 2008.

For each specification, the results for the coefficients of the investment dummies are very similar to those of the baseline model. Concerning the estimations for different cohorts, the significances are generally lower, yet this can be explained by less observations and therefore less statistical power. For the last cohort, for instance, dummies indicating the investment five or four years ago cover only MNEs with investments in 2004 or 2005. However, for each sample, there is at least one coefficient for the period after the investment that is significantly negative. Likewise in the descriptives (see Figure 3), for the first cohort, the negative

development started earlier as the coefficient for the investment year is significantly negative. For the second cohort, this trend starts one year later, and it starts two years later for the most recent investors. This might reflect higher risks for frontrunners that entered the Czech Republic in the early stage of the economic transformation, some of them even before the dissolution of the former Czechoslovakia in 1993, when uncertainty was particularly high. Investment risks diminished substantially during the second subperiod, which is also reflected by a remarkably improving rating by the International Country Risk Guide. Since the accession to the European Union in 2004, investment conditions have improved further (Mühlen and Nunnenkamp 2011).

Skill levels

According to theory and empirical evidence, not any type of job might be affected in the same manner. On the one hand, it is easier to offshore routine tasks and therefore more medium-skilled and low-skilled jobs. On the other hand, particularly in the early years of the transformation, the technological and educational level lagged behind that of Western economies. Therefore, it is unlikely that German firms preferred to relocate working steps that require many highly skilled workers. Moreover, firms that realize efficiency gains by reducing costs of production are able to cut prices, which increases their sales (in case all other determinants remain constant). Due to the expansion, they need more crucial services, such as management, marketing, and R&D services. If at least part of these headquarters services are conducted in the parent company, the demand of the investing company for employees that can conduct these tasks, which are more likely to be skill-intensive, increases. In this case, multinational enterprises are exporters of knowledge-based services (Markusen 2002). If it is planned that the affiliate obtains other inputs and complementary products from the parent company for its production, the demand for the respective workers at home increases further (Barba Navaretti et al. 2010). In this German-Czech case, German inputs are supposed to be more high-skilled intensive.

Following the basic model, there are several options to identify skill-specific effects. One is to focus on relative measures, such as the share of wage costs of the respective skill group in the total wage bill (e.g., Head and Ries 2002, Hansson 2005) or the share of workers related to a skill group in total employment (Hijzen et al. 2005, Ekholm and Hakkala 2006). Another opportunity is to estimate the labor demand for different skill levels separately (e.g., Elia et al.

2009, Driffield et al. 2009, Bajo-Rubio and Diaz-Mora 2015).⁹ The advantage of the latter is that it allows to identify the impact on skill-specific labor demand in absolute terms and not only in relation to other skill groups. Moreover, it is more comparable to the estimations for total employment, so we can draw conclusions on what drives the results for total employment. Thus, the number of employees for each skill group serves as dependent variable, setting up on the estimation equation for total employment. As firms' labor demand for a factor of production is affected by the costs of each input, wages for other skill groups are included as explanatory variables too. To consider that some firms do not employ workers of all skill types, dummies are created taking the value 1 when there is no employee in the respective skill group. The natural log of the skill-specific wage is then set to 0. Interactions between these dummies proved to be insignificant for the results and are therefore not included.

Tables 14 to 16 present the results. The skill-specific trends are clearly different. In comparison to the reference group, the demand for low-skilled and high-skilled employment increases some years before the investment, whereas this applies to high-skilled employment in particular.¹⁰ The negative trend after the investment appears for low-skilled and medium-skilled employment only, whereas it seems to be more significant for the latter. The demand for highly skilled labor still increases in the year of the investment as well as one year after. This shows a skill-upgrading process before and, in particular, after the investment. This is supported by regressions with the share of high-skilled labor as dependent variable (Table 17). Prior to the investment, in the multinationals, high-skilled employment is the factor that increases the most and therefore in relative terms. Afterwards, the number of highly skilled workers still increases or remains constant while low and medium-skilled employment decreases in absolute terms.

The results do not support the findings from Marin (2004, 2010), who argues that German firms are relocating high-skilled jobs to the CEEC, but are in line with most other studies that find evidence for skill upgrading, particularly in the case of investments in low-income countries. The fact that medium-skilled employment seems to be most affected by the negative trend suggests additional explanatory power by the task-based approach, which was initially used to explain the polarization in the US and UK labor markets, where high-income and low-income

⁹ What affects any types of measures is that SUR regressions are not practical because many (44% and 37%, for MNEs and non-MNEs, respectively) observations are lost unless the skill-specific wage is not excluded from the regressions. That is because each observation where a firm any skill group at least one full-time employee is dropped, as skill-specific wages are not fully defined in a proper way. This always applies to the wages of the skill that is represented by the dependent variable in the respective equation. In contrast, wages of other skill groups can be treated like censored predictor variables.

¹⁰ In fixed effects estimations such as those in Table 6, for low-skilled employment, the positive significant coefficient prior to the investment becomes insignificant. The positive trend for high-skilled employment remains significant, albeit to a lesser extent.

jobs had higher growth rates than those in the middle of the income distribution (Acemoglu and Autor 2011; Autor et al. 2006; Goos and Manning 2007). Whether jobs can be performed by computers or can be relocated to foreign locations depends on their routine content. The basic idea is that there is no perfect correlation between job substitutability and skills. There are low-skilled jobs that cannot be replaced because they include personal interactions and physical presence, for example. Therefore, there are many jobs in the low-income segment of the labor market that are not at risk of being relocated to foreign countries, such as cleaning, catering, hairdressing and security services. Instead, many jobs for medium-skilled workers, such as administrative clerks or even highly trained specialists are easily offshorable (Blinder 2009). The proportion of computer users is particularly high among those with secondary education (see Spitz-Oener 2008), which makes their jobs attractive for being relocated abroad if no physical presence is needed.

To check the results for robustness, seemingly unrelated regressions (SUR) that refer to the entire sample are applied. Therefore, wages are excluded, and the dependent variable is now the natural log of the number of employees in the respective skill group plus one. The results are presented in Tables 18, 19 and 20. They are very similar to the former ones. The only difference is that the coefficients of the investment dummies are in some cases more significant. This applies to low-skilled and high-skilled employment in particular. The reason is that also those observations where a firm has no employee in the respective skill group in t or $t-1$ are considered. Moreover, by assessing the entire sample, statistical power increases. This least affects estimations for medium-skilled, because most firms (99%) employ at least one medium-skilled worker during the observation period, while 14% exhibit no low-skilled and 19% no high-skilled employee. Accordingly, in contrast to the previous estimations (Tables 14 to 16), a stronger affection of medium-skilled employment by the negative trend after the investment is not found here.

Manufacturing and service FDI

Based on the ReLOC survey, the results in München et al. (2014) indicate that in the manufacturing sector, technologically advanced activities remain concentrated at the German MNEs. Instead, the German affiliates provide – even in comparison to domestic Czech firms – many manual routine jobs. In the case of investments in the Czech service sector, German affiliates and parent companies are not different regarding their factor requirements. Thus, we conclude that for service FDI, the horizontal model dominates, while for the manufacturing sector, it is clearly the vertical model. Therefore, the question arises, whether the sectoral affiliation leads to different effects on the domestic workforce. In the case of parent companies from advanced countries, vertical FDI is expected to cause a relocation of low-skilled, labor-

intensive production to foreign locations with lower costs of labor. In contrast, horizontal FDI is conducted to serve a foreign market on site where MNEs engage in the same activities in different locations, creating the same type of jobs abroad. These assumptions correspond to our findings (Münich et al. 2014). Furthermore, studies on service offshoring show that so far, it is a less significant phenomenon. The share of foreign intermediate service inputs is relatively small, and it appears that there are only minor effects on the domestic workforce (Amiti and Wei 2005, Geishecker and Görg 2013, Amiti and Wei 2009, and Liu and Trefler 2008). Accordingly, the part of cost-reduction investments is clearly smaller in the case of service FDI. In the ReLOC survey, among participants with investments in the Czech manufacturing sector, 75% named the reduction of costs as their principal investment motive, whereas among those with affiliates in the Czech service sector, only 21% indicated that. A separation regarding the sector (manufacturing or service) of the parent company reveals no further differences.

Interestingly, the simple assignment to manufacturing and service FDI is much more highly correlated with the survey-based classification into cost-reduction and market-oriented investments than measures that rely on the assumption that the investment is horizontal if the affiliate operates in the same industry as the parent company and vertical otherwise (see, for example, Buch et al. 2005). Such measures are not even significantly correlated with managers' statements on their principal intention to invest in the ReLOC survey. A general problem of this type of measure is that it relies on the level of aggregation of industry codes. When they are highly aggregated, intra-industrial sourcing of foreign labor is classified as horizontal FDI. When they are highly disaggregated, a slightly different industrial affiliation of the domestic and foreign location leads to a classification of vertical FDI. Moreover, such sensitive measures need exact reporting and detailed information on the principal activity of the parent company and the affiliate.

To test whether there are differences between manufacturing and service FDI and to clarify whether the negative development after the investment is driven by parent-affiliate relationships with mainly vertical feature, two types of investment dummies are created. The first type indicates whether the Czech affiliate is operating primarily in the manufacturing sector (718 MNEs), and the second type indicates that the Czech affiliate is operating mainly in the service sector (1,299 MNEs). Affiliates from the construction (25 MNEs) and the primary sector (58 MNEs) or with missing information (1 MNE) are excluded. The NACE codes come from the Czech Business Register retrieved in December 2009. Therefore, it is assumed that the

principal activity of the Czech affiliate remains constant during the investment of the German firm.¹¹

The estimations for total employment are similar to the basic model, which does not differentiate between manufacturing and service FDI (see Table 21). In both cases, the coefficients after the investment are negative, whereby, in average, they are larger in magnitude and more significant for manufacturing FDI. This is in line with the results for different skill groups. The negative trend of low-skilled and medium-skilled employment in the multinational companies seems to be stronger in the case of manufacturing FDI (see Table 23 and 24). The higher demand for high-skilled employment in the period after the investment is driven by investments in the Czech service sector (see Table 22). In the estimations for total employment, the positive coefficients prior to the investment are only significant for service FDI.¹² Altogether, manufacturing FDI does not lead to an increase of jobs for high-skilled employment in the business at home. While high-skilled employment increases one year after the investment, there is to the same extent a reduction in the following year. This could indicate a deployment to the Czech affiliate of newly recruited employees who had been prepared for their job at the home base. If so, the reduction of high-skilled employment in the second year can not be considered as detrimental for labor demand and workers at home. To clarify this, a much closer look on the occupation structure and individual transition histories is needed, which is beyond the scope of this paper.

Conclusions

The Czech Republic provides great opportunities for cost-reduction investments as well as for extending firms' global market share. German firms exploit these benefits most frequently. So far, the effects on the domestic employment of German multinationals investing in the CEEC are not clear-cut. By using data based on the total population of German affiliates in the Czech Republic, existing studies are complemented, and the evaluation of the labor market effects of FDI is fostered. The central result is that after the investment, the total labor demand of German

¹¹ To be sure that there is no significant occurrence of changes in the affiliation over time, the commercial register excerpt for 20 randomly drawn affiliates was checked. This includes the full history of the scope of business. None of these cases indicated that there was a fundamental switch from manufacturing to services or the other way round during the ownership of the German multinational.

¹² In fixed effects estimations for total employment such as those in Table 6, the positive coefficients prior to the investment become again insignificant. Only the regressions for high-skilled employment support the finding of a positive trend before the investment in case the affiliate is operating in the service sector.

multinational firms decreases compared to firms without FDI. The negative development continues for some years. Five years after the investment, MNEs' domestic employment has fallen in relative terms by approximately 11.5%. While the German MNEs hire new employees in the Czech Republic, their employment levels at home are falling. Whether the domestic workforce is affected negatively depends on the skill level. The multinational firms even increase their number of high-skilled employees shortly after the investment. In contrast, medium and low-skilled jobs are reduced. In both cases – the Czech affiliate operates primarily in the manufacturing sector, and the Czech affiliate operates primarily in the service sector – low and medium-skilled employment is declining. Accordingly, it is not only a matter of vertical FDI. However, as the negative coefficients of the investment dummies are, in average, more significant and greater in their magnitude for manufacturing FDI, we can conclude that this negative impact increases with a higher importance of vertical FDI.

What might be the next steps? Due to the rich database and its linkage to the employment data of the IAB, there are several opportunities for further research. One is to take a closer look at different locations of parent and daughter companies. A basic question in this regard is whether distance matters and employment effects vary with the distance to the Czech market or affiliate. While taking advantage of factor price differentials is less profitable when transport costs are high, market-motivated investments are more likely at larger distances. This could lead to different effects on MNEs, particularly in border regions, where incentives for vertical FDI are particularly high. Another subject is the identification of the wage effects of FDI on workers employed by German MNEs. In contrast to the previous analysis, this issue must be conducted at the individual level to control for workers' heterogeneity. Finally, as previously mentioned, another approach is to include the refinements from the literature on tasks, such as in Becker et al. (2013). Whether this distinction provides further insights will also be a valuable issue.

Appendix

Table 3: Regression results - Baseline

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.007	0.077		
investment in 5 years			0.018	0.054
investment in 4 years			0.006	0.422
investment in 3 years			-0.005	0.527
investment in 2 years			0.007	0.378
investment in 1 year			0.009	0.261
investment in this year	0.008	0.366	0.008	0.367
investment 1 year ago			-0.015	0.028
investment 2 years ago			-0.031	0.000
investment 3 years ago			-0.024	0.000
investment 4 years ago			-0.028	0.001
investment 5 years ago			-0.016	0.016
after investment	-0.023	0.000		
ln(employment (t-1))	0.973	0.000	0.973	0.000
ln(wage (t))	-0.273	0.000	-0.273	0.000
ln(wage (t-1))	0.288	0.000	0.288	0.000
share of highskilled (t-1)	0.061	0.000	0.061	0.000
share of routine occ. (t-1)	0.013	0.004	0.013	0.004
ln(age (t))	-0.093	0.000	-0.093	0.000
BHP_1975	-0.804	0.000	-0.804	0.000
ln(plants (t-1))	0.018	0.000	0.018	0.000
constant	0.861	0.000	0.861	0.000
Observations	152,741		152,741	
Number of firms	8,796		8,796	
R-squared	0.9704		0.9704	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 4: Regression results - Fixed effects I

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
investment in this year	0.008	0.334	0.002	0.827
investment 1 year ago	-0.001	0.918	-0.019	0.035
investment 2 years ago	-0.017	0.170	-0.029	0.003
investment 3 years ago	-0.023	0.078	-0.025	0.010
investment 4 years ago	-0.040	0.008	-0.032	0.004
investment 5 years ago	-0.052	0.002	-0.030	0.004
ln(employment (t-1))			0.761	0.000
ln(wage (t))	-0.253	0.000	-0.310	0.000
ln(wage (t-1))	0.089	0.000	0.205	0.000
share of highskilled (t-1)	0.019	0.787	0.115	0.002
share of routine occ. (t-1)	0.594	0.000	0.005	0.812
ln(age (t))	0.385	0.000	-0.031	0.000
ln(plants (t-1))	0.380	0.000	0.045	0.000
constant	3.723	0.000	1.886	0.000
Observations	129,298		129,298	
Number of firms	8,675		8,675	
R-squared within	0.1824		0.6785	
R-squared between	0.1176		0.9724	
R-squared overall	0.0854		0.9478	
Notes: Within estimator, standard errors are clustered on firm-level; including dummies for industry, region and year.				

Table 5: Regression results - Fixed effects II

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
investment 1 year ago	-0.006	0.373	-0.020	0.033
investment 2 years ago	-0.024	0.014	-0.034	0.000
investment 3 years ago	-0.032	0.005	-0.030	0.002
investment 4 years ago	-0.055	0.000	-0.041	0.000
investment 5 years ago	-0.064	0.000	-0.033	0.001
ln(employment (t-1))			0.754	0.000
ln(wage (t))	-0.246	0.000	-0.306	0.000
ln(wage (t-1))	0.075	0.002	0.201	0.000
share of highskilled (t-1)	0.007	0.919	0.120	0.002
share of routine occ. (t-1)	0.586	0.000	0.018	0.375
ln(age (t))	0.379	0.000	-0.032	0.000
ln(plants (t-1))	0.375	0.000	0.045	0.000
constant	3.650	0.000	1.865	0.000
Observations	123,413		123,413	
Number of firms	8,731		8,731	
R-squared within	0.1732		0.6664	
R-squared between	0.1159		0.9710	
R-squared overall	0.086		0.9467	
Notes: Within estimator, standard errors are clustered on firm-level; including dummies for industry, region and year.				

Table 6: Regression results - Fixed effects III

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	-0.005	0.555		
investment in 5 years			0.002	0.846
investment in 4 years			-0.005	0.639
investment in 3 years			-0.016	0.105
investment in 2 years			-0.006	0.590
investment in 1 year			0.000	0.970
investment in this year	0.001	0.959	0.001	0.956
investment 1 year ago			-0.016	0.112
investment 2 years ago			-0.032	0.002
investment 3 years ago			-0.029	0.005
investment 4 years ago			-0.036	0.002
investment 5 years ago			-0.029	0.007
after investment	-0.028	0.002		
ln(employment (t-1))	0.785	0.000	0.785	0.000
ln(wage (t))	-0.320	0.000	-0.320	0.000
ln(wage (t-1))	0.221	0.000	0.221	0.000
share of highskilled (t-1)	0.114	0.000	0.114	0.000
share of routine occ. (t-1)	0.005	0.726	0.005	0.730
ln(age (t))	-0.032	0.000	-0.032	0.000
ln(plants (t-1))	0.037	0.000	0.037	0.000
constant	1.700	0.000	1.700	0.000
Observations	158,176		158,176	
Number of firms	8,796		8,796	
R-squared within	0.7281		0.7281	
R-squared between	0.9767		0.9767	
R-squared overall	0.9528		0.9528	

Notes: Within estimations, standard errors are clustered on firm-level; including dummies for industry, region and year.

Table 7: Regression results - Two-step System GMM

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
investment in 5 years	0.011	0.246	0.009	0.277
investment in 4 years	0.004	0.596	0.004	0.606
investment in 3 years	-0.005	0.537	-0.003	0.680
investment in 2 years	0.006	0.421	0.007	0.318
investment in 1 year	0.007	0.346	0.007	0.265
investment in this year	0.005	0.537	0.011	0.143
investment 1 year ago	-0.020	0.004	-0.007	0.263
investment 2 years ago	-0.032	0.000	-0.019	0.006
investment 3 years ago	-0.026	0.000	-0.015	0.023
investment 4 years ago	-0.031	0.000	-0.024	0.004
investment 5 years ago	-0.019	0.007	-0.014	0.036
ln(employment (t-1))	0.951	0.000	1.022	0.000
ln(employment (t-2))			0.018	0.011
ln(wage (t))	-0.290	0.000	-0.379	0.000
ln(wage (t-1))	0.319	0.000	0.314	0.000
share of highskilled (t-1)	0.058	0.007	0.054	0.002
share of routine occ. (t-1)	0.000	0.990	-0.084	0.000
ln(age (t))	-0.095	0.000	-0.072	0.000
BHP_1975	-0.803	0.000	-0.675	0.000
ln(plants (t-1))	0.024	0.008	-0.037	0.000
constant	0.734	0.000	0.956	0.000
Observations	152,741		149,031	
Number of firms	8,796		8,672	
AB test AR(1) p-value	0.000		0.000	
AB test AR(2) p-value	0.015		0.219	
Hansen test p-value	0.217		0.001	
Number of instruments	155		155	
Notes: Two-step System GMM, standard errors are robust applying the finite-sample correction by Windmeijer (2005). Each equation assumes the lagged employment as endogenous variable using its second, third, fourth and fifth lag as instruments. Including dummies for industry, region, legal form and year.				

Table 8: Regression results - Robustness check: Including Eastern Germany

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.006	0.148		
investment in 5 years			0.027	0.003
investment in 4 years			0.005	0.534
investment in 3 years			-0.006	0.477
investment in 2 years			0.004	0.582
investment in 1 year			0.000	0.969
investment in this year	0.004	0.627	0.004	0.633
investment 1 year ago			-0.020	0.004
investment 2 years ago			-0.028	0.000
investment 3 years ago			-0.022	0.001
investment 4 years ago			-0.030	0.000
investment 5 years ago			-0.018	0.008
after investment	-0.024	0.000		
ln(employment (t-1))	0.966	0.000	0.966	0.000
ln(wage (t))	-0.244	0.000	-0.244	0.000
ln(wage (t-1))	0.260	0.000	0.260	0.000
share of highskilled (t-1)	0.060	0.000	0.060	0.000
share of routine occ. (t-1)	0.015	0.001	0.015	0.000
ln(age (t))	-0.106	0.000	-0.106	0.000
BHP_1975	-0.908	0.000	-0.908	0.000
ln(plants (t-1))	0.028	0.000	0.028	0.000
constant	0.950	0.000	0.950	0.000
Observations	172,868		172,868	
Number of firms	10,219		10,219	
R-squared	0.9656		0.9656	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 9: Regression results - Robustness check: Full-time equivalents

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.005	0.199		
investment in 5 years			0.018	0.051
investment in 4 years			0.004	0.598
investment in 3 years			-0.005	0.520
investment in 2 years			0.001	0.929
investment in 1 year			0.008	0.330
investment in this year	0.006	0.494	0.006	0.495
investment 1 year ago			-0.020	0.003
investment 2 years ago			-0.031	0.000
investment 3 years ago			-0.027	0.000
investment 4 years ago			-0.034	0.000
investment 5 years ago			-0.024	0.000
after investment	-0.027	0.000		
ln(employment (t-1))	0.972	0.000	0.972	0.000
ln(wage (t))	-0.215	0.000	-0.215	0.000
ln(wage (t-1))	0.226	0.000	0.226	0.000
share of highskilled (t-1)	0.052	0.000	0.052	0.000
share of routine occ. (t-1)	0.025	0.000	0.025	0.000
ln(age (t))	-0.092	0.000	-0.092	0.000
BHP_1975	-0.795	0.000	-0.795	0.000
ln(plants(t-1))	0.020	0.000	0.020	0.000
constant	0.855	0.000	0.855	0.000
Observations	152,741		152,741	
Number of firms	8,796		8,796	
R-squared	0.9706		0.9706	
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.				

Table 10: Regression results - Robustness check: Excluding outliers

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.006	0.164		
investment in 5 years			0.017	0.094
investment in 4 years			0.007	0.360
investment in 3 years			-0.008	0.343
investment in 2 years			0.004	0.666
investment in 1 year			0.009	0.283
investment in this year	0.000	0.991	0.000	0.989
investment 1 year ago			-0.018	0.015
investment 2 years ago			-0.033	0.000
investment 3 years ago			-0.026	0.000
investment 4 years ago			-0.032	0.000
investment 5 years ago			-0.020	0.006
after investment	-0.026	0.000		
ln(employment (t-1))	0.973	0.000	0.973	0.000
ln(wage (t))	-0.274	0.000	-0.274	0.000
ln(wage (t-1))	0.290	0.000	0.290	0.000
share of highskilled (t-1)	0.061	0.000	0.061	0.000
share of routine occ. (t-1)	0.011	0.011	0.011	0.011
ln(age (t))	-0.092	0.000	-0.092	0.000
BHP_1975	-0.796	0.000	-0.795	0.000
ln(plants(t-1))	0.016	0.000	0.016	0.000
constant	0.849	0.000	0.849	0.000
Observations	149,956		149,956	
Number of firms	8,618		8,618	
R-squared	0.9685		0.9685	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 11: Regression results - Robustness check: Investment 1990-1996

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.010	0.106		
investment in 5 years			0.028	0.062
investment in 4 years			0.009	0.379
investment in 3 years			0.003	0.750
investment in 2 years			-0.007	0.490
investment in 1 year			0.015	0.272
investment in this year	-0.020	0.044	-0.020	0.045
investment 1 year ago			-0.011	0.363
investment 2 years ago			-0.019	0.068
investment 3 years ago			-0.025	0.024
investment 4 years ago			-0.043	0.000
investment 5 years ago			-0.017	0.076
after investment	-0.023	0.000		
ln(employment (t-1))	0.973	0.000	0.973	0.000
ln(wage (t))	-0.285	0.000	-0.285	0.000
ln(wage (t-1))	0.301	0.000	0.301	0.000
share of highskilled (t-1)	0.065	0.000	0.065	0.000
share of routine occ. (t-1)	0.016	0.001	0.016	0.001
ln(age (t))	-0.095	0.000	-0.095	0.000
BHP_1975	-0.820	0.000	-0.820	0.000
ln(plants (t-1))	0.017	0.000	0.017	0.000
constant	0.879	0.000	0.878	0.000
Observations	139,890		139,890	
Number of firms	7,336		7,336	
R-squared	0.9709		0.9709	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 12: Regression results - Robustness check: Investment 1997-2003

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	-0.007	0.329		
investment in 5 years			0.004	0.811
investment in 4 years			-0.011	0.506
investment in 3 years			-0.021	0.069
investment in 2 years			-0.008	0.619
investment in 1 year			0.000	0.990
investment in this year	0.009	0.647	0.009	0.653
investment 1 year ago			-0.044	0.001
investment 2 years ago			-0.035	0.002
investment 3 years ago			-0.025	0.024
investment 4 years ago			-0.023	0.102
investment 5 years ago			-0.020	0.080
after investment	-0.029	0.000		
ln(employment (t-1))	0.973	0.000	0.973	0.000
ln(wage (t))	-0.281	0.000	-0.281	0.000
ln(wage (t-1))	0.297	0.000	0.297	0.000
share of highskilled (t-1)	0.063	0.000	0.063	0.000
share of routine occ. (t-1)	0.015	0.001	0.015	0.001
ln(age (t))	-0.094	0.000	-0.094	0.000
BHP_1975	-0.818	0.000	-0.818	0.000
ln(plants (t-1))	0.018	0.000	0.018	0.000
constant	0.877	0.000	0.878	0.000
Observations	139,783		139,783	
Number of firms	7,352		7,352	
R-squared	0.9696		0.9696	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 13: Regression results - Robustness check: Investment 2004-2010

Dependent variable: ln(employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.017	0.015		
investment in 5 years			0.021	0.230
investment in 4 years			0.019	0.138
investment in 3 years			0.003	0.857
investment in 2 years			0.032	0.019
investment in 1 year			0.012	0.343
investment in this year	0.031	0.046	0.031	0.046
investment 1 year ago			0.005	0.627
investment 2 years ago			-0.039	0.005
investment 3 years ago			-0.020	0.113
investment 4 years ago			-0.009	0.611
investment 5 years ago			-0.006	0.744
after investment	-0.015	0.030		
ln(employment (t-1))	0.973	0.000	0.973	0.000
ln(wage (t))	-0.278	0.000	-0.279	0.000
ln(wage (t-1))	0.294	0.000	0.294	0.000
share of highskilled (t-1)	0.063	0.000	0.063	0.000
share of routine occ. (t-1)	0.016	0.000	0.016	0.000
ln(age (t))	-0.092	0.000	-0.092	0.000
BHP_1975	-0.800	0.000	-0.800	0.000
ln(plants (t-1))	0.017	0.000	0.017	0.000
constant	0.857	0.000	0.857	0.000
Observations	139,602		139,602	
Number of firms	7,498		7,498	
R-squared	0.9695		0.9695	
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.				

Table 14: Regression results - High-skilled employment

Dependent variable: ln(high-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.025	0.000		
investment in 5 years			0.034	0.001
investment in 4 years			0.030	0.002
investment in 3 years			0.011	0.228
investment in 2 years			0.034	0.000
investment in 1 year			0.019	0.032
investment in this year	0.017	0.042	0.017	0.041
investment 1 year ago			0.034	0.000
investment 2 years ago			-0.003	0.759
investment 3 years ago			0.005	0.569
investment 4 years ago			0.009	0.238
investment 5 years ago			-0.006	0.463
after investment	0.009	0.028		
ln(high-skilled employment (t-1))	0.959	0.000	0.959	0.000
ln(wage high-skilled (t))	-0.090	0.000	-0.090	0.000
ln(wage high-skilled (t-1))	0.085	0.000	0.085	0.000
ln(wage medium-skilled (t))	0.068	0.000	0.068	0.000
ln(wage medium-skilled (t-1))	-0.002	0.910	-0.002	0.901
ln(wage low-skilled (t))	0.052	0.000	0.052	0.000
ln(wage low-skilled (t-1))	-0.031	0.000	-0.031	0.000
no medium-skilled (t)	-0.047	0.527	-0.046	0.537
no medium-skilled (t-1)	0.263	0.001	0.262	0.001
no low-skilled (t)	0.084	0.000	0.084	0.000
no low-skilled (t-1)	-0.033	0.133	-0.033	0.131
ln(age (t))	-0.039	0.000	-0.039	0.000
BHP_1975	-0.350	0.000	-0.349	0.000
ln(plants (t-1))	0.018	0.000	0.018	0.000
constant	0.114	0.004	0.112	0.005
Observations	101,202		101,202	
Number of firms	7,150		7,150	
R-squared	0.9533		0.9533	
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.				

Table 15: Regression results - Medium-skilled employment

Dependent variable: ln(medium-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.006	0.095		
investment in 5 years			0.010	0.226
investment in 4 years			0.005	0.465
investment in 3 years			-0.003	0.703
investment in 2 years			0.010	0.190
investment in 1 year			0.008	0.314
investment in this year	0.012	0.166	0.012	0.166
investment 1 year ago			-0.016	0.019
investment 2 years ago			-0.027	0.000
investment 3 years ago			-0.019	0.006
investment 4 years ago			-0.024	0.002
investment 5 years ago			-0.009	0.174
after investment	-0.019	0.000		
ln(medium-skilled employment (t-1))	0.957	0.000	0.957	0.000
ln(wage high-skilled (t))	0.044	0.000	0.044	0.000
ln(wage high-skilled (t-1))	-0.034	0.000	-0.034	0.000
ln(wage medium-skilled (t))	-0.262	0.000	-0.262	0.000
ln(wage medium-skilled (t-1))	0.260	0.000	0.260	0.000
ln(wage low-skilled (t))	0.092	0.000	0.092	0.000
ln(wage low-skilled (t-1))	-0.084	0.000	-0.084	0.000
no high-skilled (t)	0.038	0.060	0.037	0.061
no high-skilled (t-1)	-0.053	0.007	-0.053	0.007
no low-skilled (t)	0.144	0.000	0.144	0.000
no low-skilled (t-1)	-0.179	0.000	-0.179	0.000
ln(age (t))	-0.076	0.000	-0.076	0.000
BHP_1975	-0.664	0.000	-0.665	0.000
ln(plants (t-1))	0.022	0.000	0.022	0.000
constant	0.777	0.000	0.777	0.000
Observations	146,945		146,945	
Number of firms	8,706		8,706	
R-squared	0.9718		0.9718	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 16: Regression results - Low-skilled employment

Dependent variable: ln(low-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.004	0.408		
investment in 5 years			0.001	0.907
investment in 4 years			0.008	0.472
investment in 3 years			0.019	0.045
investment in 2 years			-0.001	0.927
investment in 1 year			-0.008	0.440
investment in this year	-0.013	0.238	-0.013	0.237
investment 1 year ago			-0.009	0.368
investment 2 years ago			-0.009	0.376
investment 3 years ago			-0.016	0.134
investment 4 years ago			-0.018	0.087
investment 5 years ago			-0.023	0.036
after investment	-0.014	0.001		
ln(low-skilled employment (t-1))	0.950	0.000	0.950	0.000
ln(wage high-skilled (t))	0.008	0.156	0.008	0.155
ln(wage high-skilled (t-1))	-0.001	0.921	-0.001	0.923
ln(wage medium-skilled (t))	-0.217	0.000	-0.217	0.000
ln(wage medium-skilled (t-1))	0.147	0.000	0.147	0.000
ln(wage low-skilled (t))	-0.284	0.000	-0.284	0.000
ln(wage low-skilled (t-1))	0.288	0.000	0.288	0.000
no high-skilled (t)	-0.047	0.047	-0.047	0.048
no high-skilled (t-1)	0.025	0.284	0.026	0.282
no medium-skilled (t)	-0.979	0.000	-0.979	0.000
no medium-skilled (t-1)	0.642	0.000	0.642	0.000
ln(age (t))	-0.032	0.000	-0.032	0.000
BHP_1975	-0.291	0.000	-0.291	0.000
ln(plants (t-1))	0.025	0.000	0.025	0.000
constant	0.640	0.000	0.640	0.000
Observations	115,374		115,374	
Number of firms	7,539		7,539	
R-squared	0.9446		0.9446	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 17: Regression results - High-skilled share

Dependent variable: share of high-skilled (t)				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.0029	0.000		
investment in 5 years			0.0028	0.026
investment in 4 years			0.0033	0.009
investment in 3 years			0.0030	0.019
investment in 2 years			0.0026	0.047
investment in 1 year			0.0027	0.044
investment in this year	0.0031	0.014	0.0031	0.014
investment 1 year ago			0.0059	0.000
investment 2 years ago			0.0035	0.013
investment 3 years ago			0.0022	0.067
investment 4 years ago			0.0042	0.000
investment 5 years ago			0.0029	0.003
after investment	0.0038	0.000		
share of high-skilled (t-1)	0.9101	0.000	0.9102	0.000
ln(employment(t-1))	-0.0005	0.001	-0.0005	0.001
ln(wage high-skilled (t))	-0.0035	0.001	-0.0035	0.001
ln(wage high-skilled (t-1))	0.0070	0.000	0.0070	0.000
ln(wage medium-skilled (t))	0.0075	0.020	0.0075	0.020
ln(wage medium-skilled (t-1))	0.0032	0.326	0.0032	0.326
ln(wage low-skilled (t))	-0.0056	0.000	-0.0056	0.000
ln(wage low-skilled (t-1))	0.0035	0.000	0.0035	0.000
no medium-skilled (t)	-0.0999	0.000	-0.0999	0.000
no medium-skilled (t-1)	0.1031	0.000	0.1031	0.000
no low-skilled (t)	0.2904	0.000	0.2904	0.000
no low-skilled (t-1)	-0.2078	0.000	-0.2078	0.000
ln(age (t))	-0.0001	0.861	-0.0001	0.892
BHP_1975	-0.0019	0.564	-0.0017	0.591
ln(plants (t-1))	-0.0008	0.000	-0.0008	0.000
constant	-0.0389	0.000	-0.0391	0.000
Observations	148,843		148,843	
Number of firms	8,796		8,796	
R-squared	0.913		0.913	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 18: SUR results - High-skilled employment

Dependent variable: ln(high-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.024	0.000		
investment in 5 years			0.026	0.000
investment in 4 years			0.029	0.000
investment in 3 years			0.016	0.020
investment in 2 years			0.021	0.001
investment in 1 year			0.030	0.000
investment in this year	0.026	0.000	0.026	0.000
investment 1 year ago			0.025	0.000
investment 2 years ago			0.001	0.855
investment 3 years ago			0.006	0.400
investment 4 years ago			0.001	0.926
investment 5 years ago			-0.006	0.448
after investment	0.006	0.045		
ln(high-skilled employment (t-1))	0.977	0.000	0.977	0.000
ln(age (t))	-0.028	0.000	-0.027	0.000
BHP_1975	-0.234	0.000	-0.233	0.000
ln(plants (t-1))	0.017	0.000	0.017	0.000
constant	0.246	0.000	0.245	0.000
Observations	148,843		148,843	
Number of firms	8,796		8,796	
R-squared	0.964		0.964	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 19: SUR results - Medium-skilled employment

Dependent variable: ln(medium-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	0.007	0.028		
investment in 5 years			0.015	0.022
investment in 4 years			0.006	0.347
investment in 3 years			-0.005	0.429
investment in 2 years			0.007	0.241
investment in 1 year			0.009	0.123
investment in this year	0.009	0.137	0.009	0.138
investment 1 year ago			-0.019	0.002
investment 2 years ago			-0.028	0.000
investment 3 years ago			-0.017	0.009
investment 4 years ago			-0.026	0.000
investment 5 years ago			-0.012	0.098
after investment	-0.021	0.000		
ln(medium-skilled employment (t-1))	0.967	0.000	0.967	0.000
ln(age (t))	-0.068	0.000	-0.068	0.000
BHP_1975	-0.586	0.000	-0.586	0.000
ln(plants (t-1))	0.023	0.000	0.023	0.000
constant	0.676	0.000	0.677	0.000
Observations	148,843		148,843	
Number of firms	8,796		8,796	
R-squared	0.973		0.973	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 20: SUR results - Low-skilled employment

Dependent variable: ln(low-skilled employment (t))				
	1		2	
	coefficient	p-value	coefficient	p-value
before investment	-0.005	0.203		
investment in 5 years			0.000	0.980
investment in 4 years			-0.011	0.180
investment in 3 years			0.003	0.684
investment in 2 years			-0.011	0.197
investment in 1 year			-0.006	0.477
investment in this year	-0.020	0.015	-0.020	0.015
investment 1 year ago			-0.025	0.002
investment 2 years ago			-0.015	0.060
investment 3 years ago			-0.030	0.000
investment 4 years ago			-0.031	0.000
investment 5 years ago			-0.028	0.002
after investment	-0.026	0.000		
ln(low-skilled employment (t-1))	0.955	0.000	0.955	0.000
ln(age (t))	-0.029	0.000	-0.029	0.000
BHP_1975	-0.251	0.000	-0.251	0.000
ln(plants (t-1))	0.030	0.000	0.030	0.000
constant	0.300	0.000	0.300	0.000
Observations	148,843		148,843	
Number of firms	8,796		8,796	
R-squared	0.955		0.955	
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.				

Table 21: Regression results - Target industry: Total employment

Dependent variable: ln(employment (t))					
		1		2	
		coefficient	p-value	coefficient	p-value
Manufacturing FDI	before investment	-0.004	0.555		
	investment in 5 years			0.001	0.957
	investment in 4 years			-0.003	0.833
	investment in 3 years			-0.005	0.629
	investment in 2 years			-0.013	0.190
	investment in 1 year			0.000	0.984
	investment in this year	0.000	0.983	-0.001	0.964
	investment 1 year ago			-0.020	0.040
	investment 2 years ago			-0.026	0.015
	investment 3 years ago			-0.027	0.001
	investment 4 years ago			-0.042	0.008
	investment 5 years ago			-0.022	0.037
	after investment	-0.027	0.000		
	Service FDI	before investment	0.013	0.011	
investment in 5 years				0.026	0.049
investment in 4 years				0.009	0.359
investment in 3 years				-0.004	0.700
investment in 2 years				0.019	0.081
investment in 1 year				0.015	0.095
investment in this year		0.009	0.446	0.009	0.458
investment 1 year ago				-0.013	0.190
investment 2 years ago				-0.034	0.000
investment 3 years ago				-0.020	0.041
investment 4 years ago				-0.019	0.038
investment 5 years ago				-0.009	0.282
after investment		-0.019	0.000		
ln(employment (t-1))		0.973	0.000	0.974	0.000
ln(wage (t))		-0.272	0.000	-0.272	0.000
ln(wage (t-1))		0.287	0.000	0.287	0.000
Share of high-skilled (t-1)		0.061	0.000	0.061	0.000
Share of routine occ. (t-1)		0.013	0.004	0.010	0.016
ln(age (t))		-0.093	0.000	-0.093	0.000
BHP_1975		-0.806	0.000	-0.808	0.000
ln(plants (t-1))		0.018	0.000	0.018	0.000
constant		0.862	0.000	0.865	0.000
Observations		151,962		151,962	
Number of firms		8,712		8,712	
R-squared		0.9703		0.9703	

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 22: Regression results - Target industry: High-skilled employment

		Dependent variable: ln(high-skilled employment (t))				
		1		2		
		coefficient	p-value	coefficient	p-value	
Manufacturing FDI	before investment	0.008	0.220			
	investment in 5 years			0.030	0.073	
	investment in 4 years			0.006	0.664	
	investment in 3 years			0.001	0.918	
	investment in 2 years			0.006	0.649	
	investment in 1 year			-0.004	0.789	
	investment in this year	-0.001	0.960	-0.001	0.960	
	investment 1 year ago			0.030	0.026	
	investment 2 years ago			-0.024	0.070	
	investment 3 years ago			0.013	0.323	
	investment 4 years ago			0.007	0.609	
	investment 5 years ago			-0.018	0.209	
		after investment	0.002	0.703		
	Service FDI	before investment	0.033	0.000		
investment in 5 years				0.034	0.012	
investment in 4 years				0.036	0.004	
investment in 3 years				0.017	0.168	
investment in 2 years				0.050	0.000	
investment in 1 year				0.029	0.011	
investment in this year		0.026	0.019	0.026	0.019	
investment 1 year ago				0.035	0.000	
investment 2 years ago				0.017	0.096	
investment 3 years ago				0.001	0.959	
investment 4 years ago				0.013	0.181	
investment 5 years ago				0.004	0.691	
		after investment	0.015	0.002		
		ln(high-skilled employment (t-1))	0.959	0.000	0.959	0.000
	ln(wage high-skilled (t))	-0.091	0.000	-0.091	0.000	
	ln(wage high-skilled (t-1))	0.086	0.000	0.086	0.000	
	ln(wage medium-skilled (t))	0.069	0.000	0.069	0.000	
	ln(wage medium-skilled (t-1))	-0.005	0.799	-0.005	0.796	
	ln(wage low-skilled (t))	0.051	0.000	0.051	0.000	
	ln(wage low-skilled (t-1))	-0.030	0.000	-0.030	0.000	
	no medium-skilled (t)	-0.043	0.570	-0.043	0.573	
	no medium-skilled (t-1)	0.255	0.001	0.255	0.001	
	no low-skilled (t)	0.081	0.000	0.081	0.000	
	no low-skilled (t-1)	-0.030	0.175	-0.030	0.168	
	ln(age (t))	-0.039	0.000	-0.039	0.000	
	BHP_1975	-0.349	0.000	-0.348	0.000	
	ln(plants (t-1))	0.018	0.000	0.018	0.000	
	constant	0.118	0.003	0.116	0.004	
	Observations	100,646		100,646		
	Number of firms	7,087		7,087		
	R-squared	0.9532		0.9532		
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.						

Table 23: Regression results - Target industry: Medium-skilled employment

Dependent variable: ln(medium-skilled employment (t))					
		1		2	
		coefficient	p-value	coefficient	p-value
Manufacturing FDI	before investment	-0.001	0.807		
	investment in 5 years			0.001	0.941
	investment in 4 years			0.001	0.918
	investment in 3 years			-0.004	0.692
	investment in 2 years			-0.005	0.620
	investment in 1 year			0.000	0.975
	investment in this year	0.001	0.929	0.001	0.929
	investment 1 year ago			-0.023	0.020
	investment 2 years ago			-0.021	0.040
	investment 3 years ago			-0.032	0.000
	investment 4 years ago			-0.033	0.030
	investment 5 years ago			-0.020	0.062
	after investment	-0.026	0.000		
	Service FDI	before investment	0.010	0.043	
investment in 5 years				0.012	0.309
investment in 4 years				0.006	0.529
investment in 3 years				-0.003	0.785
investment in 2 years				0.020	0.053
investment in 1 year				0.013	0.172
investment in this year		0.015	0.198	0.015	0.198
investment 1 year ago				-0.014	0.126
investment 2 years ago				-0.027	0.003
investment 3 years ago				-0.010	0.318
investment 4 years ago				-0.021	0.020
investment 5 years ago				0.002	0.818
after investment		-0.015	0.001		
ln(medium-skilled employment (t-1))		0.957	0.000	0.957	0.000
ln(wage high-skilled (t))	0.043	0.000	0.043	0.000	
ln(wage high-skilled (t-1))	-0.033	0.000	-0.033	0.000	
ln(wage medium-skilled (t))	-0.261	0.000	-0.261	0.000	
ln(wage medium-skilled (t-1))	0.258	0.000	0.258	0.000	
ln(wage low-skilled (t))	0.091	0.000	0.091	0.000	
ln(wage low-skilled (t-1))	-0.083	0.000	-0.083	0.000	
no high-skilled (t)	0.036	0.069	0.036	0.072	
no high-skilled (t-1)	-0.051	0.009	-0.051	0.010	
no low-skilled (t)	0.141	0.000	0.141	0.000	
no low-skilled (t-1)	-0.175	0.000	-0.175	0.000	
ln(age (t))	-0.076	0.000	-0.076	0.000	
BHP_1975	-0.665	0.000	-0.666	0.000	
ln(plants (t-1))	0.021	0.000	0.021	0.000	
constant	0.776	0.000	0.777	0.000	
Observations	146,204		146,204		
Number of firms	8,624		8,624		
R-squared	0.9719		0.9719		

Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.

Table 24: Regression results - Target industry: Low-skilled employment

		Dependent variable: ln(low-skilled employment (t))			
		1		2	
		coefficient	p-value	coefficient	p-value
Manufacturing FDI	before investment	0.000	0.972		
	investment in 5 years			-0.012	0.532
	investment in 4 years			0.018	0.231
	investment in 3 years			0.030	0.049
	investment in 2 years			-0.016	0.184
	investment in 1 year			-0.018	0.216
	investment in this year	0.005	0.773	0.005	0.774
	investment 1 year ago			-0.021	0.180
	investment 2 years ago			-0.023	0.108
	investment 3 years ago			-0.016	0.225
	investment 4 years ago			-0.039	0.043
	investment 5 years ago			-0.016	0.326
	after investment	-0.023	0.001		
	Service FDI	before investment	0.008	0.205	
investment in 5 years				0.010	0.483
investment in 4 years				0.001	0.935
investment in 3 years				0.015	0.244
investment in 2 years				0.011	0.409
investment in 1 year				0.003	0.810
investment in this year		-0.028	0.073	-0.028	0.072
investment 1 year ago				-0.001	0.915
investment 2 years ago				0.000	0.978
investment 3 years ago				-0.017	0.266
investment 4 years ago				-0.005	0.701
investment 5 years ago				-0.025	0.078
after investment		-0.009	0.118		
ln(low-skilled employment (t-1))		0.950	0.000	0.950	0.000
ln(wage high-skilled (t))		0.007	0.172	0.007	0.170
ln(wage high-skilled (t-1))		0.000	0.991	0.000	0.992
ln(wage medium-skilled (t))		-0.214	0.000	-0.215	0.000
ln(wage medium-skilled (t-1))		0.145	0.000	0.145	0.000
ln(wage low-skilled (t))		-0.286	0.000	-0.286	0.000
ln(wage low-skilled (t-1))		0.289	0.000	0.289	0.000
no medium-skilled (t)		-0.981	0.000	-0.982	0.000
no medium-skilled (t-1)		0.645	0.000	0.646	0.000
no high-skilled (t)		-0.047	0.045	-0.047	0.046
no high-skilled (t-1)		0.027	0.251	0.027	0.251
ln(age (t))		-0.032	0.000	-0.032	0.000
BHP_1975		-0.289	0.000	-0.289	0.000
ln(plants(t-1))		0.025	0.000	0.025	0.000
constant		0.634	0.000	0.633	0.000
Observations		114,811		114,811	
Number of firms		7,475		7,475	
R-squared		0.9446		0.9446	
Notes: Pooled OLS, standard errors are clustered on firm-level; including dummies for industry, region, legal form and year.					

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