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Multinationals, Foreign Market Entry, and Employment Security

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March 1, 2010

PRELIMINARY

Abstract

We analyze how foreign direct investment (FDI) affects employment security. Using administrative micro data for German employees allows us to follow individual workers over time. FDI intensity is measured at the sectoral level, which enables us to take into account direct as well as indirect (spillover) effects of FDI. Furthermore, we are able to account for both inward and outward FDI and to distinguish between FDI at the intensive margin and FDI at the extensive margin in the form of Greenfield investments and foreign acquisitions. We are also able to investigate whether specific worker groups are affected differently by FDI. Our main finding is that both inward and outward FDI significantly increases employment security. Important exceptions are very young and old workers, who are negatively affected. These results seem to be mainly driven by the intensive margin.

JEL codes: *F21, F23, J23, J63*

Keywords: *foreign direct investment, labour market transitions, duration analysis.*

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1 Introduction

Foreign direct investment (FDI) flows have increased all over the world and the value of Germany's FDI outflows and inflows has more than quadrupled within ten years to reach a volume of more than US \$ 167 billion and US \$ 50 billion in 2007, respectively.¹ The growing importance of FDI has raised a controversial debate among both economists and politicians. On the one hand, FDI can enhance efficiency and induce technology spillovers. On the other hand, politicians and employees are concerned about the possible negative effects on wages, job security and the survival probability of target firms.

Despite a growing number of studies, the question whether FDI complements or substitutes domestic production and employment still seems to be unresolved as existing empirical studies yield conflicting results.² The existing literature on the effects of FDI consists on the one hand of industry and country-level studies which are able to account for direct and indirect effects of FDI, but are often plagued with econometric problems such as aggregation bias and endogeneity. On the other hand, there are micro studies that either use firm-level data (see e.g. Desai, Foley, and Hines, 2009) or linked-employer employee data (see Becker and Muendler, 2008, for instance). These studies have the advantage of accurately measuring direct effects of FDI, but cannot account for indirect effects on other workers that stem from input-output linkages, spillovers or competitive effects. In addition, most of these studies are limited to FDI at the intensive margin (investment or expansion in existing affiliates), but disregard the extensive margin (newly founded firms or production units and newly acquired firms).

In this paper, we choose an intermediate approach by combining micro data on individual workers' employment histories with industry-level data on FDI. The purpose of this paper is to analyze how individual employment security is affected by FDI. We contribute to the existing literature in several respects. First, we are able to measure sectoral effects of FDI, thus taking into account direct as well as indirect (spill-over) effects. Second, we distinguish between different types of FDI. On the one hand, we analyze the effects of inward and outward FDI simultaneously. On the other hand, we examine the extensive and the intensive margin of FDI, as well as FDI coming from and going to low and high wage countries. Third, we perform an in-depth analysis of heterogenous effects on workers. In particular, we examine whether workers with different skills and of different age are affected differently by FDI.

Accounting for indirect effects and distinguishing between the extensive and the intensive margin of FDI can be important for several reasons. We expect outward FDI and domestic economic activity to

¹Cf. <http://stats.unctad.org/FDI/TableViewer/tableView.aspx?ReportId=1254>.

²See for example Desai, Foley, and Hines (2009), Pfaffermayr (2004), Slaughter (2000), Konings and Murphy (2006) and Becker and Muendler (forthcoming). There is also a related literature on the effects of international outsourcing (see e.g. Geishecker, 2008).

be substitutes at the task or product level due a substitution of exports or certain production stages. Nonetheless, they may be complements or substitutes at a more aggregated level of the firm due to productivity improvements, scale economies and the access to foreign knowledge and technology. The effects of FDI may also depend on the nature of the investment (extensive or intensive margin, Greenfield FDI vs. M&A). FDI at the extensive margin might substitute for upstream production stages, while subsequent investments can be complementary to domestic production. If FDI takes the form of an acquisition, duplicated tasks and production units might be cut. Contrarily, economic theory predicts that cross-border M&As are rather undertaken to access complementary technologies, while Greenfield investments are undertaken to exploit existing firm-specific assets or differences in production costs across countries (Nocke and Yeaple, 2007, 2008).

Similarly, inward FDI may complement or substitute existing production and employment. Economic theory predicts that firms undertaking FDI must have a productivity advantage compared to other firms (Helpman, Melitz, and Yeaple, 2004). This is because FDI involves high sunk costs and is thus only profitable for high-productivity firms. This productivity advantage might generate spillovers to existing firms and can affect their incentives to invest and to innovate. Again, the effect of inward FDI may depend on the mode of entry. On the one hand, as opposed to acquisitions, Greenfield FDI adds new production capacities to the host country. On the other hand, acquisitions can affect the productivity in target firms and both modes of entry can drive competitor firms with lower productivity out of the market thereby possibly destroying jobs - at least in the short run. However, this effect might be offset in the long run due to entry and growth of incumbent firms.

The remainder of this paper is structured as follows. The next section gives a brief review of the theoretical and empirical literature on the effects of FDI on labour market outcomes. Section 3 describes the different data sources employed in the empirical analysis, i.e. the micro data set on individual workers' employment history, and the firm-level data sets used to calculate FDI intensity by sector. The empirical strategy is laid out in Section 4. Section 5 contains the results, and Section 6 concludes.

2 Literature

The expected labour market effects of FDI are closely related to the various types of FDI and the underlying motives for the investments. Trade theoretical models that incorporate heterogeneous firms usually use a combination of transportation costs and sunk costs to explain why – within industries – some firms export, others engage in FDI and some firms operate solely on the domestic market (see Helpman, Melitz, and Yeaple, 2004, for instance). Within these models, FDI is conducted to gain access to foreign markets via Greenfield investments and therefore adds new production facilities to the

host country and, from the perspective of the home country, is an alternative to exporting. Another type of FDI are vertical investments that arise due to differences in factor prices across countries (Head and Ries, 2003) and substitute for upstream production stages. While most researchers assume that horizontal investments are the prevalent mode of FDI, Helpman (2006) argues that most FDI is neither purely horizontal nor purely vertical.

FDI through cross-border acquisitions may in addition be motivated by market power (Neary, 2007), by the desire to gain access to country or firm-specific assets (Nocke and Yeaple, 2007, 2008) or by efficiency motives and exploiting economies of scale and scope (Röller, Stennek, and Verboven, 2001). Because of the various types of FDI, it is difficult to predict the overall impact of FDI on labour market dynamics in the home as well as in the host country.

A sizable empirical literature has investigated the effect of outward FDI on domestic labour market outcomes.³ Researchers have aimed at measuring the degree of substitutability between foreign and domestic labour either by estimating the elasticity of domestic labour demand with respect to foreign wages, or by regressing domestic employment on foreign employment or another measure of foreign affiliate production.⁴ So far, results have not been conclusive. Some studies find a weak substitutability between parent and affiliate employment (Braconier and Ekholm, 2000; Becker, Ekholm, Jäckle, and Muendler, 2005; Konings and Murphy, 2006), which is mostly driven by activities in other high-wage countries, while other studies point to a complementary relationship (Brainard and Riker, 1997; Desai, Foley, and Hines, 2009). Aiming to reconcile these contradicting findings, Harrison and McMillan (2009) stress the importance of distinguishing between horizontal and vertical FDI motives, where in the former case foreign labour is a substitute, and in the latter case it is a complement for domestic labour. On the other hand, Becker and Muendler (forthcoming) highlight differences between multinationals' expansions at the extensive and the intensive margin, with domestic employment predominantly responding to changes at the extensive margin. None of the aforementioned studies looks at short-term labour market dynamics. Becker and Muendler (2008) investigate this issue using linked employer-employee data of German multinationals. They find that expansions abroad lead to lower separation rates at home.⁵

³See Crinò (2009) for a recent and comprehensive survey.

⁴Another popular line of research investigates the effects on the skill intensity of domestic production. Whereas Head and Ries (2002) and Hansson (2005), using firm-level data for Japan and Sweden, respectively, find a positive effect of offshore production on the relative demand for skilled labour, Slaughter (2000) finds no significant relationship using industry-level data for the US.

⁵There are a few studies that analyze the impact of industry-level international outsourcing – measured as the share of imported intermediates in industry total output – on individual labour market transitions (Egger, Pfaffermayr, and Weber, 2007; Geishecker, 2008; Munch, forthcoming; Bachmann and Braun, 2008; Baumgarten, 2009). Outsourcing measures in these studies include intra-firm imports and imports from external suppliers. In general they find that it reduces employment stability but to an economically small extent.

Regarding inward FDI, the empirical literature since Caves (1974) has mainly aimed at identifying (potential) spillover effects on the domestic economy, in particular on productivity.⁶ Most have done so with limited success.⁷ However, Javorcik (2004) in her study on Lithuania finds larger effects when she considers spillovers not only in the same industry – as most of the previous literature did – but also in upstream and downstream sectors.

Finally, another related stream of the literature looks at the employment effects of foreign takeovers. In our context, studies that analyze the effect of foreign ownership or foreign acquisitions on plant survival (cf., e.g., Görg and Strobl, 2003, for the former and Bandick and Görg, forthcoming, for the latter) and on individual job security (Andrews, Bellmann, Schank, and Upward, 2007) are of particular interest. These studies again yield mixed results. Moreover, they also abstract from potential industry-wide effects.

3 The Data

3.1 Individual-level data

The data set used is the Employment Panel of the German Federal Employment Agency (“Bundesagentur für Arbeit”, BA), the BA Employment Panel, which is provided at a quarterly frequency for the time period 1998-2007.⁸ The most important data source of the panel is the employment statistics of the BA. These administrative data cover the employment history of all individuals in Germany who work in an employment covered by social security, which corresponds to approximately 75-80% of employment in Germany.⁹ The basis of the employment history is the integrated notification procedure for health insurance, the statutory pension scheme, and unemployment insurance.

At the beginning and at the end of any employment spell, employers have to notify the social security agencies. This information is exact to the day. For spells spanning more than one calendar year, an annual report for each employee registered within the social insurance system is compulsory, and provides an update on, for example, the qualification and the current occupation of the employee. The wage information includes all wage and bonus payments, and is provided on a yearly basis for every employment spell. This implies that, for spells spanning more than one calendar year, the

⁶One example for a study on a different outcome variable, namely wages, is given by Aitken and Harrison (1996). Analyzing data on Mexico, Venezuela and the US, they find positive wage effects for foreign-owned firms in all three countries. They find some indication for spillovers on other domestic firms in the US but not in Mexico and Venezuela.

⁷Görg and Strobl (2001) summarize the earlier literature. A recent example is given by Haskel, Pereira, and Slaughter (2007).

⁸Cf. Koch and Meinken (2004) and Schmucker and Seth (2009) for a description of the data set.

⁹The most important employment types not covered by the data set are self-employment and public servants (“Beamte”).

evolution of wages from one year to the next can be observed. Further worker characteristics included are the year of birth, sex, marital status, and nationality.

The BA Employment Panel is a 1.92% random sample of the employment statistics of the Federal Employment Agency. All individuals from the employment statistics who are born on seven specific days of the year are included in the sample. These days are randomly selected, but remain the same for all waves of the panel. Therefore, the BA Employment Panel is representative for all dependent-status workers covered by social security legislation, and panel mortality is not an issue. The panel provides information on workers at a quarterly frequency, i.e. on 31 March, 30 June, 30 September, and 31 December.

Note that by construction the panel is representative regarding employment covered by the social security system but not regarding unemployment. It contains, however, supplementary information on unemployment episodes of the sampled individuals. Thus, for them we can derive three labour market states at the end of each quarter: employment (E) covered by social security, unemployment (U), if the worker is receiving transfer payments, participates in active labour market programmes or is registered as job-seeking, and non-participation (N). Non-participants are those individuals not recorded in the data set at any of the reference dates. Therefore, this state includes those workers out of the labour market, as well as workers not covered by social security legislation, e.g. civil servants and self-employed workers.

Unfortunately the information on unemployment is not consistent over time. In particular, due to a change in the notification procedures, it is missing for certain municipalities after the year 2005. Thus, to avoid complications, we subsume the states non-participation and unemployment into one category and simply distinguish between periods of employment and periods of non-employment in our analysis. Moreover, we exclude the year 2007 from the analysis in order to avoid potential problems of measurement error. Due to its timeliness the last year of the sample is the only one that hasn't undergone a posterior revision. One particular problem is that information from the last quarter of the previous year is simply extrapolated if the new notification has not yet reached the Federal Employment Agency.

3.2 Industry-level data

According to the OECD benchmark definition (OECD, 1999), FDI reflects the objective of obtaining a lasting interest by an investor –which may be an individual, government or a firm– in a subsidiary operating in another country. FDI involves both the initial transaction between two entities (extensive margin) and the subsequent capital transactions (intensive margin). An investment at the extensive margin either takes place through the foundation of a new subsidiary (Greenfield FDI) or

the acquisition of an equity share in an existing plant or company (usually referred to as cross-border M&A). Cross-border M&As have increased sharply in the last two decades. In years of merger waves, cross-border M&A flows amounted up to 80% of FDI flows and are the dominant market entry mode into high wage countries in terms of the transaction volume (although not necessarily in terms of the number of transactions). Every investment at the intensive margin implies subsequent cross-border investments at the extensive margin.

Our main data source for FDI is the AMADEUS database, which contains information on financial data as well as ownership and subsidiary information for European firms, covering more than 1.000.000 German firms and more than 20.000 foreign subsidiaries. AMADEUS is provided by Bureau van Dijk and Creditreform - the largest credit rating agency in Germany. The AMADEUS database has been used in numerous empirical studies on FDI, most of them measuring productivity and employment effects (see Helpman, Melitz, and Yeaple, 2004; Budd, Konings, and Slaughter, 2005, for instance). Ownership information includes the country of origin, the type of shareholder (private investor, bank, industrial company etc.) and the percentage of equity held by each shareholder. We merged a series of yearly updates of the database (spanning the years 2000-2007) to consider entry and exit of firms and changes in ownership. Data from AMADEUS are used to identify Greenfield Investments and existing linkages between firms and their shareholders and subsidiaries. The fact that the aggregate foreign production activities in our sample are close to official statistics indicates that the AMADEUS data are representative for the purpose at hand.¹⁰

Although AMADEUS contains information about foreign subsidiaries, the data do not allow for a distinction between Greenfield FDI and cross-border acquisitions in many cases. Data on cross-border and domestic M&As are therefore extracted from the ZEPHYR data base compiled by Bureau van Dijk. ZEPHYR includes data on M&As, initial public offerings (IPOs), joint ventures and private equity transactions, and provides information about the date and the value of a deal, the source of financing as well as a description of the type of transaction, and the firms involved in the deal. Compared to other M&A data sources such as Thompson Financial Securities data, the ZEPHYR database has the advantage that there is no minimum deal value for a transaction to be included in the data set. Comparing aggregate statistics derived from own calculations using the ZEPHYR database with those from Thompson financial data reported in Brakman, Garretsen, and Marrewijk (2006), shows that the coverage of transactions with a deal value above US\$ 10 million is very similar.¹¹

Finally, we use data from the OECD STAN database to construct control variables at the industry

¹⁰Bundesbank (2009) reports that sales of foreign affiliates with a direct German equity share increased from 757 to 910 billion euros between 2005 and 2007, while sales of foreign subsidiaries in AMADEUS increased from 786 to 948 billion euros during the same time period.

¹¹Calculations on cross-border acquisitions are available from the authors upon request.

level. These variables include the capital stock, value added, R&D expenditures, imports and exports.

3.3 FDI indicators

We use the firm-level data sets described above to construct FDI indicators at the sectoral level. Following Javorcik (2004) and Aghion, Blundell, Griffith, Howitt, and Prantl (2009), we compute the market share of foreign-owned firms on the German market in each industry. Our first measure of inward FDI thus reads

$$IFDI_{jt} = \frac{\sum_{i \in j} s_{ijt} D_{ijt}(\text{foreignowner})}{\sum_{i \in j} s_{ijt}} \quad (1)$$

s_{ijt} denotes real sales of firm i in industry j in the year t and $D_{ijt}(\text{foreignowner})$ takes the value of one if a foreign firm holds a majority share in firm i , and zero otherwise. As we are interested in changes of firm activity in foreign countries, we will use the first difference of this indicator as explanatory variable in our regression equations. This indicator has several advantages over alternative FDI measures. In contrast to using the number of foreign owned firms it takes the size of firms into accounts, while it is advantageous to using investment flows as it directly takes into account the (change in) production in foreign owned firms and not ownership changes between different foreign investors.

We also calculate indicators for the market entry of foreign investors which differentiate between Greenfield investments and foreign acquisitions. We define the foreign firm entry rates as the share of sales that is generated by subsidiaries of foreign firms that enter the respective German industry for the first time in period t :

$$IFDI_greenfield_{jt} = \frac{\sum_{i \in j} s_{ijt} D_{ijt}(\text{foreignowner\&entrant})}{\sum_{i \in j} s_{ijt}} \quad (2)$$

$$IFDI_acquisition_{jt} = \frac{\sum_{i \in j} s_{ijt} D_{ijt}(\text{foreignacquisition})}{\sum_{i \in j} s_{ijt}} \quad (3)$$

Our indicators for outward FDI are constructed in a similar way: Our measure of outward FDI is defined as the ratio of foreign affiliate to domestic production (including exports).¹²

$$OFDI_{jt} = \frac{\sum_{i \in j} \text{foreignsales}_{ijt}}{\sum_{i \in j} s_{ijt}} \quad (4)$$

In an analogous way to the entry indicators for inward FDI, we calculate indicators for outward FDI at the extensive margin for current entry via Greenfield investment and cross-border acquisitions separately. The indicators are defined as the ratio of foreign production of new entrants to domestic production in the industry:

$$OFDI_greenfield_{jt} = \frac{\sum_{i \in j} \text{foreignsales}_{ijt} D_{ijt}(\text{greenfield})}{\sum_{i \in j} s_{ijt}} \quad (5)$$

¹²In order to avoid including pure financial investments and double counting across industries in our calculation, we deviate from the OECD definition of FDI and only include majority-owned foreign affiliates.

$$OFDI_acquisition_{jt} = \frac{\sum_{i \in j} foreignsales_{ijt} D_{ijt}(acquisition)}{\sum_{i \in j} s_{ijt}} \quad (6)$$

4 Empirical Strategy

In order to gauge the effect of the different FDI dimensions on employment security, we estimate a set of hazard models, which allow us to control for state or duration dependence. Given the availability of our FDI data, our analysis focusses on the manufacturing sector (NACE/ISIC codes 15–36) and the time period 2001–2006. In a first step, we use the BA employment panel data to construct job spells as consecutive quarters worked at the same establishment.¹³ We restrict attention to full-time workers aged 18 to 65 in regular employment, thereby excluding apprentices, part-time employed workers, the marginal employed and individuals who are on leave due to military service, child bearing etc.¹⁴ We consider two different definitions of a failure. According to our first definition a job spell ends if the individual leaves the establishment, no matter whether a period of non-employment or an employment relationship at another establishment follow, which is consistent with the standard concept of job stability (e.g. Farber, 1999). In contrast, in our second definition only transitions into non-employment are coded as failure. Hence, this definition focusses on those out-of-job transitions that are more likely to be involuntary in nature and particularly costly from the perspective of the affected individuals. Unfortunately, our data do not allow us to make further distinctions between quits and layoffs.

Since we have quarterly data we choose a discrete (grouped-time) representation of the hazard model. For this purpose we follow the suggestions of Allison (1982) and Jenkins (1995) and organize the data in person-period form. The job hazard is then defined as the exit probability in the time interval $[t - 1, t)$ conditional upon survival up to $t - 1$:

$$\lambda_i(X_{it}, \alpha_{it}) = Pr(t - 1 \leq T < t | T \geq t - 1, X_{it}, \alpha_{it}), \quad (7)$$

where T is the random duration variable, X_{it} a vector of individual, establishment and industry characteristics, and α_{it} is the baseline hazard. We choose a complementary log-log representation of the hazard rate:

$$\lambda_i(X_{it}, \alpha_{it}) = 1 - \exp(-\exp(\beta' X_{it} + \alpha_{it})), \quad (8)$$

which corresponds to a proportional hazards model of the underlying data process in continuous time. Note that due to the longitudinal character of our data some individuals can have multiple job spells.

¹³Since there is no information linking establishments to firms, our job measure is establishment-based.

¹⁴These sample restrictions imply that transitions from full-time to part-time employment at the same establishment are also coded as failures. We make an exception to this rule when the intervening period not spent in full-time regular employment only lasts for one quarter. Note, however, that these transitions only account for a very small fraction of all transitions and are thus of minor importance.

Instead of imposing a particular functional form on the baseline hazard we model the latter in a semi-parametric way through a set of interval duration dummies. The chosen intervals are (0;1] quarter; (1;2] quarters; (2;3] quarters; (3;4] quarters; (4;6] quarters; (6;8] quarters; (8;11] quarters; and (11; ∞) quarters. Hence, full flexibility is ensured at the beginning of each spell, when many transitions take place.¹⁵ In contrast, we are restricted in the way we model the baseline hazard for long durations due to the nature of our data and our sampling scheme. Since the period of analysis is rather short and we do not want to restrict ourselves to the analysis of short job spells only, we opt for a stock as opposed to a flow sampling scheme. However, one aspect we have to deal with is left-truncation or delayed entry of ongoing spells. That is, in 2001 when our period of analysis starts, many individuals have already been employed for a while at the same establishment. It is important to condition on the elapsed duration in order to obtain unbiased results. We are able to do so – albeit in the aforementioned restricted way – by using the employment information for the years 1998 to 2000, as well. In any case, we consider the implicit assumption that the baseline hazard is constant for all durations greater than 11 quarters to be a reasonable approximation.

The regressor vector X_{it} includes individual and establishment characteristics (age, gender, nationality, the level of education/training, establishment size, the share of high-skilled workers in the establishment and the region of the workplace) as well as the industry-aggregated FDI and M&A indicators as described in Section 3.3. To control for other time-varying industry characteristics, measures of (the log of) industry output (y – measured as the industry production value), the import and export intensities (imp/y and exp/y), the share of R&D expenditures in industry output ($R\&D/y$) as well as the capital-output ratio (k/y) add to the list of explanatory variables.¹⁶ In addition, the model also contains a full set of time and industry dummies in order to capture permanent differences between industries as well as general economic conditions and business cycle effects.

Two additional caveats with respect to our estimation need to be mentioned. First, ignoring unobserved individual heterogeneity when it is important can lead to biased estimation results of the baseline hazard and the response of the hazard rate to changes in the exogenous variables (e.g. Lancaster, 1990). Whereas disentangling true duration dependence from a selection effect is not the aim of the analysis and hence unproblematic, potential biases in the coefficients of the exogenous variables give more cause for concern. This problem, however, has been shown to be important in the presence of a wrong functional form of the baseline hazard and much less so when a flexible specification is chosen (cf. for example Meyer, 1990; Dolton and van der Klaauw, 1995). Moreover, theoretical reasonings (e.g. van den Berg, 2001) and simulation results (cf. Baker and Melino, 2000) indicate that,

¹⁵One reason is that German legislation allows for a probationary period of up to six months during which the standard rules governing employment protection do not apply.

¹⁶To be precise, these variables enter our regression in first differences.

if present at all, biases tend towards zero so that our estimates should rather be conservative and not exaggerated.

Second, our analysis combines individual-level and more aggregated industry-level data. As Moulton (1986, 1990) shows, this can potentially lead to (downward) biased standard errors due to contemporaneous correlation. The standard approach in the literature is to cluster the standard errors which however is only valid under the assumption of a large number of groups relative to the number of observations (see Wooldridge, 2002, Ch. 11, or the discussion in Geishecker, 2008). We deal with this issue in two ways. On the one hand, we cluster the standard errors at the industry-year level, which yields a sufficient number of clusters (around 100, depending on the specification). Second, following Geishecker (2008), we include a full set of industry dummies, which account for any contemporaneous residual correlation that is due to time-constant unobserved group heterogeneity.

5 Results

5.1 Aggregate effects of FDI

We estimate the model described in the previous section for transitions from employment to non-employment, which reflects the notion of employment security.¹⁷ In doing so, we use three different specifications, one for each type of FDI we are interested in. The first specification includes both inward and outward FDI, where FDI comprises both the intensive and the extensive margin. In a second specification, we focus on the extensive margin of inward and outward FDI. Finally, indicators for the components of FDI at the extensive margin, Greenfield FDI and acquisitions, are the explanatory variables of interest in the third specification. All specifications contain the control variables described above, in addition to the different FDI indicators.

The results for the first specification are displayed in Table 4. The control variables have the expected signs. For example, output growth of the establishment, sectoral R&D expenditure, and the share of high-skilled workers in the workforce of the establishment are all significantly correlated with lower transitions to non-employment, i.e. with higher employment security. The indicators for inward outward FDI are both significant at the 1% level, and both have a negative sign. This implies that increased intensities of both inward and outward FDI are associated with a reduced hazard of transiting from employment to non-employment. Thus, both types of FDI seem to have a positive effect on the employment security of workers employed in sectors which experiences increased intensities of FDI, compared to workers in sectors with lower growth rates of R&D intensity.

¹⁷Future versions of this paper will also include transitions out of a job independently of the destination state of a worker, i.e. job-to-job transitions are also included. As described in Section 4, this corresponds to the notion of job security.

Tables 5 and 6 display the results of the specifications including the extensive margin of FDI only, as well as components thereof. As becomes evident in Table 5, there is no significant effect of the extensive margin of neither inward nor outward FDI on the transition hazard analyzed. The same is true when one decomposes FDI at the extensive margin into its components, acquisitions and Greenfield FDI. As the results in Table 6 show, neither of the two components of FDI at the extensive margin is significantly correlated with the transition hazard. Given this result, we conclude that the significant impact of overall inward and outward FDI on the transition hazard to non-employment (cf. Table 4), is driven by FDI at the intensive margin. Therefore, the effects of inward and outward FDI seem to be due to changes in the FDI intensity of existing establishments, rather than to acquisitions or the foundation of new establishments in foreign markets.

In order to quantify the economic significance of our results, we compute marginal effects for our first specification, which includes the indicators for aggregate inward and outward FDI (cf. Table 7). These marginal effects imply that, for inward FDI, an increase by one standard deviation reduces worker flows to non-employment by 0.13 percentage points, which is on average equivalent to 5% of these transitions. Given an increase of outward FDI by one standard deviation, the transitions to non-employment are reduced by 2.2%.

These results are in line with Becker and Muendler (2008), who find positive effects of FDI expansions abroad on the retention of domestic workers in multinational enterprises. One of their explanations for this result is that vertical foreign expansions can lead to cost savings, increased world-wide market shares, and domestic employment growth. Our results imply that these effects work throughout the sectors that increase FDI, which is likely to be due to spill-over effects at the sectoral level.

[RESULTS ON FDI ACCORDING TO DESTINATION REGION (HIGH/LOW-WAGE COUNTRIES): TO BE COMPLETED]

5.2 Heterogeneous effects of FDI

In the final step of our analysis, we examine how the different types of FDI affect different worker groups. In order to do so, we estimate regressions which include the interaction of our FDI indicators with worker age classes, as well as regressions with the interaction of our FDI indicators with workers' skill levels.

The results for workers belonging to different age groups are displayed in Table 8. The effects are similar for inward and outward FDI: positive effects on employment security can only be observed for workers of a medium age. Young and older workers are not significantly affected by either type of FDI.

The heterogeneity of the effects is even stronger when one focuses on the extensive margin of FDI (cf. Table 9). Here, inward FDI increases transitions to non-employment, i.e. it reduces employment security for young workers (aged 18-25) and for old workers (56-65). Opposed to this, employment security rises for middle-aged workers (aged 26-45) as inward FDI increases at the intensive margin. The results for outward FDI at the extensive margin are qualitatively similar, although the heterogeneity between workers of different age is less stark than for inward FDI. Splitting up extensive FDI into its components, acquisitions and Greenfield FDI, one can see that these heterogeneous effects are also qualitatively similar for these different types of FDI (cf. Table 10).

The vulnerability of young and old workers is in all likelihood due to different factors. For young workers, institutional factors of the German labour market, such as firing restrictions, probably play an important role. If firms have to adjust their workforce, it is much more difficult to lay off workers with long tenure than workers who have recently started their job. Therefore, if FDI requires labour market adjustments, the burden is likely to fall on younger workers. For older workers, on the other hand, technology probably plays a more important role. Increased FDI, especially when it takes place at the extensive margin, usually goes together with either technology adoption, changes in work organisation, or both. Older workers may not be able keep up with the resulting work requirements, and are therefore at risk of losing their job. Labour market policies, such as early retirement schemes, are likely to reinforce this effect.

The results for different skill groups reveal heterogeneity along different dividing lines. As Table 11 shows, on the one hand, inward FDI has a positive effect on employment security for medium- and high-skill workers. On the other hand, this is true for low- and medium-skill workers, but not for high-skill workers, in the case of outward FDI. As there are hardly any significant differences between workers with different skill levels for FDI at the extensive margin (cf. Tables 12 and 13), these results seem to be entirely driven by the intensive margin.

6 Conclusion

In this paper, we analyze how foreign direct investment (FDI) affects employment security. Using administrative micro data for German employees allows us to follow individual workers over time. FDI intensity is measured at the sectoral level, which enables us to take into account direct as well as indirect (spillover) effects of FDI. Furthermore, we distinguish between different types of FDI. On the one hand, we analyze the effects of inward and outward FDI simultaneously. On the other hand, we examine the extensive and the intensive margin of FDI, as well as FDI coming from and going to low and high wage countries. Finally, we perform an in-depth analysis of heterogeneous effects

on workers. In particular, we examine whether workers with different skills and of different age are affected differently by FDI.

Our results show that both inward and outward FDI significantly increase employment security. This result seems to be mainly driven by the intensive margin. Both the foundation of new establishments (Greenfield FDI) and acquisitions of existing establishments seem to have no effect on domestic employment security. The aggregate effects of inward and outward FDI are economically significant. For inward FDI, an increase by one standard deviation reduces worker flows to non-employment by 0.13 percentage points, which is on average equivalent to 5% of these transitions. Given an increase of outward FDI by one standard deviation, the transitions to non-employment are reduced by 2.2%.

We furthermore show important heterogeneity in the effects of FDI on workers' employment security. Very young and old workers seem to be negatively affected by both inward and outward FDI. In this respect, both the intensive and the extensive margin play an important role. We put these results down to the institutional features of the labour market, as well as to workers' ability to adapt to changing work requirements. We also find heterogeneity between different skill groups, which are driven by the intensive margin. Overall, however, concerns about the detrimental effects of FDI on workers' employment security seem to be exaggerated.

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Appendix A

Table 1: Indicators of Cross-Border M&As by Sector

	IFDI				OFDI		
	Nace 2	Mean	Std. Dev.	Change	Mean	Std. Dev.	Change
				2002-2007			2002-2007
Food & tobacco products, beverages	15&16	0.046	0.007	-0.013	0.009	0.001	-0.002
Textiles	17	0.069	0.007	-0.005	0.007	0.002	0.005
Wearing apparel, dressing, fur dyeing, leather, leather products, footwear	18&19	0.053	0.016	0.029	0.027	0.008	0.02
Wood, products of wood and cork	20	0.045	0.011	-0.015	0.005	0.002	-0.003
Paper, paper products	21	0.121	0.010	-0.014	0.015	0.005	0.01
Printing, publishing	22	0.060	0.028	-0.029	0.003	0.001	0.002
Coke, refined petroleum, nuclear fuel, chemicals, chemical products	23&24	0.163	0.020	-0.025	0.042	0.013	0.005
Rubber, Plastics Products	25	0.12	0.024	0.021	0.028	0.007	0.016
Other non-metallic mineral products	26	0.134	0.042	-0.031	0.039	0.015	0.017
Basic metals	27	0.137	0.021	-0.026	0.120	0.042	0.076
Fabricated metals products	28	0.078	0.02	-0.036	0.029	0.012	0.004
Machinery and equipment nec	29	0.118	0.016	-0.026	0.068	0.008	-0.002
Office, accounting, comp. machinery	30	0.299	0.127	-0.274	0.12	0.079	-0.117
Electrical machinery and apparatus nec	31	0.191	0.048	-0.037	0.135	0.049	-0.041
Radio, TV, communication equipment	32	0.155	0.053	-0.035	0.137	0.314	-0.765
Medical precision, optical instruments	33	0.064	0.006	0.002	0.023	0.007	0.017
Motor vehicles, trailers, semi-trailers	34	0.213	0.095	-0.144	0.101	0.041	0.095
Other transport equipment	35	0.233	0.043	-0.063	0.047	0.017	0.043
Manufacturing nec	36	0.046	0.006	0.016	0.006	0.001	-0.002
Recycling	37	0.062	0.081	0.008	0.003	0.004	0.008

Data source: Amadeus data set. Authors' calculations for the time period 2002-2007.

Note: "nec" stands for "not elsewhere classified".

Table 2: IFDI by Sector

	IFDI greenfield				IFDI acquisition		
	Nace 2	Mean	Std. Dev.	Change	Mean	Std. Dev.	Change
				2002-2007			2002-2007
Food & tobacco products, beverages	15&16	0.00047	0.00065	0.00016	0.0072	0.0046	-0.0092
Textiles	17	0.00083	0.0012	0.0011	0.0092	0.006	-0.0088
Wearing apparel, dressing, fur dying	18	0.0004	0.0005	0.0011	0.0106	0.0125	-0.0197
Leather, leather products, footwear	19						
Wood, products of wood and cork	20	0.0007	0.0014	0.0034	0.0067	0.0054	-0.0153
Paper, paper products	21	0.0020	0.0024	-0.0029	0.0129	0.0073	-0.0181
Printing, publishing	22	0.00019	0.00026	0.00015	0.0016	0.00066	-0.00012
Coke, refined petroleum, nuclear fuel, chemicals, chemical products	23&24	0.0022	0.0024	0.00088	0.023	0.0150	-0.0108
Rubber, Plastics Products	25	0.0054	0.0093	0.00019	0.0172	0.005	-0.0045
Other non-metallic mineral products	26	0.00068	0.00086	-0.0020	0.0427	0.0375	0.0022
Basic metals	27	0.0008	0.0018	-0.0045	0.0178	0.0107	-0.0136
Fabricated metals products	28	0.0015	0.0030	0.0012	0.0175	0.0184	-0.0495
Machinery and equipment nec	29	0.0018	0.0012	-0.0001	0.0143	0.0087	-0.0185
Office, accounting, comp. machinery	30	0.0007	0.0011	-0.0024	0.0221	0.0251	-0.0219
Electrical machinery and apparatus nec	31	0.0045	0.0071	0.00007	0.0437	0.0481	-0.0606
Radio, TV, communication equipment	32	0.00086	0.0013	0.0027	0.0105	0.0063	-0.0127
Medical precision, optical instruments	33	0.00013	0.00014	0.00034	0.0129	0.0074	-0.01227
Motor vehicles, trailers, semi-trailers	34	0.0074	0.0968	0.0039	0.0205	0.0192	0.0210
Other transport equipment	35	0.0051	0.0117	0.00031	0.039	0.0579	-0.1520
Manufacturing nec	36	0.00033	0.00031	0.000027	0.0087	0.0052	0.0043
Recycling	37	0.0353	0.086	0.00055	0.0079	0.0096	0.00082

Data source: Amadeus data set. Authors' calculations for the time period 2002-2007.

Note: "nec" stands for "not elsewhere classified".

Table 3: OFDI by Sector

	Nace 2	OFDI greenfield			OFDI acquisition		
		Mean	Std. Dev.	Change 2002-2007	Mean	Std. Dev.	Change 2002-2007
Foods & tobacco products, beverages	15&16	0.00043	0.00052	-0.00077	0.0058	0.0057	-0.0039
Textiles	17	0.00042	0.00069	-0.00029	0.0070	0.0107	-0.0226
Wearing apparel, dressing, fur dying leather, leather products, footwear	18&19	0.00056	0.00075	-0.00010	0.00066	0.0011	0.00
Wood, products of wood and cork	20	0.000075	0.00018	-0.00045	0.00	0.00	0.00
Paper, paper products	21	0.00080	0.0017	-2.55e-06	0.0068	0.0106	0.00037
Printing, publishing	22	0.00022	0.00024	-0.00034	0.0054	0.0098	0.00023
Coke, refined petroleum, nuclear fuel, chemicals, chemical products	23 &24	0.0026	0.0023	0.00023	0.0101	0.0073	0.0091
Rubber, Plastics Products	25	0.0020	0.0028	0.000043	0.0050	0.0085	0.00068
Other non-metallic mineral products	26	0.0035	0.0038	0.0054	0.0030	0.0060	0.0031
Basic metals	27	0.0069	0.0067	-0.0075	0.0160	0.0162	-0.0025
Fabricated metals products	28	0.0014	0.0012	0.0016	0.0040	0.0086	0.0010
Machinery and equipment nec	29	0.0048	0.0038	0.0023	0.0127	0.0125	-0.0045
Office, accounting, comp. machinery	30	0.00040	0.00047	0.00039	0.00	0.00	0.00
Electrical machinery and apparatus nec	31	0.021	0.0348	0.0086	0.0057	0.0087	0.0144
Radio, TV, communication equipment	32	0.0064	0.0138	-0.0338	0.0104	0.0215	0.0517
Medical precision, optical instruments	33	0.0043	0.0038	0.0056	0.016	0.0101	0.0123
Motor vehicles, trailers, semi-trailers	34	0.00380	0.00750	0.003	0.0033	0.0076	-0.0186
Other transport equipment	35	.00096	.0010749	.0015402	.0052801	.0120133	.0278222
Manufacturing nec	36	0.00031	0.0005	0.00032	0.00033	0.00077	0.000062
Recycling	37	0.000048	0.00012	0.00	0.000036	0.000088	-0.00021

Data source: Amadeus data set. Authors' calculations for the time period 2002-2007.

Note: "nec" stands for "not elsewhere classified".

Table 4: The effect of inward and outward FDI on the transition hazard from employment to non-employment

	Coefficient	SD	P-value
d(IFDI)	-.6960	.1858	0.000
d(OFDI)	-.2306	.0879	0.009
d(exp/y)	-.0865	.3013	0.774
d(imp/y)	-.3916	.2268	0.084
d(log(y))	-.8911	.2446	0.000
d(k/y)	.7866	.5889	0.182
R&D/y	-6.7606	3.564	0.058
share high-skill	-.2888	.05642	0.000
No. of observations	2,306,461		

Data: BA Employment Panel, authors' calculations for the time period 2001-2006.

Notes: d is the difference operator. Variables at the sectoral level: IFDI and OFDI, indicators for inward and outward FDI as defined in Equations 1 and 4, respectively; y is sectoral production value, k the capital stock, exp/y and imp/y denote export and import intensity, $R\&D$ is expenditure on research and development. "Share high-skill" is measured at the firm level and denotes the share of high-skilled workers in a firm's workforce. Further control variables included: sex, age, level of education/training, nationality (all at the individual level); firm size, firm location (East/West Germany); full set of year and industry dummies. Standard errors are clustered at the industry-year level.

Table 5: The effect of the extensive margin of inward and outward FDI on the transition hazard from employment to non-employment

	Coefficient	SD	P-value
OFDI extma	.0568771	.3203519	0.859
IFDI extma	-.1441555	.1523545	0.344
d(exp/y)	-.0756798	.2541097	0.766
d(imp/y)	-.4008097	.2116671	0.058
d(log(y))	-.9013425	.3094839	0.004
d(k/y)	-.0725519	.5289029	0.891
R&D/y	-.5914898	.6532208	0.365
share high-skill	-.2960898	.051196	0.000
No. of observations	2,787,220		

Note: *OFDI extma* and *IFDI extma* are the indicators for outward FDI and inward FDI measured at the extensive margin, respectively. See notes to Table 4 for the definitions of the other variables.

Table 6: The effect of inward/outward acquisitions and Greenfield FDI on the transition hazard from employment to non-employment

	Coefficient	SD	P-value
IFDI acqui	-.246874	.2892472	0.393
IFDI green	-.0549473	.1851162	0.767
OFDI acqui	-.9536213	.8035238	0.235
OFDI green	.4565633	.4668845	0.328
d(exp/y)	-.0837114	.2534699	0.741
d(imp/y)	-.4255019	.2146801	0.047
d(log(y))	-.881031	.2958662	0.003
d(k/y)	-.5870861	.6415759	0.360
R&D/y	-3.643881	3.722256	0.328
share high-skill	-.2960898	.051196	0.000
No. of observations	2,787,220		

Note: *IFDI/OFDI acqui* and *IFDI/OFDI green* are the indicators for inward/outward foreign acquisitions and Greenfield FDI, respectively. See notes to Table 4 for the definitions of the other variables.

Table 7: Marginal effects of inward and outward FDI on the transition hazard from employment to non-employment

	dy/dx	Std. Err.	P-value
d(IFDI)	-.0176611	.0047162	0.000
d(OFDI)	-.0058522	.0022308	0.009
d(exp/y)	-.0021957	.0076464	0.774
d(imp/y)	-.0099355	.0057559	0.084
d(log(y))	-.0226111	.0062025	0.000
d(k/y)	.0199596	.0149423	0.182
R&D/y	-.1715318	.0903356	0.058

Note: See notes to Table 4.

Table 8: The effect of inward and outward FDI on the transition hazard from employment to non-employment for different age groups

	Coefficient	P-value
IFDI×age 18-25	-.2383168	0.510
IFDI×age 26-35	-.5998193	0.049
IFDI×age 36-45	-.2821129	0.606
IFDI×age 46-55	-1.191817	0.040
IFDI×age 56-65	-1.097864	0.314
OFDI×age 18-25	-.1194165	0.419
OFDI×age 26-35	-.2277309	0.066
OFDI×age 36-45	-.3175656	0.067
OFDI×age 46-55	-.1488469	0.299
OFDI×age 56-65	-.0146159	0.977
No. of observations	2,787,220	

Note: Further explanatory variables included as in Table 4.

Table 9: The effect of inward and outward FDI at the extensive margin on the transition hazard from employment to non-employment for different age groups

	Coefficient	P-value
IFDI extma×age 18-25	.8191732	0.000
IFDI extma×age 26-35	-1.366045	0.000
IFDI extma×age 36-45	-1.390739	0.001
IFDI extma×age 46-55	-.2545356	0.648
IFDI extma×age 56-65	1.968399	0.000
OFDI extma×age 18-25	.8725256	0.649
OFDI extma×age 26-35	-.7440874	0.075
OFDI extma×age 36-45	-1.245095	0.015
OFDI extma×age 46-55	-1.073774	0.251
OFDI extma×age 56-65	2.453625	0.059
No. of observations	2,787,220	

Note: Further explanatory variables included as in Table 4.

Table 10: The effect of inward/outward acquisitions and Greenfield FDI on the transition hazard from employment to non-employment for different age groups

	Coefficient	P-value
IFDI acqu \times age 18-25	0.7686024	0.057
IFDI acqu \times age 26-35	-1.490454	0.008
IFDI acqu \times age 36-45	-0.9324408	0.098
IFDI acqu \times age 46-55	-1.18622	0.036
IFDI acqu \times age 56-65	1.48193	0.070
IFDI green \times age 18-25	0.8231071	0.000
IFDI green \times age 26-35	-1.358902	0.000
IFDI green \times age 36-45	-2.192234	0.000
IFDI green \times age 46-55	0.5486194	0.014
IFDI green \times age 56-65	2.556705	0.000
OFDI acqu \times age 18-25	0.6441197	0.588
OFDI acqu \times age 26-35	-3.262887	0.032
OFDI acqu \times age 36-45	-2.150684	0.252
OFDI acqu \times age 46-55	-3.887629	0.010
OFDI acqu \times age 56-65	4.692269	0.038
OFDI green \times age 18-25	0.9144387	0.019
OFDI green \times age 26-35	-0.0344663	0.964
OFDI green \times age 36-45	-0.9663137	0.430
OFDI green \times age 46-55	0.180857	0.906
OFDI green \times age 56-65	1.460358	0.462
No. of observations	2,787,220	

Note: Further explanatory variables included as in Table

4.

Table 11: The effect of inward and outward FDI on the transition hazard from employment to non-employment for different skill groups

	Coefficient	P-value
IFDI \times mis skill	-0.3423684	0.472
IFDI \times low skill	-0.0571498	0.842
IFDI \times med skill	-0.8812607	0.000
IFDI \times high skill	-0.9235002	0.051
OFDI \times mis skill	-0.0324823	0.882
OFDI \times low skill	-0.3320888	0.007
OFDI \times med skill	-0.1735882	0.077
OFDI \times high skill	-0.2581238	0.119
No. of observations	2,787,220	

Note: *mis skill* and *med skill* stand for missing skill information and the medium skill class, respectively. Further explanatory variables included as in Table 4.

Table 12: The effect of inward and outward FDI at the extensive margin on the transition hazard from employment to non-employment for different age groups

	Coefficient	P-value
IFDI ext \times mis skill	0.317102	0.204
IFDI ext \times low skill	-0.1655532	0.502
IFDI ext \times med skill	-0.1055386	0.539
IFDI ext \times high skill	-0.6617393	0.301
OFDI ext \times mis skill	0.582336	0.364
OFDI ext \times low skill	0.0778504	0.892
OFDI ext \times med skill	-0.0932428	0.804
OFDI ext \times high skill	-0.4213264	0.587
No. of observations	2,787,220	

Note: Further explanatory variables included as in Table 4. The skill variables are defined as in Table 11.

Table 13: The effect of inward/outward acquisitions and Greenfield FDI on the transition hazard from employment to non-employment for different age groups

	Coefficient	P-value
IFDI acqu \times mis skill	0.1263363	0.777
IFDI acqu \times low skill	-0.218451	0.611
IFDI acqu \times med skill	-0.2709284	0.353
IFDI acqu \times high skill	-1.587185	0.084
IFDI green \times mis skill	0.4506285	0.063
IFDI green \times low skill	-0.2094586	0.221
IFDI green \times med skill	-0.0167971	0.927
IFDI green \times high skill	0.3883429	0.174
OFDI acqu \times mis skill	0.0345186	0.984
OFDI acqu \times low skill	-1.316576	0.296
OFDI acqu \times med skill	-1.046619	0.340
OFDI acqu \times high skill	2.73727	0.315
OFDI green \times mis skill	0.734101	0.223
OFDI green \times low skill	0.5314024	0.337
OFDI green \times med skill	0.2132712	0.676
OFDI green \times high skill	-1.032862	0.065
No. of observations	2,787,220	

Note: Further explanatory variables included as in Table

4. The skill variables are defined as in Table 11.