Cross-border Investment, Heterogeneous Workers, and Employment Security: Evidence from Germany

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PRELIMINARY

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Abstract

We analyse how foreign direct investment (FDI) affects employment security using administrative micro data for German employees. FDI intensity is measured at the industry level, which enables us to take into account the sum of direct effects at the investing firms as well as indirect effects of FDI that stem from competitive effects, input-output linkages, and technology spillovers. We account for both inward and outward FDI, and differentiate these two types of FDI by source and destination region, respectively. We also investigate whether specific worker groups are affected differently by FDI. We find that both inward and outward FDI at the industry level significantly reduces employment security. This is particularly the case for inward FDI coming from the western part of the European Union, as well as for outward FDI going to Central and Eastern Europe. We also show that the most affected workers are old as well as low- and medium-skilled workers.

JEL codes: *F21, F23, J23, J63*
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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 due to increased specialization and induce an international diffusion of technology. On the other hand, politicians and employees in industrialized countries are concerned about the potential negative effects on wages and job security. One particular concern is that FDI leads to increased lay-offs of low-skilled workers.

Despite a growing number of studies, the question whether outward FDI complements or substitutes for domestic employment still seems to be unresolved as existing empirical studies yield conflicting results.[2] The existing literature on the employment effects of FDI consists on the one hand of industry- and country-level studies (see e.g. Slaughter, 2000) 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 competitive effects, spillovers, factor price changes, and input-output linkages. For instance, Girma and Görg (2007) argue that the wage increases which are frequently observed in acquired plants after foreign acquisitions do not allow them to draw welfare conclusions because higher wages might harm competitors and reduce their demand for labour. Similarly, competitive pressure induced by foreign firm entry can negatively affect incumbent firms' growth or even drive them out of the market (Kosova, 2009). Moreover, there is also a large empirical literature on productivity spillovers induced by FDI, see e.g. Javorcik (2004). In addition, most previous 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 the paper is to analyse how individual employment security in Germany is affected by FDI. Studying effects on employment security is important not only because it affects individuals' utility, but also because even temporary non-employment induces search costs and welfare losses due to a non-productive allocation of produc-

[1] Cf. `http://stats.unctad.org/FDI/TableViewer/tableView.aspx?ReportId=1254`.

[2] See the next section for a review of the related literature.

tion factors. The case of Germany is particularly interesting not only because the German economy is the largest economy in the European Union, but also because Germany is characterized by highly regulated labour markets and rigid wages. Due to these labour market characteristics, FDI is likely to affect job security more than individual wages.

We contribute to the existing literature in several respects. First, we are able to measure industry-wide effects of FDI, thus taking into account direct as well as indirect effects. Second, we distinguish between different types of FDI. On the one hand, we analyse the effects of inward and outward FDI simultaneously. On the other hand, we distinguish between different destination regions of outward FDI and different source regions of inward FDI. Third, 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.[3] Finally, we also analyse if the effect of FDI depends on whether it takes place at the extensive or at the intensive margin.

The remainder of this paper is structured as follows. The next section reviews 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 industry and year. The empirical strategy is laid out in Section 4, Section 5 contains the main results. Section 6 summarizes and concludes the analysis.

2 Related literature

The expected labour market effects of inward and outward FDI are closely related to the various types of FDI and the underlying motives for the investments. Trade theory 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, horizontal FDI is conducted to gain access to foreign markets via greenfield investments (new firms or production units founded by foreign investors) and therefore adds new production facilities to the host country. Furthermore, since firms that engage in FDI have a productivity advantage, technology spillovers to firms in the host country can be expected. However, job creation in new plants can be accompanied by reduced innovation incentives for technological laggards (Aghion, Blundell, Griffith, Howitt, and Prantl, 2009), rising wages, or a crowding out of domestic production (Kosova, 2009) that

[3] Moreover, by taking into account individual-level heterogeneity, we avoid aggregation bias and considerably mitigate potential problems of endogeneity bias. In particular, labour market outcomes of individual workers are unlikely to influence industry aggregates. See also the related discussion in e.g. Geishecker and Görg (2008).

leads to a reduction in labour demand and job security in the host country. From the perspective of the home country, FDI might substitute exports and thus reduce domestic production.

However, horizontal outward FDI might also positively affect domestic employment, at least for certain worker groups. The knowledge capital model (Carr, Markusen, and Maskus, 2001) explains the existence of multinational enterprises with the availability of firm-specific assets which are costly to replicate, but can be transferred to foreign affiliates. This induces firms to concentrate skill-intensive services at the headquarter. It is likely that this channel rather benefits highly educated and productive workers. Indeed, there is evidence that multinational activity is associated with increased demand for headquarter activities such as R&D or marketing (Fors and Svensson, 2002) and a rising skill intensity in the home country (see, for instance, Head and Ries, 2002).

Another type of FDI consists of vertical cross-border investments that arise due to differences in factor prices across countries (Head and Ries, 2003) and substitute for upstream production stages. In industrialized countries, vertical FDI typically affects workers with a low education and productivity whose jobs are relocated to low wage countries. It may not only reduce labour demand within the investing firm, but may also harm workers in supplying firms, whose production processes are replaced by those of foreign affiliates. This type of FDI can be interpreted as offshoring within the boundaries of the firm. While it is likely that offshoring leads to reduced labour demand for some groups of workers, the effect might be offset by a productivity increase that stems from cost savings and benefits workers of some if not all skill groups (Grossman and Rossi-Hansberg, 2008). While most researchers assume that horizontal investments are the prevalent mode of FDI, others argue that most FDI is neither purely horizontal nor purely vertical (Helpman, 2006; Alfaro and Charlton, 2009).

Cross-border mergers and acquisitions – which take a considerable share in FDI – may in addition be motivated by market power (Neary, 2007) or by the desire to gain access to country- or firm-specific assets (Nocke and Yeaple, 2007, 2008) or by efficiency motives, exploiting economies of scale and scope (Röller, Stennek, and Verboven, 2001). The expected effects of FDI through acquisitions depend on whether efficiency increases exist and whether they are large enough to outweigh the reduction in production due to increased market concentration. 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. Hence, the research question ultimately boils down to an empirical matter.

The existing empirical literature is quite sizable when it comes to labour market effects of outward FDI.[4] 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

[4]See Crinò (2009) for a recent and comprehensive survey.

production. 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. In their study on the US, they find foreign and domestic labour to be substitutes in the case of horizontal FDI and to be complements in the case of vertical FDI. On the other hand, Muendler and Becker (2010) 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 for German multinationals. They find that expansions abroad lead to lower separation rates at home.[5] Another 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.

Regarding inward FDI, the empirical literature 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] Another related strand of the literature investigates labour market effects of foreign ownership and cross-border mergers and acquisitions (M&As). Görg and Strobl (2003) find that foreign-owned firms are more likely to exit the market, but that jobs generated in these firms are more stable. Results on the effects of foreign acquisitions on employment growth in target firms are mixed (Arnold and Javorcik, 2009; Bandick and Görg, 2010; Girma and Görg, 2004). Stiebale and Trax (forthcoming) find positive effects of cross-border M&As on the acquirers' domestic employment growth rates.

[5] There are a several studies that analyse 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, 2010; Bachmann and Braun, 2011; Baumgarten, 2009). Outsourcing measures in these studies include intra-firm imports and imports from external suppliers. These studies yield mixed results concerning the effects of outsourcing on employment stability.

[6] One example for a study on a different outcome variable, namely wages, is given by Aitken and Harrison (1996). Analysing 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.

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

3 Data and measurement

3.1 Individual-level data

In order to follow individual workers' employment history over time, we use 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 current wage income, the qualification, and the current occupation of the employee. 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 quarterly data of the employment statistics which includes all individuals of the population who are born on seven specific days of the year. 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.

In addition, the panel contains 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 covered by social security, unemployment if the worker is receiving transfer payments, participates in active labour market programmes or is registered as job-seeking, and non-participation if there is no record of the individual at the reference date.

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

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

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

analysis. Moreover, we exclude the year 2007 from the analysis in order to avoid potential problems of measurement error. This is because, due to its timeliness, the last year of the sample is the only one that has not 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 and measurement of FDI

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.[10]

To construct industry-level FDI indicators from the AMADEUS database, we proceed as follows.[11] Following Javorcik (2004) and Haskel, Pereira, and Slaughter (2007), we compute the market share of foreign-owned firms on the German market in each industry. Our first measure of inward FDI thus reads

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

s_{ijt} denotes real sales of firm i in industry j in the year t and $D_{ijt}(foreignowner)$ takes the value of one if a foreign firm holds a majority share in firm i, and zero otherwise. An industry is defined at the two digit NACE level. 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 account. Furthermore,

[10] 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. Bundesbank (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. Note that the FDI definition we use for our empirical analysis differs from the one used in German official statistics since we do not impose a minimum threshold on the value of total assets, but restrict our analysis to majority-owned affiliates.

[11] Since the industry classification is the same as in the BA Employment Panel, these aggregate indicators can be merged with the individual employment biographies in the subsequent empirical analysis. However, no such link between FDI and individual workers can be established at the firm level because corresponding firm identifiers are not available in the BA Employment Panel.

unlike investment flows it directly measures the (change in) production in foreign-owned firms and not ownership changes between different foreign investors.

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]

$$OFDI_{jt} = \frac{\sum_{i \in j} foreignsales_{ijt}}{\sum_{i \in j} s_{ijt}}. \tag{2}$$

Finally, we use data from the OECD STAN database to construct control variables at the industry level. These variables include the capital stock, the production value, R&D expenditures, imports, and exports. Detailed descriptive statistics of our FDI indicators by industry are given in Table 1. Table 2 contains summary statistics of all remaining variables.

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 data availability, our analysis focusses on the manufacturing sector (NACE Rev 1.1. 15–36) and the time period 2002–2006. In a first step, we use the BA employment panel data to construct employment spells as consecutive quarters spent in employment. Accordingly, a failure occurs if the individual makes a transition from employment to non-employment between two adjacent quarters.

We restrict attention to full-time workers aged 18 to 64 in regular employment, thus excluding apprentices, part-time and marginal employed workers, as well as individuals who are on leave due to military service, child bearing etc.[13]

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 defined as the exit probability in the time interval $[t,\, t+1)$ conditional upon survival up to t:

$$\lambda_i(X_{it}, \alpha_{it}) = Pr(t \leq T < t+1 | T \geq t, X_{it}, \alpha_{it}), \tag{3}$$

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

[12] In 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.

[13] These 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.

the hazard rate:

$$\lambda_i(X_{it}, \alpha_{it}) = 1 - \exp\left(-\exp\left(\beta' X_{it} + \alpha_{it}\right)\right), \tag{4}$$

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 employment spells.

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; $(11;15]$ quarters; and $(15;\infty)$ quarters. Hence, full flexibility is ensured at the beginning of each spell, when many transitions take place.[14] 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 2002 when our period of analysis starts, many individuals have already been employed for a while. 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 2001, as well. In any case, we consider the implicit assumption that the baseline hazard is constant for all durations greater than 15 quarters to be a reasonable approximation.[15]

The regressor vector X_{it} includes individual, plant, and industry level characteristics. At the individual level, we control for age, tenure, gender, nationality, and the level of education and training. In particular, we use the information on the level of education and training to define three skill groups. Low-skilled workers are individuals with primary or lower secondary education, medium-skilled workers are individuals with secondary education and/or a completed apprenticeship, and high-skilled workers are individuals with tertiary education.[16] Information about skills and age are also used to estimate heterogeneous effects for workers with different characteristics. At the establishment level, we control for size, the share of high-skilled workers, and the region of the workplace. At the industry level, we use the aggregated FDI indicators as described in the data section. We control for several

[14] One 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.

[15] Indeed, Kaplan-Meier curves of job durations shown by Boockmann and Steffes (2010) have largely flattened out after 1,500 days.

[16] To correct for inconsistent and missing information on the individual's education, we correct the education variable following an imputation procedure provided by Fitzenberger, Osikominu, and Völter (2006). Specifically, we use the imputation procedure 2B proposed by the authors, where education reports are extrapolated if a person's education sequence is consistent, i.e. non-decreasing over time.

other time-varying industry characteristics that are expected to affect both FDI and employment dynamics according to economic theory. A measure of (the log of) industry output ($\log Y$ – measured as an industry's production value) is employed to control for changes in demand. The net export intensity ($(EXP - IMP)/Y$) controls for other aspects of international competition. The share of R&D expenditures in industry output ($R\&D/Y$) as well as (the log of) the industry capital stock ($\log K$) control for (changes in) production technology and the knowledge content of an industries' output which are likely to affect the demand for heterogeneous skill groups. To reduce concerns about endogeneity and to allow for a sufficiently long time span for the effects to materialize, we use lagged values of all our industry-level variables.[17] In addition, the model also contains a full set of industry and quarterly time dummies in order to capture permanent differences between industries as well as general economic conditions and business cycle effects. The presence of industry fixed effects also ensures that it is indeed the variation of our FDI measures (and the other time-varying industry variables) within industries over time that drives the regression results, not their differences in the cross-section.

Two additional caveats with respect to our estimation need to be mentioned. First, ignoring unobserved individual heterogeneity 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). While 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 – which stem from overestimating state dependence – 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, if present at all, regressors that do not measure state dependence tend to be biased towards zero so that our estimates should rather be conservative and not exaggerated. Any estimation procedure that accounts for unobserved heterogeneity by including random effects relies on the assumption of independence of observations between cross-sectional observations units. Since our model includes regressors that vary across industry and time, but not across individuals within an industry, this assumption cannot be met. Hence, estimating a pooled model instead of a random effects specification is advantageous for our purpose. Nevertheless, as a robustness check, we also estimate a hazard model which explicitly takes account of unobserved individual heterogeneity

[17] We thereby follow the example of Liu and Trefler (2008), who estimate the effect of service in- and outsourcing on different labour market transition probabilities using a sample of US workers.

by including a normally distributed random effect.[18,19]

Second, as shown by Moulton (1986, 1990), the combination of individual-level and aggregated industry-level data can potentially lead to (downwardly) biased standard errors due to dependent errors across individuals. We deal with this issue by clustering the standard errors at the industry-year level, which corresponds to the level of aggregation of the industry-level variables.[20] Moreover, note that any contemporaneous residual correlation that is due to time-constant unobserved group heterogeneity is accounted for by industry dummies.

5 Results

In a first step, we estimate the model described in the previous section for transitions from employment to non-employment including aggregate measures of both inward and outward FDI as our main explanatory variables of interest. In the first extension of this baseline specification, we analyse whether the source (destination) regions of inward (outward) FDI matter for the labour market effects of FDI. In further extensions, we also examine heterogeneous effects on workers of different age and skill groups, and interactions between the regional differentiation of FDI and skill groups. Finally, we analyse how different margins of FDI, namely the extensive and the intensive margin, affect employment security.

5.1 Baseline results

Table 4 presents the estimation results for the baseline specification, displaying the coefficients and standard errors of the FDI indicators as well as the control variables. The coefficients of the control variables have the expected signs and can be summarized as follows. First, the likelihood of making a transition from employment to non-employment decreases with rising employment duration and job tenure, which may be due to the accumulation of (specific) human capital, but also reflect the selection of workers into longer-lasting jobs based on unobservables (cf. Kiefer, 1988). Second, there is a U-shaped relationship between age and the hazard rate, with young (18–25 years) and older (55–64 years) workers being more at risk than middle-aged workers. This mirrors the hump-shaped relationship between productivity and age, which has been documented in previous empirical work

[18] The estimation results from the random effects model turn out to be very similar to the estimation results from the standard complementary log-log model. They can be obtained from the authors upon request.

[19] In principle, the presence of repeated spells for some individuals would also allow for a fixed-effects regression framework. However, the sample period is short so that a large – and most likely not random – share of observations (from individuals without repeated spells) would be lost. In general, censoring is widespread and not independent of the length of preceding spells, which renders a fixed-effects treatment inappropriate (cf. van den Berg, 2001).

[20] The significance of the results remains unchanged when clustering at the industry level instead.

(see, for instance, Skirbeek, 2004 for an overview), but is in all likelihood also due to additional factors. For younger workers, less stringent firing restrictions applying to workers who have just recently started their job probably constitute an important determinant while for older workers, (early) retirement becomes increasingly relevant. Third, employment security increases in the skill level. Fourth, women and workers with foreign nationality are more likely to leave employment than men and German workers, respectively (cf. Royalty, 1998). Fifth, turning to establishment-level variables, employment security rises with establishment size and the share of high-skilled workers in the workforce (cf. Bachmann and David, 2010). Interestingly, conditional on our extensive set of control variables, working in eastern Germany – which still displays much higher unemployment rates than western Germany – is not associated with a significantly higher transition rate from employment to non-employment.

We now turn to the industry-level variables. It can be seen that net export intensity, output, and R&D intensity are all correlated with lower transitions to non-employment, i.e. with higher employment security, although none of these coefficients is statistically significant at conventional levels. By contrast, the industry capital stock is negatively and significantly correlated with employment security, which could be a sign of firms replacing labour with capital.

The indicators for inward and outward FDI are both significant at the 5% level, and both have a positive sign. This implies that increased intensities of both inward and outward FDI are associated with an increased hazard of transiting from employment to non-employment. Thus, both types of FDI seem to have a negative effect on the employment security of workers employed in industries which experience increased intensities of FDI, compared to workers in industries with lower growth rates of FDI.

In quantitative terms, a percentage point increase in inward FDI (outward FDI) is associated with an increase in the hazard rate by 0.7 (0.3) per cent. However, to assess the economic significance of the effects, we also have to take into account the actual variation in our FDI measures. We therefore compute the implied effects of an FDI increase by one within-industry standard deviation. We prefer the within-industry over the total standard deviation since in our specification with industry dummies, we rely on within-industry variation across time to identify the parameters. Specifically, we use the formula $(\exp(SD * \hat{\beta}_{FDI}) - 1) * 100\%$, where SD is the sample average of within-industry standard deviations of the respective FDI indicator, and $\hat{\beta}_{FDI}$ is the estimated coefficient of the respective regression. We find that the results from our baseline specification imply an increase of the hazard of an individual worker making a transition to non-employment of 1.9 per cent and 1.8 per cent for inward FDI and outward FDI, respectively.[21] Therefore, the baseline effects are quantitatively

[21]The within-industry standard deviations of inward and outward FDI in the regression sample are 0.027 and 0.060, respectively (cf. Table 3).

relatively small, but non-negligible.[22]

The results concerning outward FDI are at odds 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 the positive effects of Becker and Muendler (2008) at the firm level cannot be generalized to the industry level. One explanation for this may be that large multinational firms reduce their demand for products from domestic firms as they expand abroad, thus reducing labour demand in the affected firms. An alternative and potentially complementary explanation is that multinationals investing abroad become more efficient and productive, gain market shares at the expense of domestic competitors and force them to exit the market or to cut production and employment. Further, Becker and Muendler (2008) focus only on the intensive margin of FDI, while our measure includes the extensive and the intensive margin of FDI. It might well be that substitution mainly takes place when foreign markets are entered, while subsequent investments in existing affiliates may be complementary or unrelated to domestic production. Indeed, in a different paper Muendler and Becker (2010) find that FDI at the extensive margin – induced by international wage differences – has large effects on domestic employment. We investigate effects of FDI at different margins in the next section in more detail.

The nature of FDI may be very different according to its origin (for inward FDI) or its destination (for outward FDI). It is likely that outward FDI of the vertical type is rather conducted in Eastern European countries, while horizontal FDI rather takes place in western European countries or the US, although to some degree vertical linkages may play a role for investment into all countries (Alfaro and Charlton, 2009). There are various reasons to expect that the effects of inward FDI may vary by region as well. For instance, it can be assumed that German companies compete most intensely with firms from other western European countries and that the effects of inward FDI depend on the degree of technological development of the source country. We therefore perform an additional regression which includes FDI indicators for different regions. For inward FDI, we distinguish between FDI coming from the western countries of the European Union (EU), and all other countries. For outward FDI, we differentiate between the western countries of the EU, Central and Eastern Europe (CEE), the US, and all other countries. The results of this exercise are presented in Table 5.[23]

[22]The order of magnitude of the estimated effects is similar to the results obtained by Bachmann and Braun (2011), who use the same data base as we do and focus on the impact of international outsourcing on different labour market transition probabilities. In contrast, Geishecker (2008), using survey data from the German Socio-economic Panel (SOEP), finds somewhat larger effects when considering the impact of international outsourcing on employment security. Yet, recall from our discussion in Section 2 that FDI and international outsourcing as used in the mentioned studies constitute different concepts.

[23]We also investigated whether inward FDI from the US has different effects since these firms often operate at or

For inward FDI, it becomes apparent that while FDI coming from the western part of the EU is significantly correlated with reduced employment security, this is not the case for FDI coming from other countries. Therefore, it is mainly this type of FDI that is driving the negative aggregate employment security effects, although the null hypothesis of a uniform impact across regions of origin cannot be rejected at conventional levels of significance.[24] An explanation may be that FDI originating from western Europe reflects a similar production technology and thus induces higher competitive pressures, leading to increased adjustments within an industry. For outward FDI, the negative employment security effects seem to be caused by FDI going to Central and Eastern Europe. Outward FDI going to western Europe and the US does not have a statistically significant effect. FDI with other countries as destination even seems to have a positive impact on employment security, although this is only weakly statistically significant.[25] An explanation for this result for outward FDI could be that CEE countries generally have a much lower wage level than Germany as well as a relatively advanced level of production technology. This makes them attractive for cost-saving vertical outward FDI.

5.2 Heterogeneous effects of FDI

We now examine how the different types of FDI affect different worker groups. In order to do so, we estimate regressions which include the interaction terms of our FDI indicators with worker age classes, as well as regressions with the interaction of our FDI indicators with workers' skill levels. Furthermore, given that we found the effects of FDI to differ strongly between source and destination regions, we also interact the regionally differentiated FDI indicators with workers' skill levels.

The results for workers belonging to different age groups are displayed in Table 6. The effects are similar for inward and outward FDI: negative effects on employment security can only be observed for young (18–25 years) and older workers (56–64 years), with the effect for older workers being much stronger than for young workers, especially for inward FDI. Medium-aged workers (36–45 years) even seem to benefit from inward FDI. These differences by age are statistically significant as the corresponding Wald tests confirm.

Recalling our discussion of the baseline results above, our results indicate that it is – according to the age-productivity profile – the most productive group of workers that is unaffected or even benefits from FDI, while less productive workers are negatively affected. Moreover, for young workers, the

close to the technological frontier (Aghion, Blundell, Griffith, Howitt, and Prantl, 2009), but we did not find evidence for significant effects of FDI from the US.

[24]The corresponding Wald test has a value of 0.81, which corresponds to a p-value of 0.37. Note that the Wald test is preferred over the likelihood ratio test since the latter requires iid observations, and therefore does not allow for clustering.

[25]Overall, the Wald test clearly rejects the null hypothesis of a uniform impact across regions of destination.

aforementioned 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, technology probably plays a more important role. Increased FDI usually goes together with either technology adoption, changes in work organization, or both.[26] Older workers may not be able to 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 also reveal important heterogeneities although the null hypothesis of a uniform impact can only be rejected for outward FDI. As Table 7 shows, inward FDI has a negative effect on employment security for low- and medium-skilled workers, which are of a similar magnitude. For outward FDI, the same two groups are affected, and in this case the effect for workers with low skills seems to be stronger than for workers with medium skills. High-skilled workers, by contrast, are not affected by either inward or outward FDI in a statistically significant way. In line with our results for the heterogeneous effects across age groups, it seems that the less productive workers are those that are most affected, while high-skilled employees – arguably the most productive workers – do not suffer from increased FDI. A possible explanation for the heterogeneous effects across workers is that highly productive and educated employees are those with the highest ability to cope with changes in the working environment, increased competition, new knowledge and technologies.

How important are these heterogeneous effects in economic terms? To answer this question, we again calculate the effect of an increase in the FDI indicators by one within-industry standard deviation. It turns out that the skill-dependent effects of FDI are still moderate, amounting to 2.1 per cent (inward FDI) and 2.5 per cent (outward FDI) for low-skilled workers, who are most severely affected. In contrast, the heterogeneities are more pronounced for the different age groups. The largest effect can be observed for older workers. For this worker group, an increase of inward FDI by one within-industry standard deviation implies an increase in the hazard of transiting to non-employment by 9.7 per cent.

In a further step, we also analyse whether different workers groups are affected differently according to the origin of inward FDI and the destination of outward FDI. As becomes apparent in Table 8, the negative employment security effects of outward FDI going to CEE countries are most pronounced for low-skilled workers. Medium-skilled workers are also affected, but to a lower degree, and high-skilled workers are not affected at all. Outward FDI to "the rest of the world" has a positive effect on the

[26] See e.g. Fors and Svensson (2002) on the complementarity between international investment and R&D, and Abramovsky and Griffith (2006) on the relationship between offshoring and information technologies.

employment security of high-skilled workers, but no effect on other workers. A possible explanation is that this type of FDI aims to access foreign markets, but does not lead to a reduction of exports and domestic jobs because of the high distance to the destination countries. Further, these investments can induce branching (Head and Ries, 2002), where skill-intensive production processes such as product design are concentrated in the home country and exported to foreign affiliates.

As for inward FDI (cf. Table 9), heterogeneous effects for FDI coming from western European countries can be observed. In particular, the negative employment effects are concentrated on low- and medium-skilled workers at a similar magnitude. Again, however, according to the corresponding Wald test, the coefficients for the different FDI source regions and skill groups are not significantly different from each other.

5.3 The extensive and intensive margin of FDI

The interaction between labour market adjustment and FDI may also depend on the margin of FDI. For example, Muendler and Becker (2010) find that when looking at labour demand by multinational enterprises, domestic employment predominantly responds to FDI taking place at the extensive margin. In the final step of the analysis, we therefore examine whether the extensive and the intensive margin of FDI has a different impact on aggregate employment security. In order to do so, we calculate indicators for the market entry of foreign investors (the extensive margin of FDI) and for the expansion of existing production facilities in a foreign country (the intensive margin). For inward FDI, we define the extensive margin as the share of sales generated by subsidiaries of foreign firms that enter the respective German industry in period t. In contrast, the intensive margin is defined as the share of sales generated by existing affiliates (incumbents) of foreign firms in period t:

$$IFDI\ ext_{jt} = \frac{\sum_{i \in j} s_{ijt} D_{ijt}(foreign\ owner \& market\ entry)}{\sum_{i \in j} s_{ijt}} \tag{5}$$

$$IFDI\ int_{jt} = \frac{\sum_{i \in j} s_{ijt} D_{ijt}(foreign\ owner \& incumbent)}{\sum_{i \in j} s_{ijt}} \tag{6}$$

$IFDI\ ext$ and $IFDI\ int$ denote inward FDI at the extensive and intensive margin, respectively, s_{ijt} denotes real sales of firm i in industry j in period t and $D_{ijt}(X)$ takes the value of one if condition X holds for firm i at time t, and zero otherwise.

In an analogous way to the indicators for inward FDI, we calculate indicators for outward FDI at the extensive and the intensive margin. The extensive margin is defined as the ratio of foreign production by newly founded or acquired subsidiaries of domestic firms to overall domestic production in the industry in period t. Analogously, the intensive margin relates foreign production of existing

foreign affiliates to domestic production in the industry in period t:

$$OFDI\ ext_{jt} = \frac{\sum_{i \in j} foreignsales_{ijt} D_{ijt}(foreign\ market\ entry)}{\sum_{i \in j} s_{ijt}} \tag{7}$$

$$OFDI\ int_{jt} = \frac{\sum_{i \in j} foreignsales_{ijt} D_{ijt}(incumbent)}{\sum_{i \in j} s_{ijt}} \tag{8}$$

These indicators are used in the same way as above, i.e. we include them in a regression explaining employment security of individual workers. The results of this exercise are presented in Table 10. For inward FDI, it becomes apparent that it is the extensive margin that plays a crucial role for employment security of individual workers in Germany. By contrast, there is no significant effect of FDI at the intensive margin on employment security. Therefore, employment security of individual workers in Germany is only negatively affected by the market entry of foreign firms. If a foreign firm expands existing production facilities, there seems to be no significant effect. This may be due to market entry by a foreign firm inducing the largest change in competitive pressure in incumbent firms within the same industry or – in the case of foreign takeovers – due to the new foreign owners cutting down costs and employment of the acquired firm in the short run.

As for outward FDI, both the indicator for the extensive margin and the indicator for the intensive margin are significant at the 5% level. Furthermore, the Wald test does not reject the null hypothesis of homogeneous effects of the extensive and intensive margins of FDI.

6 Conclusion

In this paper, we analyse 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 industry level, which enables us to take into account direct as well as indirect effects of FDI that may stem from competitive pressure, input-out linkages, technology spillovers, and changes in factor prices. Furthermore, we distinguish between different types of FDI. On the one hand, we analyse the effects of inward and outward FDI simultaneously. On the other hand, we examine FDI coming from and going to low and high wage countries. Moreover, we distinguish between FDI taking place at the extensive and the intensive margin, respectively. We also 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.

Our results show that both inward and outward FDI significantly reduce employment security. We furthermore show important heterogeneity in the effects of FDI on workers' employment security. Very young and old workers are negatively affected by both inward and outward FDI, while medium-aged workers may even benefit from inward FDI in terms of employment security. 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. Only low and medium-skilled workers seem to suffer from FDI, while high-skilled workers do not seem to be negatively affected. Thus, overall these results indicate that it is the, arguably, less productive workers that face greater displacement risks in response to increasing FDI, while the most productive workers are unaffected or even benefit from greater employment security.

One important implication of our findings is that the results previously found in the literature, which were based on firm data or linked employer-employee data, cannot be generalized to the economy as a whole. Our approach shows that taking into account indirect effects at the industry level – which may stem from competitive pressure, input-output linkages and changes in factor prices – leads to very different conclusions. A more detailed analysis of these indirect effects therefore seems to be a fruitful avenue for future research.

Our results imply that increasing flows of FDI generate adjustment costs due to lay-offs which lead to a temporary unproductive use of production factors and probably to increased search costs afterwards. Presumably, our results can to some extent be explained by characteristics of the German labour market which is characterized by collective agreements and a low flexibility of wages. However, it should also be stressed that our study is concerned with one important aspect of the effects of FDI on the labour market, short-run adjustment costs, only. Another important aspect consists in the effects on the level of employment, which are likely to be more long-run in nature, and which were not investigated here.

From an economic policy point of view – since there are obviously various benefits from FDI as well – our results suggest that measures that aim to increase FDI flows should be accompanied by a flexibilization of labour markets to avoid economic costs generated by increased lay-offs. As our results indicate that the workers most affected from FDI are those with low education and productivity, they should also be accompanied by measures that aim to increase the productivity of old, very young, and low-skilled employees.

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Appendix A

Table 1: Indicators of inward and outward FDI by Sector

		IFDI			OFDI		
	Nace 2	Mean	Std. Dev.	Change 2002-2007	Mean	Std. Dev.	Change 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 dying, 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: "Nace" is the "Nomenclature of economic activities, "nec" stands for "not elsewhere classified".

Table 2: Data description and summary statistics

		Mean	Std. Dev.	Data source
Individual-level variables				
Transition hazard from empl. to non-empl.		0.026	0.159	BA Employment Panel
Duration employment spell: (0; 1] quarter	Dur. empl. spell: 1 Q	0.020	0.141	BA Employment Panel
Duration employment spell: (1; 2] quarters	Dur. empl. spell: 2 Q	0.018	0.133	BA Employment Panel
Duration employment spell: (2; 3] quarters	Dur. empl. spell: 3 Q	0.016	0.126	BA Employment Panel
Duration employment spell: (3; 4] quarters	Dur. empl. spell: 4 Q	0.015	0.123	BA Employment Panel
Duration employment spell: (4; 6] quarters	Dur. empl. spell: 5–6 Q	0.030	0.169	BA Employment Panel
Duration employment spell: (6; 8] quarters	Dur. empl. spell: 7–8 Q	0.028	0.166	BA Employment Panel
Duration employment spell: (8; 11] quarters	Dur. empl. spell: 9–11 Q	0.040	0.196	BA Employment Panel
Duration employment spell: (11; 15] quarters	Dur. empl. spell: 12–15 Q	0.050	0.219	BA Employment Panel
Job tenure: (0; 2] quarters	Job tenure: 1–2 Q	0.071	0.257	BA Employment Panel
Job tenure: (2; 8] quarters	Job tenure: 3–8 Q	0.158	0.365	BA Employment Panel
Age: 26–35	Age: 26–35	0.241	0.428	BA Employment Panel
Age: 36–45	Age: 36–45	0.350	0.477	BA Employment Panel
Age: 46–55	Age: 46–55	0.252	0.434	BA Employment Panel
Age: 56–64	Age: 56–64	0.079	0.270	BA Employment Panel
Skill: low	Skill: low	0.163	0.370	BA Employment Panel
Skill: medium	Skill: medium	0.729	0.444	BA Employment Panel
Sex: female	Female: yes	0.232	0.422	BA Employment Panel
Nationality: foreign	Foreign: yes	0.085	0.279	BA Employment Panel
Establishment-level variables				
Region: east	Region: east	0.129	0.335	BA Employment Panel
Establishment size: 1–4	Est. size: 1–4	0.025	0.156	BA Employment Panel
Establishment size: 5–9	Est. size: 5–9	0.036	0.186	BA Employment Panel
Establishment size: 10–19	Est. size: 10–19	0.056	0.230	BA Employment Panel
Establishment size: 20–49	Est. size: 20–49	0.104	0.305	BA Employment Panel
Establishment size: 50–99	Est. size: 50–99	0.104	0.305	BA Employment Panel
Establishment size: 100–199	Est. size: 100–199	0.128	0.335	BA Employment Panel
Establishment size: 200–499	Est. size: 200–499	0.185	0.388	BA Employment Panel
Share of high-skilled in workforce	Share high-skilled	0.097	0.124	BA Employment Panel
Industry-level variables				
Inward FDI	IFDI	0.130	0.076	AMADEUS
Inward FDI from western EU countries	IFDI EUW	0.102	0.065	AMADEUS
Inward FDI from all other countries	IFDI Non-EUW	0.028	0.032	AMADEUS
Inward FDI, intensive margin	IFDI int.	0.097	0.062	AMADEUS
Inward FDI, extensive margin	IFDI ext.	0.033	0.045	AMADEUS
Outward FDI	OFDI	0.051	0.080	AMADEUS
Outward FDI to western EU countries	OFDI EUW	0.035	0.066	AMADEUS
Outward FDI to Central and Eastern Europe	OFDI CEE	0.011	0.019	AMADEUS
Outward FDI to the US	OFDI US	0.002	0.010	AMADEUS
Outward FDI to all other countries	OFDI ROW	0.003	0.012	AMADEUS
Outward FDI, intensive margin	OFDI int.	0.039	0.071	AMADEUS
Outward FDI, extensive margin	OFDI ext.	0.012	0.020	AMADEUS
Next export intensity	NEXP/Y	0.143	0.187	OECD STAN
log(Production value)	log(Y)	18.216	0.777	OECD STAN
log(Net capital stock)	log(K)	17.186	0.682	OECD STAN
R&D intensity	R&D/Y	0.024	0.025	OECD STAN

Data: Regression sample, authors' calculations for the time period 2002–2006.

Table 3: Within-industry standard deviations of FDI indicators

Variable	Within-industry Std. Dev.
IFDI	0.027
IFDI int.	0.032
IFDI ext.	0.038
OFDI	0.060
OFDI int.	0.054
OFDI ext.	0.017
IFDI EUW	0.030
IFDI Non-EUW	0.019
OFDI EUW	0.049
OFDI CEE	0.008
OFDI US	0.008
OFDI ROW	0.010

Data: Regression sample, authors' calculations for the time period 2002–2006.

Note: This table displays the within-industry standard deviations, which are used to assess the economic significance of the regression results.

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

	Coefficient	SE
Dur. empl. spell: 1 Q	1.5071***	0.0370
Dur. empl. spell: 2 Q	1.3262***	0.0322
Dur. empl. spell: 3 Q	1.1700***	0.0579
Dur. empl. spell: 4 Q	1.0161***	0.0319
Dur. empl. spell: 5-6 Q	0.6778***	0.0262
Dur. empl. spell: 7-8 Q	0.8124***	0.0287
Dur. empl. spell: 9-11 Q	0.6373***	0.0221
Dur. empl. spell: 12-15 Q	0.4496***	0.0210
Job tenure: 1-2 Q	0.6794***	0.0304
Job tenure: 3-8 Q	0.4048***	0.0203
Age: 26-35	-0.1310***	0.0224
Age: 36-45	-0.3045***	0.0246
Age: 46-55	-0.1898***	0.0203
Age: 56-64	1.1439***	0.0362
Skill: low	0.5982***	0.0307
Skill: medium	0.3193***	0.0256
Female: yes	0.2602***	0.0161
Foreign: yes	0.1716***	0.0178
Region: east	0.0220	0.0183
Est. size: 1–4	0.7353***	0.0361
Est. size: 5–9	0.6005***	0.0437
Est. size: 10–19	0.4866***	0.0322
Est. size: 20–49	0.3625***	0.0276
Est. size: 50–99	0.2776***	0.0231
Est. size: 100–199	0.1383***	0.0205
Est. size: 200–499	0.0778***	0.0196
Share high-skilled	-0.1204**	0.0567
IFDI	0.7115***	0.2748
OFDI	0.2997**	0.1293
NEXP/Y	-0.0946	0.2586
log(Y)	-0.1291	0.2251
log(K)	0.5872**	0.2848
R&D/Y	-0.8806	3.4045
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. The (complementary log-log) regression also includes full sets of industry and quarterly time (=wave) dummies. Baseline categories: Dur. empl. spell: $\geq$ 15 quarters; Job tenure: $>$ 8 quarters; Age: 18–25; Skill: high; Est. size: $>$ 500 employees.

Table 5: The effect of inward and outward FDI on the transition hazard from employment to non-employment for different source and destination regions

	Coefficient	SE
IFDI EUW	0.4665**	0.2354
IFDI Non-EUW	0.2304	0.2777
OFDI EUW	0.3179	0.3943
OFDI CEE	2.5299***	0.9504
OFDI US	-0.1255	2.5320
OFDI ROW	-1.2327*	0.6726
Wald test (IFDI indicators equal), χ^2 (1)	0.81	
p-value	0.317	
Wald test (OFDI indicators equal), χ^2 (3)	12.02	
p-value	0.007	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4. EUW stands for the western countries of the European Union, CEE for Central and Eastern Europe, ROW for all other countries (rest of the world).

Table 6: The effect of inward and outward FDI on the transition hazard from employment to non-employment for different age groups

	Coefficient	SE
IFDI×Age: 18–25	0.8381***	0.2699
IFDI×Age: 26–35	-0.3799	0.3392
IFDI×Age: 36–45	-0.8020**	0.3397
IFDI×Age: 46–55	0.6296	0.4970
IFDI×Age: 56–64	3.4328***	0.3698
OFDI×Age: 18–25	0.3506**	0.1403
OFDI×Age: 26–35	0.1774	0.1280
OFDI×Age: 36–45	0.1370	0.1255
OFDI×Age: 46–55	0.1340	0.1485
OFDI×Age: 56–64	0.6855***	0.2564
Wald test (IFDI × age equal), χ^2 (4)	91.75	
p-value	0.000	
Wald test (OFDI × age equal), χ^2 (4)	12.55	
p-value	0.014	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4.

Table 7: The effect of inward and outward FDI on the transition hazard from employment to non-employment for different skill groups

	Coefficient	SE
IFDI × Skill: low	0.7820***	0.2845
IFDI × Skill: medium	0.7474***	0.2862
IFDI × Skill: high	0.3367	0.4244
OFDI × Skill: low	0.4074***	0.1487
OFDI × Skill: medium	0.3240**	0.1412
OFDI × Skill: high	-0.0177	0.1452
Wald test (IFDI × skill equal), χ^2 (2)	2.71	
p-value	0.259	
Wald test (OFDI × skill equal), χ^2 (2)	8.32	
p-value	0.016	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4.

Table 8: The effect of outward FDI on the transition hazard from employment to non-employment for different source and destination regions, and different skill groups

	Coefficient	SE
IFDI	0.4065*	0.2236
OFDI EUW × Skill: low	0.5540	0.5761
OFDI EUW × Skill: medium	0.2281	0.4131
OFDI EUW × Skill: high	0.7582	0.6949
OFDI CEE × Skill: low	3.4732***	0.9933
OFDI CEE × Skill: medium	2.6055**	1.1504
OFDI CEE × Skill: high	0.6964	2.6965
OFDI US × Skill: low	-1.7369	3.5155
OFDI US × Skill: medium	0.7113	2.6314
OFDI US × Skill: high	-5.3428	4.3669
OFDI ROW × Skill: low	0.2044	1.0258
OFDI ROW × Skill: medium	-1.4734*	0.8435
OFDI ROW × Skill: high	-3.6658***	1.0080
Wald test (OFDI regional × skill equal), χ^2 (11)	60.34	
p-value	0.000	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4. EUW stands for the western countries of the European Union, CEE for Central and Eastern Europe, ROW for all other countries (rest of the world).

Table 9: The effect of inward FDI on the transition hazard from employment to non-employment for different source and destination regions, and different skill groups

	Coefficient	SE
IFDI EUW × Skill: low	0.8967***	0.2778
IFDI EUW × Skill: medium	0.8301***	0.2987
IFDI EUW × Skill: high	0.3720	0.5074
IFDI Non-EUW × Skill: low	0.5146	0.4971
IFDI Non-EUW × Skill: medium	0.4733	0.2993
IFDI Non-EUW × Skill: high	-0.1282	0.5138
OFDI	0.3256**	0.1329
Wald test (IFDI regional × skill equal), χ^2 (5)	5.91	
p-value	0.315	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4.

Table 10: The effect of inward and outward FDI on the transition hazard from employment to non-employment, extensive and intensive margin of FDI

	Coefficient	SE
IFDI ext.	0.7451***	0.1852
IFDI int.	-0.1885	0.2964
OFDI ext.	0.6593**	0.3081
OFDI int.	0.1737**	0.0827
Wald test (IFDI ext. = IFDI int.), χ^2 (1)	20.10	
p-value	0.000	
Wald test (OFDI ext. = OFDI int.), χ^2 (1)	2.18	
p-value	0.140	
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: * p<0.10, ** p<0.05, *** p<0.01

Standard errors (SE) are clustered at the industry-year level. Further explanatory variables included as in Table 4. Definition of the extensive/intensive margin of IFDI/OFDI (IFDI/OFDI ext./int.) explained in Section 5.3.

Appendix B Not intended for publication

Table 11: The effect of inward and outward FDI on the transition hazard from employment to non-employment - random effects specification

	Coefficient	SE
Dur. emp. spell: 1 Q	1.4239***	0.0252
Dur. emp. spell: 2 Q	1.2839***	0.0257
Dur. emp. spell: 3 Q	1.1383***	0.0244
Dur. emp. spell: 4 Q	1.0043***	0.0259
Dur. emp. spell: 5–6 Q	0.6791***	0.0236
Dur. emp. spell: 7–8 Q	0.8270***	0.0232
Dur. emp. spell: 9–11 Q	0.6631***	0.0201
Dur. emp. spell: 12–15 Q	0.4758***	0.0198
Job tenure: 1–2 Q	0.6657***	0.0209
Job tenure: 3–8 Q	0.4112***	0.0161
Age: 26–35	-0.1711***	0.0148
Age: 36–45	-0.3575***	0.0154
Age: 46–55	-0.2349***	0.0165
Age: 56–64	1.1875***	0.017
Skill: low	0.6230***	0.0219
Skill: medium	0.3218***	0.0195
Female: yes	0.2913***	0.0103
Foreign: yes	0.1862***	0.0151
Region: east	0.0253**	0.0128
Est. size: 1–4	0.8036***	0.0225
Est. size: 5–9	0.6522***	0.0209
Est. size: 10–19	0.5310***	0.0189
Est. size: 20–49	0.3937***	0.0165
Est. size: 50–99	0.2994***	0.0168
Est. size: 100–199	0.1484***	0.0164
Est. size: 200–499	0.0819***	0.0151
Share high-skilled	-0.1249***	0.0453
IFDI	0.7166***	0.2138
OFDI	0.3033***	0.0978
NEXP/Y	-0.1119	0.1977
log(Y)	-0.1764	0.1454
log(K)	0.5853***	0.1635
R&D/Y	-1.1807	2.6685
No. of observations	2,242,036	

Data: (Augmented) BA Employment Panel, authors' calculations for the time period 2002–2006.

Note: Cf. Table 4 for further explanatory notes.