

Koerner, Konstantin; Moritz, Michael; Schäffler, Johannes

Article — Published Version

Foreign direct investment and onshore employment dynamics: Evidence from German firms with affiliates in the Czech Republic

The World Economy

Provided in Cooperation with:

John Wiley & Sons

Suggested Citation: Koerner, Konstantin; Moritz, Michael; Schäffler, Johannes (2021) : Foreign direct investment and onshore employment dynamics: Evidence from German firms with affiliates in the Czech Republic, The World Economy, ISSN 1467-9701, Wiley, Hoboken, NJ, Vol. 45, Iss. 6, pp. 1773-1829, <https://doi.org/10.1111/twec.13223>

This Version is available at:

<https://hdl.handle.net/10419/265083>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<http://creativecommons.org/licenses/by-nc/4.0/>

Foreign direct investment and onshore employment dynamics: Evidence from German firms with affiliates in the Czech Republic

Konstantin Koerner^{1,2}  | Michael Moritz¹ | Johannes Schäffler¹

¹Institute for Employment Research (IAB), Nuremberg, Germany

²Humboldt University of Berlin, University of Regensburg, Regensburg, Germany

Correspondence

Konstantin Koerner, Institute for Employment Research (IAB), Regensburger Str. 100, 90478 Nuremberg, Germany.
Email: konstantin.koerner@iab.de

Abstract

In this paper, we revisit questions about the onshore employment effects of firms that conduct foreign direct investment (FDI) in countries with substantially lower average wages. Our results derive from the use of rich administrative records on the universe of employees in German multinational enterprises (MNEs) that were active in the Czech Republic in 2010. Compared with former studies, the unique data set in this study includes a much higher fraction of small- and medium-sized firms and leads to strikingly different results for service MNEs. Applying coarsened exact matching for firms and an event-study design, we show that the domestic employment growth of MNEs decreases relative to that of non-MNEs and that the affected workers are those with low or medium educational attainment in the manufacturing sector and with medium or high educational attainment

We are highly appreciative of the helpful comments from participants in the 29th Annual Conference of the European Association of Labour Economists (EALE) in St. Gallen, the Inaugural Conference of the Asian and Australasian Society of Labour Economics (AASLE) in Canberra and the 23rd Annual Meeting of the Society of Labor Economists (SOLE) in Toronto. We are particularly grateful for the comments of one anonymous referee, which helped to vastly improve the paper, and for valuable advice and suggestions by Uwe Blien, Linda Borrs, Udo Brixy, Wolfgang Dauth, Johann Eppelsheimer, Hannah Illing, Joachim Möller, Katja Wolf and Nikolaus Wolf. We thank Kimberly M. from American Journal Experts for proofreading.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2021 The Authors. *The World Economy* published by John Wiley & Sons Ltd.

in the service sector. Regarding workers' tasks, our results do not show that FDI affects routine jobs beyond a worker's skill level.

KEYWORDS

small and medium sized enterprises, foreign direct investment, coarsened exact matching, multinational firms, offshoring, skills

1 | INTRODUCTION

In globalised production networks involving low-wage countries, foreign direct investment (FDI) enables firms to directly benefit from factor price differences or from local resources. These multinational enterprises (MNEs) exchange goods within the boundaries of the firm and across borders, which amounts to ~30% of total world trade (Antras, 2003; Bernard, Jensen & Schott, 2009; Ramondo, Rappoport & Ruhl, 2016). Despite the importance of such foreign activities and its high political concern, the extant literature has not yet provided a conclusive answer regarding their effects on domestic labour (see the reviews by see the reviews by Hummels, Munch & Xiang, 2018; Feenstra, 2010; Crinò, 2009, or see Pflüger, Blien, Möller & Moritz, 2013 for a focus on Germany). On the one hand, FDI induces positive labour market effects because it enhances MNE productivity due to intensified market access, the exploitation of international factor price differences and greater specialisation. On the other hand, offshore labour may act as a substitute for the workforce in the home country, or workers may be reallocated from high-productivity MNEs to less-productive domestic players (Egger, Kreickemeier & Wrona, 2015; Grossman & Rossi-Hansberg, 2008).

Seminal works by, for instance, Muendler and Becker (2010) for German MNEs find that the initial expansion into Central and Eastern European countries (CEECs)—the most important FDI destination for German MNEs at the end of the 1990s—led to declining employment in the parent companies.¹ Comparing MNEs with national firms, Becker and Muendler (2008) show that the separation rate of jobs at the parent company decreases after FDI to CEECs, and adding to this, Becker, Ekholm and Muendler (2013) reveal that the task and skill composition of the German parent company is not affected by such FDI. However, one substantial caveat in all of these studies is the selection bias towards large MNEs. Because their FDI information is drawn from the MiDi-Ustan data set from the Deutsche Bundesbank, their sample includes a selection of relatively large MNEs (see Pflüger et al., 2013).² Because of these thresholds, small- and medium-sized enterprises (SMEs) are strongly underrepresented, which biases the results, especially for many small service MNEs.

We therefore revisit questions regarding how the parent company's workforce evolves around the year of FDI in a formerly closed low-wage economy. Using an event-study design,

¹Using the same dataset, Jäckle and Wamser (2010) explore the effects of FDI by applying a Heckman (1978) approach and find little impact on the growth rate of German MNEs relative to firms that do not invest abroad.

²The reported MNEs are selected based on the size of the balance sheet: for MNEs that own at least 10 percent of their foreign affiliates, the total balance sheet of those affiliates must exceed 5 million euros or for MNEs that own at least 50% of their foreign affiliates, the total balance sheet of those affiliates must exceed 0.5 million euros.

we identify the onshore employment effects with respect to workers' skills (and tasks) by comparing the evolution of German MNEs around their FDI date with that of similar firms that never conducted FDI (in the following referred to as non-MNEs, control firms, or reference firms). To establish a strong comparability between them, we apply a coarsened exact matching approach, as suggested by King and Nielsen (2019). Hence, we rely on the identifying assumption that in the matched sample, the FDI decision is random conditional on the covariates.

Our unique data set is derived from the ReLOC project at the IAB and contains data on every German MNE with at least one affiliate in the Czech Republic in 2010. The choice of the Czech Republic is due to the outstanding importance of CEECs as offshoring or FDI destinations for German firms (see Figure A1). Among the CEECs, Marin (2004, p. 4) shows that the Czech Republic receives the largest share of German FDI. Furthermore, she reveals (Marin, 2006, p. 614) that within the CEECs, the Czech Republic is Germany's most important offshoring destination, as ~76% of the German affiliates in this country import *and* export inputs from and to their parent firms.

In a detailed and time-consuming record linkage procedure, Schäffler (2014) connects the German firms that are active in the Czech Republic to high-quality labour administration sources (IAB Integrated Employment Biographies) covering every worker subject to social security contributions in Germany. In 2008, the MNEs' parent companies employed ~6.6% of all employees in the region of the former West Germany, amounting to ~1.7 million workers.³ Essential for this paper, the data also include small FDI and a substantial number of SMEs (see Table A7 and the histogram in Figure A2 in the appendix), which mitigates the selectivity concerns present in former studies. Two examples illustrate the extent of this difference: first, in the sample of Becker and Muendler (2008, p. 11) or Becker et al. (2013), the average MNE's onshore employment was 2684, while it is 745 workers in our data set.⁴ Second, in 2011, the databases of Bureau van Dijk and the MiDi database contained data on ~1000 Czech companies with German owners.⁵ In contrast, the IAB-ReLOC database covers ~3900 Czech companies with German owners (>2400 German MNEs). This important data improvement is due to the direct utilisation of administrative sources such as the Czech Commercial Register (Hecht, Litzel & Schäffler, 2013).

Our key findings add to previous results. In accordance with the results of Muendler and Becker (2010), we show that German MNEs' employment grows significantly more slowly than that of comparable purely domestic firms. Moreover, we narrow the drivers of these negative effects to (i) decreasing demand for medium-skilled workers, (ii) decreasing demand for

³Aggregated employee data are drawn from a cross-section of the IAB Integrated Employment Biographies, namely, IAB Employment Histories. In 2008, these data included a total of 25.83 million workers in West Germany.

⁴If not otherwise specified, our full sample considers only the former West Germany. Both numbers include employees, apprentices, trainees, and marginal workers. Muendler and Becker (2010) use data from the USTAN database. In their sample, the average MNE employs 1629 workers. We prefer the comparison to the sample of Becker and Muendler (2008); Becker et al. (2013), who also use comprehensive labor market data from the Federal Employment Agency (*Bundesagentur für Arbeit - BA*).

⁵The Bureau van Dijk databases include datasets such as Amadeus, Markus, Orbis and Dafne, which are also limited to rather large companies. Before launching the *Elektronischer Bundesanzeiger* in 2007, commercial data providers always had much more information about larger firms because information about their investments is published in business reports more often than is that of SMEs.

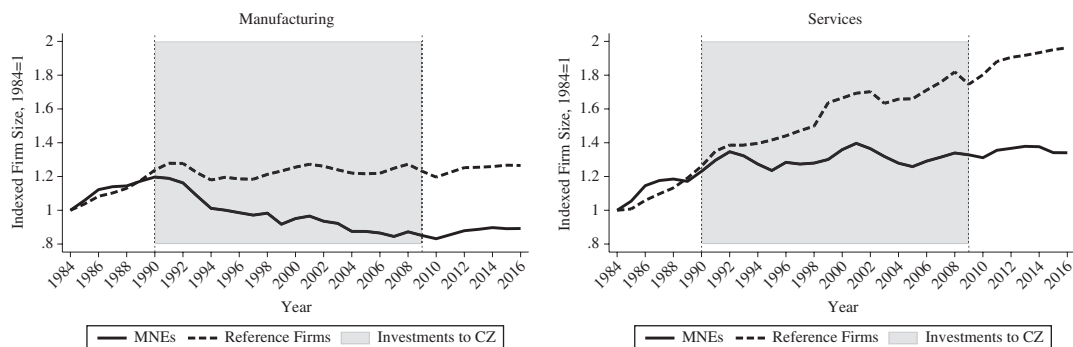


FIGURE 1 Indexed Average Firm Size of MNEs and Non-MNEs.

Notes: The left (right) panel illustrates the growth path of firms in the West German manufacturing (service) sector. The index considers changes in the average onshore employment of MNEs (solid line) and firms without any FDI (dotted line) around the expansion period to the Czech Republic (grey area) and does not include employment in East German plants, firm entrants or firms that were liquidated between 1984 and 2016. The index shows an evolving growth differential of the two groups of firms after 1990

low-skilled workers in manufacturing and (iii) decreasing demand for high-skilled workers in the service sector—whereas Becker et al. (2013) find no significant results for workforce composition. Adding to Becker et al. (2013), we show that aside from controlling for skill, the task demand is barely affected by FDI to the Czech Republic.

To provide an idea of firms' evolution during the investment period, we plot the employment growth of continuing firms (no entries or exits in the observation period) in Figure 1. The growth path of MNEs (solid line) is similar to that of non-MNEs (dotted line) before the fall of the Iron Curtain but declines in the period of FDI to the Czech Republic between 1990 and 2009 (grey area). This relative decline is remarkable since similar studies, such as Becker et al. (2013, p. 97), observe 13.2% growth in average employment in German manufacturing MNEs (with FDI in any country and from 1998 to 2001).⁶

Several papers have compared the performance of MNEs with that of national firms. Often, their methodologies differ slightly because they match these firms via propensity scores and then apply a difference-in-difference estimation. Among them, Becker and Muendler (2008) show that the workforce of German firms with FDI expansion has higher retention than that of competitors without any FDI. This finding is supported by Desai, Foley and Hines (2009), who identify positive effects of affiliate growth on employment among US parents. For Italy and France, Borin and Mancini (2016) and Navaretti, Castellani and Disdier (2010) further distinguish FDI by destination country and find positive effects on employment in the onshore part of MNEs after FDI in advanced economies and only weak effects after FDI in less developed countries. For the onshore part of Korean manufacturing MNEs, Debaere, Lee and Lee (2010) provide evidence that, after initial FDI in a less developed country, employment grows 2% more slowly than that in non-MNEs and that the growth difference holds for a period of up to three years after the FDI. In contrast, investments in more advanced countries do not lower the employment growth of Korean MNEs. Using US manufacturing MNEs, Harrison and McMillan (2011) find very similar effects. Hijzen, Jean and Mayer (2011), on the contrary, find no significant employment effect

⁶Note that the drop in average employment is not driven by the inclusion of small firms. In Figure A4, the distinction by firm size shows that small firms have grown disproportionately faster.

on French MNEs in the manufacturing sector that establish foreign affiliates. They also add the service sector to the analysis and find that these firms grow more quickly than their domestic competitors after international expansion.

Regarding the onshore composition of workers, most studies provide evidence of skill upgrading over the course of FDI; see, for example, Davies and Desbordes (2015) for 17 OECD countries, Sethupathy (2013) and Crescenzi, Ganau and Storper (2021) for the United States, Head and Ries (2002) for Japan, Hansson (2005) for Sweden, Geishecker, Görg and Maioli (2008) for Germany and the UK and Castellani, Mariotti and Piscitello (2008) for Italian MNEs with CEECs as hosts for FDI. For German MNEs, Becker et al. (2013) report skill upgrading after FDI to developed countries and for service MNEs after FDI to developing countries. They also add workers' task profiles to the analysis, which are based on the approach by Autor, Levy and Murnane (2003) and add to the discourse of offshorability by Blinder (2009). After FDI to high-wage countries, the share of noninteractive and/or routine jobs increases, as does the share of white-collar occupations. These effects are, however, not substantial after FDI to low-wage countries, which is in accordance with Hakkala, Heyman and Sjöholm (2014) for Swedish MNEs and Borin and Mancini (2016) for Italian MNEs.

A smaller strand of the literature highlights FDI related to research and development and other high-skilled activities. At the level of European regions, Castellani and Pieri (2013) find no effect on employment. At the firm level, using a survey of German and Austrian MNEs, Marin (2004) and Marin, Schymik and Tarasov (2018) argue that these firms offshore their high-skilled jobs and managers to Eastern Europe, especially in service-related activities; Marin (2004, p. 23) provides exemplary evidence that firms 'centralise and outsource some [...] headquarters activities such as accounting and personnel management to [...] subsidiaries in the Czech Republic'. This supply and wage level of high-skilled workers in the Czech Republic may be one key motive for FDI, especially for SMEs, since in the onshore 'battle for talent' these firms may be surpassed by larger competitors that can afford to pay higher wages (see, e.g. Noorbakhsh, Paloni & Youssef, 1999 or Becker, Driffeld, Lancheros & Love, 2020). The onshore labour substitution may then be particularly strong. However, the heterogeneous employment effects with respect to the parent firm size are also impacted by other channels. Since the growth rate of SMEs is higher than that of larger competitors and since SMEs are more often organised in a single plant instead of having multiple production sites (see Figure A4, Table A8, or Hall, Fujita, Mallampally & Sauvart, 1998; UNCTAD, 1998; Yeung, 2017), relative employment growth after FDI could be higher in SMEs than in larger firms, because the latter may be replacing a complete plant with a foreign affiliate. The smallest average firm size that we have found in the corresponding literature is by Navaretti et al. (2010) analysing Italian MNEs that employ on average 199 workers. They find weakly positive or no statistically significant effect of FDI to low-wage countries on the onshore labour force. The second smallest average firm size is in the sample of Debaere et al. (2010) and comprises 366 workers. They find negative employment effects after FDI to a developing country. Thus, after revisiting the literature, we conclude that the onshore employment effects following FDI remain highly ambiguous.

Our paper contributes to the literature in several ways. First, our results are derived from administrative data sources, which are very precise and more reliable than commercial sources or survey data. Additionally, our data set covers the universe of German manufacturing and service MNEs active in a low-wage country for more than two decades. Especially, in the understudied service sector—with generally smaller firms—we consider the inclusion of SMEs and the mitigation of selection bias to be an important contribution. Second, we leverage the information on occupational classifications to complement our analyses with established task indices and explore whether these task indices (routine or noninteractive) can explain employment changes

beyond the effects of workers' skills. Third, we add a coarsened exact matching approach that compares similar firms in terms of all considered characteristics and not only in terms of the unidimensional propensity to invest abroad.

The remainder of the paper is organised as follows. The next section introduces the unique data set, which alleviates selectivity concerns and presents summary statistics. Section 3 explains the empirical setup for our results in Section 4. Section 5 tests the robustness of these outcomes, and Section 6 concludes the paper.

2 | DATA AND DESCRIPTIVE STATISTICS

Our data set is derived from various administrative sources that are combined with firm-level information from commercial providers. Basic data processing is conducted by Schäffler (2014) and within the scope of the IAB project *Research on Locational and Organizational Change* (IAB-ReLOC).⁷ The starting point is the identification of any affiliate in the Czech Commercial Register that has a direct or indirect German ownership share of at least 25%. The records were accessed in August 2010, and thus, they comprehensively cover FDI from 1990 to the beginning of 2009.⁸

Information on German parent *firms* is drawn from administrative data of the Federal Employment Agency, which covers the universe of *establishments* in Germany with at least one employee liable for social security contributions.⁹ Since this information does not include a firm identifier, Schäffler (2014) applies a record linkage (by names and addresses) that identifies the onshore plants of German firms with affiliates in the Czech Republic.¹⁰ Equipped with rich MNE data, we now turn to the reference firms.

Reference firms have neither a sister company nor direct or indirect FDI in any country. Their names, addresses and investment information were acquired from the German Commercial Register. *TNS Infratest* then added further firm data after applying the same linkage procedure as Schäffler (2014). Based on industry and size, a stratified sample was drawn from the administrative sources that oversampled large- and medium-sized companies to ensure their comparability with MNEs (Hecht, Hohmeyer, et al., 2013).¹¹

We then merge firms with worker-level information of the IAB Integrated Employment Biographies for the period from 1986 to 2011, from which we are particularly interested in daily

⁷The IAB-ReLOC data are confidential but accessible for noncommercial researchers during a visiting stay at the IAB.

⁸2009 and 2010 are covered incompletely due to the time lag between FDI and the notice in the commercial registers. The results are robust to the exclusion of these years.

⁹Note that in our sample, we observe plants (or, synonymously, production sites or establishments) that we link to firms. FDI information, however, is available only at the firm level.

¹⁰The record linkage is based on the address of the company and the owner's name and is implemented in two steps: first, preprocessed names *and* addresses link the establishments to the IAB-ReLOC firms, and second, only the name identifies a company belonging to one of the IAB-ReLOC firms. The linkage is feasible due to firm names in the establishment data. This information is usually subject to restrictive privacy protection, but it was made exceptionally available for the IAB-ReLOC project.

¹¹The IAB also commissioned an IAB-ReLOC Survey (at *TNS Infratest*) with information on MNEs in Germany and the Czech Republic and on the reference firms in these two countries. Due to the small number of respondents, we do not use the above survey in the present study. For a comprehensive evaluation of the survey, we refer to Hecht, Hohmeyer et al. (2013) or Hecht et al. (2019).

wages and educational attainment (skills). The latter distinguishes three types of workers: high-skilled workers who attained a university degree (of applied sciences), medium-skilled workers who attained a vocational qualification or a higher secondary degree (German Abitur) and low-skilled workers who attained neither a vocational qualification nor a higher secondary degree. To further improve data quality, we impute missing skill information using the algorithm suggested by Fitzenberger, Osikominu and Völter (2006). Since the wage data are censored at the upper earnings limits of the compulsory social security system (e.g. annual income of 66,000 euros in West Germany in 2010), we impute the wages of top-coded entries similarly to Card, Heining and Kline (2013).

Other firm-level characteristics are drawn from the IAB Establishment History Panel. These include the date of foundation, main industry and geographic location. For multisite companies, we select the region or industry that accounts for the largest share of employees within the firm. East German establishments are excluded for various reasons. First, our investigation starts before their coverage in the IAB database. Second, we want to abstract from the specific circumstances of the former planned economy and its economic units. We would obtain biased FDI estimates, for example, due to the confounding effects from the disposition of firms by the *Treuhand* to, in particular, West German investors. Aggregating establishments across East and West Germany includes employment shifts that are not driven by increasing labour demand but by access to funds or low-priced real estate. We suspect that many acquisitions of East German plants are similar to an investment in the Czech Republic. Thus, there is a trade-off between considering a larger population and interpreting the blurred estimates of the effects of FDI in the source country. We elected to favour precise estimates since the exclusion of East German establishments comes at a relatively low cost, as only ~10% of German affiliates in the Czech Republic have an owner from East Germany (Schäffler, Hecht & Moritz, 2017).

Our full sample covers 2410 (6336) West German firms with (no) FDI. In the subsequent analysis, we consider only the initial entry date of the firm, which Muendler and Becker (2010) refer to as the extensive margin of offshoring. As Figure 2 illustrates, MNEs' entry dates in the Czech Republic are distributed around two peaks: one peak in the mid-1990s after the EU and the Czech Republic mutually opened up their markets for trade and another peak after the

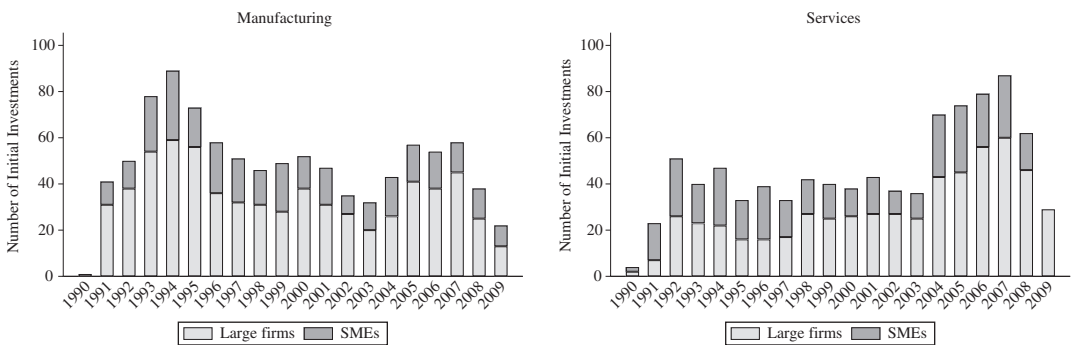


FIGURE 2 Number of German Firms that Initially Invested in the Czech Republic.

Notes: The number of German parent firms that initially invested in the Czech Republic. The peak for manufacturing firms arises in 1994 after the ratification of the EU-Czech trade agreement or Czech's membership in the General Agreement on Tariffs and Trade (GATT). In the service sector, the peak arises in 2007, 3 years after membership in the EU. Note that 2009 is not covered completely due to the time lag of reporting FDI to commercial registers. The drop in investment is thus a sample artefact rather than a structural change. Small- and medium-sized enterprises (SMEs) employ up to 100 workers in the year of FDI

TABLE 1 Characteristics of MNEs prior to FDI and Non-MNEs in the full sample

	Manufacturing				Services			
	MNE		Balancing		MNE		Balancing	
	Mean	Median	Stdd. Bias	(Var. Ratio)	Mean	Median	Mean	Median
Employees	1136.5	229.37	0.1435		447.56	142.74	0.0967	
	156.5	152			41	53		
	(8935.7)	(337.3)	(701.7)		(4435.4)	(454.7)	(95.1)	
High-skilled (%)	8.24	6.39	0.1878		16.91	9.35	0.3802	
	5.06	3.57			7.14	1.89		
	(10.49)	(9.09)	(1.333)		(22.09)	(17.36)	(1.62)	
Medium-skilled (%)	71.58	75.27	-0.2295		75.58	78.90	-0.1533	
	72.69	77.55			80.77	86.57		
	(16.12)	(16.09)	(1.003)		(21.79)	(21.52)	(1.026)	
Low-skilled (%)	20.18	18.33	0.1123		7.52	11.75	-0.2847	
	16.86	14.29			2.65	4.39		
	(16.69)	(16.29)	(1.049)		(11.45)	(17.65)	(0.421)	
Employment growth	3.0713	2.8357	0.2036		2.8106	2.6614	0.1243	
	2.7726	2.7243			2.7218	2.6966		
	(1.2800)	(1.0198)	(1.575)		(1.2882)	(1.1077)	(1.352)	
Wage bill	136721.5	25300.0	0.1432		48429.7	14090.2	0.1162	
	14707.2	14108.0			4857.8	4698.7		
	(1098890.2)	(58985.0)	(347.08)		(415148.0)	(46568.9)	(79.47)	

TABLE 1 (Continued)

	Manufacturing				Services			
	MNE	Reference	Balancing	MNE	Reference	Balancing	Mean	Reference
Plants	2.50	1.48	0.1368	10.94	2.90	0.0652		
	<i>I</i>	<i>I</i>		<i>I</i>	<i>I</i>			
	(10.21)	(2.53)	(16.308)	(174.14)	(10.94)	(253.157)		
Avg. Mahalanobis distance			2.8065					3.0596
Firms	1156	2904		1254	3432			

Notes: This table presents the summary statistics for MNEs and non-MNEs in West Germany. MNE information is reported for the period two years prior to the investment, while non-MNE information includes observations for all years without any missing values. Employment numbers include only regular employment and not apprentices, marginal employment or temporary workers. Employment growth is measured as the log of the employment difference over the last four years. Concerning multisite MNEs, more than 30% consist of more than one establishment in Germany. The wage bill is denoted in euros and considers average daily wages. For definitions of standardised bias and variance ratio, see footnote 14. The overall dissimilarity of control firms is measured by the Mahalanobis distance for the 7 reported variables and relative to the respective mean of treatment firms.

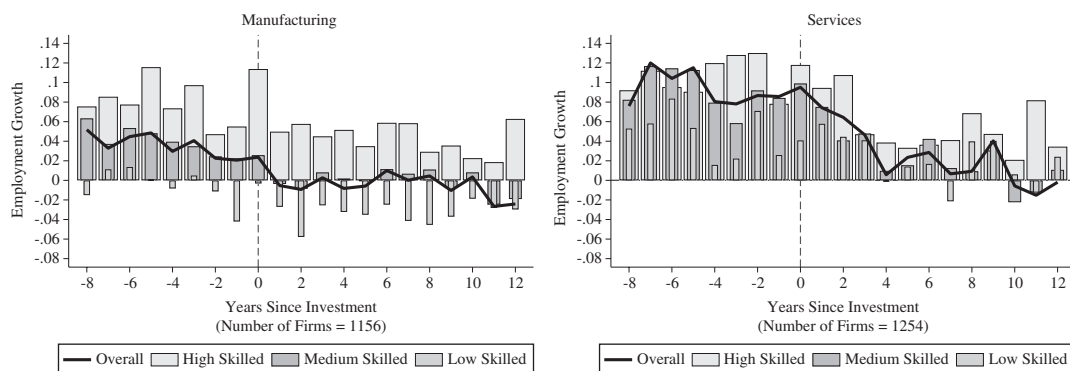


FIGURE 3 Employment Growth (by Skill Group) of MNEs around Investment.

Notes: This figure displays the annual employment growth around FDI for manufacturing (left panel) and services (right panel) MNEs. The black line represents the growth in all employees, whereas the bars consider the growth per skill group. For comparison, we create symmetry around zero and calculate each growth rate by considering the average employment in t and $t-1$ in the denominator of the growth rate

Czech accession into the European Union in 2004. While the first peak is mainly due to FDI by manufacturing firms, the second peak predominantly saw investments by service firms.

Table 1 reports the main summary statistics of onshore variables in the manufacturing and service sectors, of which MNE data only consider values two years prior to FDI to show their initial properties. We want to highlight important differences in terms of three aspects: (i) between sectors, (ii) within sectors and between MNEs and reference firms and (iii) relative to other data sets such as the MiDi data set. (i) First, the table shows that firms in the manufacturing sector are much larger than those in the service sector, where the latter includes firms with many more plants (e.g. stores). Relative to the other sector, manufacturing production is low-skill intensive, while production in service firms is high-skill intensive. (ii) Second, on average, MNEs are larger, employ a larger share of high-skilled workers, pay higher wages and grow faster in the years prior to FDI than (the stratified sample of) non-MNEs. Firm characteristics are, hence, in line with studies such as Helpman, Melitz and Yeaple (2004), which shows that only productive firms conduct FDI because of its high fixed costs, or Antras and Helpman (2004), which draws theoretical links between productivity, firm size and the decision to invest abroad. (iii) Third, note that despite being large compared to non-MNEs, our average MNE is still substantially smaller than the selection of MNEs in the MiDi data set because firm size correlates positively with the size of the FDI, which is covered without any absolute lower bound in the IAB-ReLOC data. We highly stress this improvement in the data since a relatively high fraction of German SMEs invested in the Czech Republic due to the relatively low costs of FDI.¹² If these firms are not considered in the analysis, then the results may be substantially biased by selectivity.

Having described the data, we now turn to the analysis of the effects of FDI on firm employment. Thus far, Figure 1 has shown that relative employment evolves negatively for MNEs,

¹²Moritz et al. (2020), Hecht (2017), and Buch et al. (2005, p. 59 f.) note that the average German affiliate in CEECs is remarkably small. On the one hand, geographic proximity contributes to low expenditures for cross-border transactions and communication. On the other hand, political developments reduce investment risks and associated costs. These are, for example, the stable political climate in Eastern Europe, the single market of the EU, and advances in the Schengen area.

which may be due to FDI but also to other events or influences particular to these firms, such as relocating jobs to East Germany. In Figure 3, we therefore zoom in on the evolution of manufacturing (left panel) and services (right panel) MNEs around their years of investment in the Czech Republic. To ease the comparability of increases and decreases, we create symmetry around zero by using the average employment in t and $t - 1$ in the denominator of growth rates. Hence, the range of values lies between -2 and 2 , instead of between -1 and $+\infty$ (compare Davis, Haltiwanger & Schuh, 1996, p. 190).

It is striking that employment growth (black solid line) fundamentally changes immediately after investment. While prior to investment, the average MNE follows a growth path, after investment, firm employment decreases in a manufacturing MNE or grows much more slowly in a service MNE. The trend exists in both sectors and for all skill groups, although there are substantial differences in magnitude. Manufacturing firms annually grew between 2 and 6% prior to the investment, mainly due to not only the increase in high-skilled workers but also the increase in medium-skilled workers. The growth in low-skilled workers somewhat oscillated around zero. After FDI, the employment of high-skilled workers grew at a slower pace, while the number of medium-skilled workers being barely changed, and low-skilled employment continuously decreased. In the service sector, the pre-FDI growth of all worker types was between 8% and 12% and relatively similar for high- and medium-skilled workers. The number of low-skilled workers, however, grew more slowly. After investment, growth rates fell successively to below 4%. The differences between skill groups were less pronounced than those in the manufacturing sector.

3 | EMPIRICAL STRATEGY

In the previous section, we described the chronological interrelatedness between the occurrence of FDI and the evolution of an MNE's workforce. Adverse employment effects, however, may also be driven by a general trend that correlates with the decision to conduct FDI—a concern that we mitigate using the following event-study design.

3.1 | Event-study design

We base our estimation design on Borusyak and Jaravel (2018) and Schmidheiny and Siegloch (2019), applying a distributed-lag model with first differences:

$$\Delta \ln L_{it} = \sum_{j=-23}^{+20} \gamma_j D_{i,t}^j + \zeta \Delta \mathbf{z}_{it} + \theta_t + \Delta \varepsilon_{it} \quad (1)$$

where $\Delta \ln L_{it}$ is the change in firm i 's employment in logarithms (growth rate), $\Delta \mathbf{z}_{it}$ is a vector of time-varying firm controls such as the change in the squared value of a firm's age, θ is the year fixed effect, and $\Delta \varepsilon_{it}$ is the change in the error term.¹³ The main interest is in the event dummies $D_{i,t}^j$. They are equal to one whenever firm i conducts FDI in j years from t and zero

¹³We do not consider the difference in age (nonsquared) since it renders perfectly collinear in the presence of time fixed effects and in first differences.

otherwise. Hence, for each MNE, the sum in (1) contains only a single coefficient of γ per year. The observation window reaches from 1986 to 2011, and these years also mark the borders for the maximum number of lags and leads indicated by the boundaries of the sum. For instance, if a German firm buys a Czech affiliate in 1991, then the regression may contain up to 5 lines of lags (1986–1991) and up to 20 lines of leads (1992–2011) for this firm. We choose a broad observation period because some portion of the effects may not arise immediately after the investment but rather after organisational rearrangements some years later. Therefore, we can also control for another growth scenario, for example, when firm employment initially decreases but subsequently experiences higher growth rates in the medium or long run. Observing a long preceding period helps to reveal whether the investment changed an existing trend. It would be positive, for instance, if the firm acquires managers who plan and cope with the organisational changes. In the case of multiple investments in Czech affiliates, we consider only the first occasion.

Since we include the whole set of event dummies, each of them is exclusively identified by the MNEs' differences from control firms; that is, only firms without any FDI serve as references for identification. The coefficient of each investment dummy then indicates the difference in employment growth between MNEs in a given year and the reference group.

The specification with first differences solves many problems related to unobserved firm characteristics that usually do not change during the sample period; these characteristics can be the location or legal form (German *AG* or *GmbH*, etc., which are similar to *Inc.* or *Ltd. Co.*, etc.) of the firm, or, in combination with time fixed effects, the linear term of a firm's age. If some change correlates with employment growth and is unrelated to the FDI decision, then we assume that it is random and does not influence our mean outcomes. If, instead, it is related to FDI, then it depicts another channel that we capture in our estimates. The latter relates to the problem of *bad controls* and is the reason for omitting a plethora of possible control variables. That is, the FDI decision may influence employment growth not only directly but also through channels such as wages, skill or task composition, the number of plants or sales.

3.2 | Coarsened exact matching

Although the reasons for conducting FDI are manifold, Helpman et al. (2004) have shown and Table 1 confirms that the tendencies to invest abroad are stronger for more productive firms. If we employ our full sample, we then end up comparing the growth of MNEs with that of firms that may not have the features or resources needed to benefit from international activities. Technically, we face the problem that the full sample is not unconfounded: choosing to invest is not random conditional on the covariates. To mitigate this problem, we focus on a subsample of MNEs and reference firms with similar characteristics. Our analysis then relies on the assumption that the probability of conducting FDI is comparable among firms, and hence, assignment to the treatment is conditionally random.

To achieve that prerequisite to the greatest extent possible, various matching strategies are available. We follow the suggestion of King and Nielsen (2019) and apply coarsened exact matching (CEM) on a variety of characteristics that determine a firm's FDI activity. The main advantage of this approach over other methods, such as propensity score matching (PSM), is that the distribution of all covariates of each matched pair is balanced and not the one-dimensional overall propensity for FDI. To give an example, in PSM, we could end up with a match of a large MNE with low employment growth and a small non-MNE with high growth. In CEM, on the contrary,

all covariates are fairly balanced, which also results in a better balance of the higher moments of their distributions (e.g. variance ratios closer to one). While PSM does not always lead to a higher balance of the covariates, CEM ensures this by its methodology and thereby also implies higher balance for higher-order terms such as interacting covariates (Iacus, King & Porro, 2012; Ripollone, Huybrechts, Rothman, Ferguson & Franklin, 2020). The main disadvantage of CEM is the curse of dimensionality; that is, the method cannot include many matching variables since each of them exponentially decreases matching feasibility. Our matching procedure is, hence, a trade-off between balancing firm characteristics of substantial importance for the selection into FDI (internal validity: mitigating confounders) and pruning dissimilar firms, that is reducing the number of observations in our subsequent regressions (external validity: results are valid for the population of firms). Specifically, Ripollone et al. (2020, p. 613) note that CEM is usually preferable to PSM, 'if only a few (<10) strong confounders must be controlled'. To explore this practice for our analysis, we need to identify those features that are important for a firm's decision to conduct FDI and that may impact the outcome variable (employment growth) in its aftermath. To observe the results from other ratios of internal versus external validity, we also run several PSM specifications with either 23 covariates or only the key variables in Section 5. Since continuous checks hint at the importance of only a few key characteristics that are relevant for a firm's decision to invest in the Czech Republic, we choose the following CEM procedure as our baseline procedure because it provides the best proportion for the number of observations and the balance of covariates:

1. Exact matching of the firm's sector (service and manufacturing) since growth rates and firm characteristics differ greatly between sectors, and thus, the responses to FDI may also differ by sector.
2. Exact matching of the year, which is two years prior to the investment. This adjustment provides non-MNEs with a virtual investment year, at which the conditional probability of investing is similar to that of the MNEs, but the firms randomly chose not to invest. The choice of year for the matching includes another trade-off. A shorter period before the event can capture effects that are due to the anticipation of FDI. However, a longer matching period before the event can include firm adjustments that are not related to FDI and, hence, weaken the balancing for the identification of the labour market effect. Figure 3 suggests that two years prior to the event is sufficient for avoiding changes due to FDI.
3. Consider treatment and control firms that are inside the support region (highest/lowest value of the smaller group $\pm 3\%$) for each covariate and in each year and within an economic sector. The rationale is to drop all observations with firm characteristics that appear only in the treatment or control group. In terms of employment, for example we drop treatment firms in manufacturing that exceed the largest control firm in manufacturing by more than 3%.
4. Create five equally sized bins for each of 8 covariates: number of employees, share of high-skilled workers, share of medium-skilled workers, share of low-skilled workers, employment growth, wage bill, number of establishments, and propensity to invest in the Czech Republic for 24 industries and each West German state. The main aim is to capture the determinants of employment growth pre- and post-FDI. The number of employees, employment growth and the wage bill also approximate firm productivity and the feasibility of coping with the high fixed costs of FDI. These are also partially captured by the skill shares and number of plants, since a firm with more educated workers and a multisite firm are more likely to manage and coordinate a new offshore plant. The finer industry classification captures the firms' economic activity, which is also associated with productions of different complexity. More complex goods and services can usually be

divided into more production steps (e.g. cars). The location of firms may be of relevance if, for instance, firms closer to the border respond more strongly to FDI.

5. If firms are in exactly the same bin for each covariate, then we randomly assign a control firm to exactly one treatment firm. This results in unique one-to-one matches without replacement.

Table 2 reports the balancing of the matched sample of MNEs and reference firms by comparing their means and standard deviations. We also compute the Mahalanobis distance of controls to their respective match, as well as the standardised biases and variance ratios.¹⁴ The statistics show that the subsample is much more balanced than the full sample, as the standardised bias is below 5% for most of the variables (as suggested by Caliendo & Kopeinig, 2008), and the variance ratio is much closer to one. Substantial differences between firm types remain only for the number of plants in the manufacturing sector, but overall the average Mahalanobis distance drops from 2.8 or 3.1 (relative to the treatment mean), in the manufacturing, or service sector to 0.113 or 0.121 (within matches).

While the fairly balanced matching covariates reduce sources of selection bias, we still need to discuss unobserved or—due to the limitation of the CEM—not included sources that may impact both a firm's decision to invest in the Czech Republic and employment growth after FDI. Ideally, we would follow theory and control for measures of productivity and related characteristics such as size, growth, revenue and leverage. Since privacy protection makes it impossible to merge the data set with financial accounts of firms, we are limited to approximating the latter with labour market information. Not included but potentially relevant information is, for example, the firm's product type, management intensity, customer preferences, revenue or leverage. After explaining when firm differences in these sources lead to a higher propensity to engage in FDI, we also need to consider whether they also imply heterogeneous employment responses after FDI.¹⁵

We start with the example of certain product types and consider those with high scale effects. These products would encourage (market) expansions by the firm and thereby increase the propensity for FDI. Since these products favour firm expansion, it is also likely that serving a larger market will raise employment growth in the domestic part of the firm. Our estimates in the following hence reflect an upper bound of MNE growth. A similar reasoning holds for high management intensity or revenues. These firms are more prone to foreign expansion since they feature relatively low costs of FDI or low relative costs. It is also likely that—beyond FDI—high management intensity fosters employment growth because, *ceteris paribus*, the firm already has a greater capacity to manage a larger workforce. High revenues could lead to increased hiring of managers or administrative workers to cope with the international organisation. In another scenario, the customers' taste favours the firms' regional attachment to the Czech Republic and thus also the firms' propensity for FDI. Beyond the effect of FDI, the employment effect would, again, also be positive since customers' taste is satisfied, which in turn increases their demand. Finally, we turn to the other side of the coin, that is, firms that cannot afford the high costs of FDI. For firms in economic turmoil or highly leveraged firms, these expenses will impede their international expansion. Not considering the effect of FDI, the expected growth rates of FDI-engaging firms would thus be higher than those of non-MNEs. Hence, in the subsequent analysis, we consider estimates of positive employment effects for MNEs as an upper

¹⁴Standardized bias is the mean difference divided by the square root of the mean variance of the two covariates:

$$\frac{\mu_{\text{treatment}} - \mu_{\text{control}}}{\sqrt{\frac{\sigma_{\text{treatment}}^2 + \sigma_{\text{control}}^2}{2}}}$$

The variance ratio is calculated with $\frac{\sigma_{\text{treatment}}^2}{\sigma_{\text{control}}^2}$.

¹⁵Note that firm characteristics impacting the probability to invest without having an additional effect on the growth rate after FDI are of no concern for the matching procedure.

TABLE 2 Characteristics of MNEs and Non-MNEs after coarsened exact matching

	Manufacturing (886 firms)				Services (668 firms)			
	MNE	Reference	Balancing	Reference	MNE	Reference	Balancing	Reference
	Mean	Mean	Stdd. Bias	Mean	Mean	Mean	Stdd. Bias	Stdd. Bias
	Median	Median		Median	Median	Median		
	(SD)	(SD)	(Var. Ratio)	(SD)	(SD)	(SD)	(Var. Ratio)	(Var. Ratio)
Log employment	4.8543	4.7872	0.0399	3.0050	3.0743	3.0743	-0.0364	-0.0364
	5.0238	4.9836		2.7081	2.7081	2.7081		
	(1.7956)	(1.5540)	(1.3351)	(1.9826)	(1.8286)	(1.8286)	(1.1755)	(1.1755)
High-skilled (%)	5.67	5.74	-0.0103	16.09	15.13	15.13	0.0411	0.0411
	4.09	3.98		2.47	2.45	2.45		
	(6.80)	(6.74)	(1.0198)	(24.00)	(22.67)	(22.67)	(1.1209)	(1.1209)
Medium-skilled (%)	72.52	72.95	-0.0259	78.04	78.92	78.92	-0.0374	-0.0374
	74.56	73.87		83.84	85.71	85.71		
	(17.02)	(16.21)	(1.1019)	(24.00)	(22.63)	(22.63)	(1.1246)	(1.1246)
Low-skilled (%)	21.80	21.30	0.0288	5.87	5.95	5.95	-0.0079	-0.0079
	19.16	18.96		0	0	0		
	(17.79)	(16.85)	(1.1142)	(10.85)	(10.96)	(10.96)	(0.9808)	(0.9808)
Employment growth	3.0081	2.9717	0.0301	2.7266	2.7136	2.7136	0.0109	0.0109
	2.7653	2.7726		2.7218	2.7218	2.7218		
	(1.2759)	(1.1368)	(1.2597)	(1.2336)	(1.1260)	(1.1260)	(1.2002)	(1.2002)
Log wage bill	9.3692	9.3188	0.0284	7.6438	7.5993	7.5993	0.0215	0.0215
	9.5235	9.5125		7.3709	7.3867	7.3867		
	(1.8912)	(1.6535)	(1.3081)	(2.1296)	(2.0015)	(2.0015)	(1.1321)	(1.1321)

(Continues)

TABLE 2 (Continued)

	Manufacturing (886 firms)			Services (668 firms)		
	MNE	Reference	Balancing	MNE	Reference	Balancing
	Mean	Mean	Stdd. Bias	Mean	Mean	Stdd. Bias
	Median	Median	.	Median	Median	.
	(SD)	(SD)	(Var. Ratio)	(SD)	(SD)	(Var. Ratio)
Log number of plants	0.3172	0.1863	0.2360	0.3112	0.2609	0.0668
	0	0	.	0	0	.
	(0.6420)	(0.4506)	(2.0304)	(0.8212)	(0.6796)	(1.4600)
Avg. Mahalanobis distance			0.1130			0.1213

Notes: This table reports the summary statistics for one-to-one matched MNEs and non-MNEs two years prior to the (virtual) investment year. The coarsened exact matching procedure considers only firms in the support region; that is, it excludes firms with characteristics that exceed the respective maximum in the other group (control or treatment) by more than 3%. Moreover, we use 5 equally sized bins per covariate and randomly match firms in the same set of bins. We evaluate the balancing quality of the matching via the standardised bias and variance ratio; that is the quality of the match increases with attenuated standardised biases and variance ratios close to one. The overall dissimilarity of control firms is measured for all matching covariates and for each match by the Mahalanobis distance. The lower the Mahalanobis distance is, the more similar the characteristics within the matches.

bound, while negative employment growth instead serves as a conservative estimate. The latter case also implies that CEM's limitation of matching on only few covariates is of low concern.

4 | RESULTS

Our empirical strategy identifies how a firm's FDI decision impacts its employment around the year of investment. It does so by applying an event-study design that controls for time-invariant firm characteristics. After a preliminary analysis of outcomes for the full sample, we estimate the employment dynamics of coarsened exactly matched firms.

4.1 | Preliminary analysis: employment growth differential of the unmatched sample

We now turn to the estimation of Equation (1) using the full sample of 164,410 unmatched firm-year observations. Despite the disadvantage that the results from this nonmatched sample do not reveal the causal effect of FDI on firm employment (low internal validity), the evolution of the average MNE relative to an excess of dissimilar reference firms is still relevant since the full sample of the reference firms is more representative of the remaining economy than the matched subgroup (high external validity).

Figure 4 plots the estimates (black line) and their 95% confidence intervals (grey area), in which we cluster standard errors at firm-year levels. The top panel shows the results for the full sample. Prior to investment, the confidence interval overlaps with the zero line for most years, which means that the growth of MNEs is not significantly different from the growth of reference firms. The size of the coefficients suggests that, on average, MNEs tend to grow somewhat faster than reference firms prior to investment. The investment year marks a striking turning point, after which MNEs' relative employment growth changes its trend and significantly decreases in the years after investment, ranging from -1.9% to -3.3% compared to the reference firms. Until 20 years after investment, we do not observe that MNEs return to a growth path relative to non-MNEs.

In the following analysis, we focus on a ten-year window around the investment since the sample is constructed in a way that centres the MNE data around the year of investment. These years, hence, contain less noise, more precise estimates and narrower confidence bands. Regarding employment growth after 10 years of investment, the trend never changes to become significantly positive. Therefore, in the case of German FDI in the Czech Republic, there is no evidence of an increase in firm employment in the long run. This finding is in contrast to other studies, such as Navaretti et al. (2010) and Hijzen et al. (2011), where efficiency-seeking FDI to low-income countries has positive labour market effects in the long run, as there is a time lag until gains in productivity lead to new hires.

Considering insights from theory, Czech affiliates will substitute for *some* types of labour, while they complement *other* types of labour inside or outside the MNE. This substitutability is also related to the concept of the offshorability of jobs à la Blinder and Krueger (2013). They state, on the one hand, that in the service sector, the tradability of tasks depends on certain characteristics, such as the proximity of the location where the task is performed to the end customer. On the other hand, in the manufacturing sector, virtually everything can be put into boxes and sent abroad. From the outset, this sector is thus more prone to offshoring activities, and the related

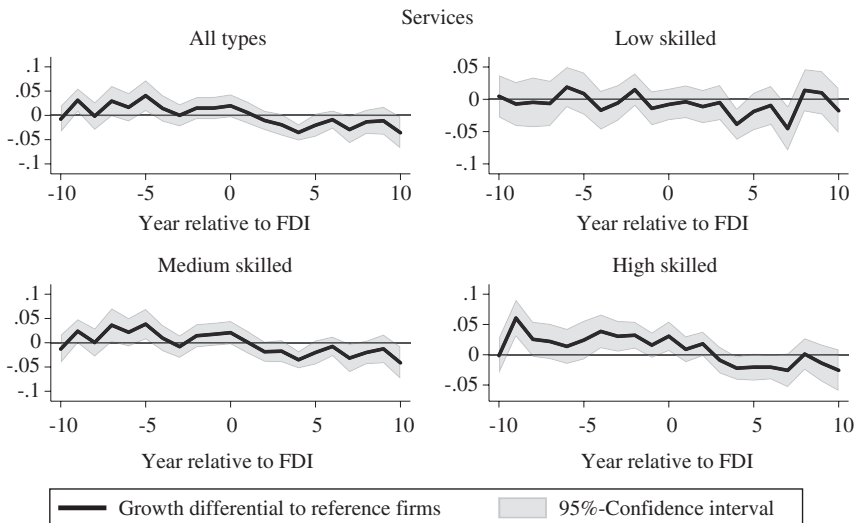
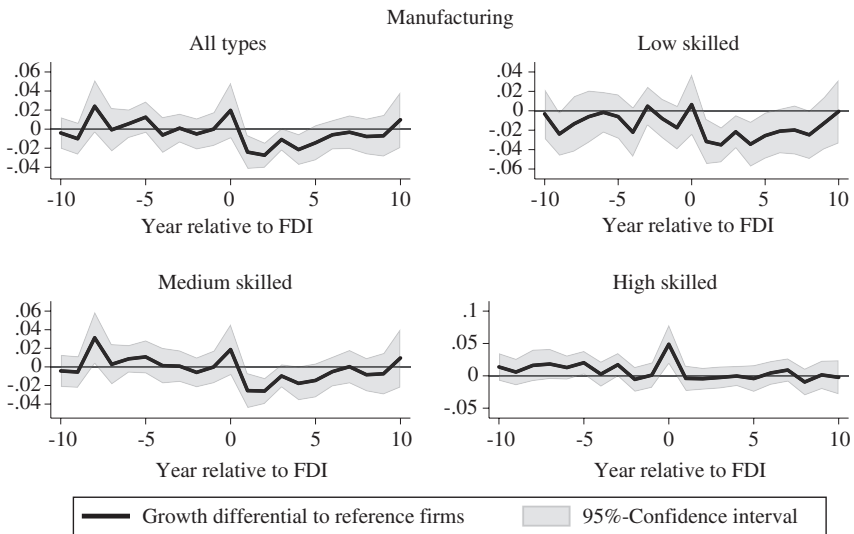
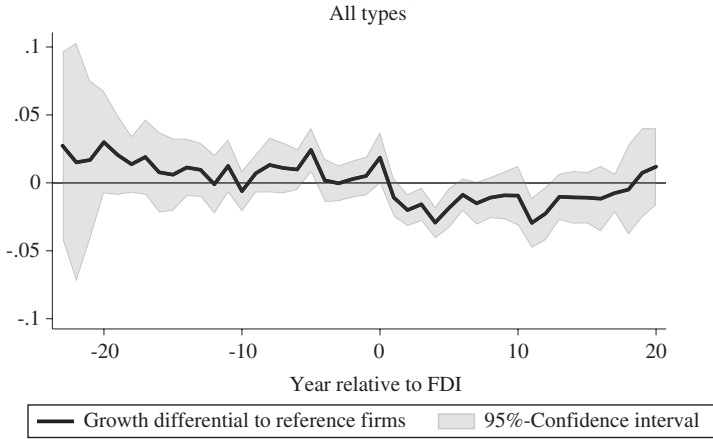


FIGURE 4 Employment Growth Differential of MNEs compared to Non-MNEs.

Notes: This figure presents the growth differential between MNEs and non-MNEs for the pooled sample of West German workers and separately by sector and skill group. The grey area is the 95% confidence interval, which tests whether a coefficient is individually different from zero. If it crosses the zero line, then no significant difference between MNEs and non-MNEs is measured. Standard errors are clustered at firm-year levels (see Abadie et al., 2017). The respective output is drawn from Table A1

theory predicts trade patterns according to the comparative advantage in factors of production. Regarding the skill level of workers, this would imply that Czech affiliates substitute for low- and medium-skilled labour in German production. MNEs, however, are also able to cut prices due to cost reductions in production, which, according to Markusen (2004), increases their sales and the labour demand for rather high-skilled headquarters activities such as management, marketing, and research and development.¹⁶

The bottom panels in Figure 4 depict the development in MNEs' employment within the manufacturing or service sector and separately by skill level. Within manufacturing (left panel), MNEs' employment mainly adjusts during the five years after investment. Compared to the reference firms, the annual growth of MNEs is 1.3% to 2.8% lower. It is evident that the effects differ with respect to workers' skills. The drop in relative employment growth is strongest for low-skilled workers (−2.3% to −3.8% per year) but also sizable for medium-skilled workers (down to −2.8% per year). High-skilled workers, however, are not considerably affected. Their employment even rises in the year prior to investment, presumably because MNEs hire managers who perform organisational restructuring.

Service MNEs react with a similar but weaker break in the existing growth path relative to the reference firms. Relative growth decreases successively until reaching −3.8% per year. Noticeable differences become visible in the growth across skills. While the highest adverse effects are found for medium- and low-skilled workers (up to −5.1%), high-skilled workers also experience annual decreases of approximately −2.3% relative to non-MNEs. These downturns are preceded by increases and motivate a more thorough analysis in the next subsection.

4.2 | Employment growth differential among matched firms

Although the previous approach already considered time-invariant heterogeneity, the estimates could still be biased by some other effect that correlates with any firm characteristic and FDI timing. This means, for instance, that the employment response of more productive firms could be affected by a technology shock that is mainly available to productive firms (due to high costs) at a similar time as FDI but that is causally unrelated. As Table 1 suggests, the average MNE substantially differs from the average reference firm. We thus consider only firms paired in our matching procedure, in which the members of a pair are similar to one another in all matching covariates.

¹⁶In the literature, several measures have been applied to identify skill-specific effects. One is to focus on relative terms, such as skill-group shares in the total wage bill (Becker et al., 2013; Head and Ries, 2002). Another strand of the literature uses the share of a skill group in total employment (Hijzen et al., 2005). However, another strand estimates the labor demand separately for different skill groups (Driffield et al., 2009; Bajo-Rubio and Diaz-Mora, 2015; Elia et al., 2009). The latter has the advantage of identifying the impact on skill-specific labor demand directly and not relative to other skill groups; thus, it is straightforwardly comparable to the estimations for total employment, allowing us to draw conclusions regarding which type of labor drives overall reductions.

TABLE 3 Baseline regression results of matched firms

Dependent variable: $\Delta \log$ Employees	Manufacturing sector				Service sector				
	All	By skill group			All	By skill group			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.0111 (0.57)	0.0175 (1.04)	0.00349 (0.16)	0.0210 (1.27)	0.0381** (1.83)	0.0109 (0.24)	–0.0140 (–0.26)	0.0192 (0.47)	0.000680 (0.02)
3–0 years prior to FDI	0.0125 (0.77)	–0.00823 (–0.48)	–0.0330 (–1.23)	–0.0118 (–0.72)	0.0297 (1.37)	0.0421 (1.31)	–0.0123 (–0.35)	0.0276 (0.84)	0.0518 (1.53)
0–3 years after	–0.0487*** (–2.78)	–0.0566*** (–3.23)	–0.0851*** (–2.88)	–0.0493*** (–2.77)	0.0177 (0.88)	–0.0414 (–1.28)	0.0245 (0.67)	–0.0425 (–1.30)	0.00471 (0.13)
3–6 years after	–0.0548*** (–3.30)	–0.0317* (–1.66)	–0.0676** (–2.49)	–0.0304 (–1.55)	0.0143 (0.58)	–0.0830*** (–2.68)	–0.0525 (–1.37)	–0.0840*** (–2.60)	–0.0653* (–1.92)
6–9 years after	–0.0383* (–1.93)	–0.0144 (–0.75)	–0.0301 (–1.37)	–0.0166 (–0.88)	0.0294 (1.21)	–0.0547 (–1.25)	–0.0510 (–1.02)	–0.0395 (–0.91)	–0.0628 (–1.44)
Observations	9550	5944	5944	5944	5944	3458	3458	3458	3458

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects, and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie et al., 2017).
p* < .1; *p* < .05; and ****p* < .01.

We then assume that the treatment—that is, FDI—can be conducted by all firms equally well but that only a virtually random fraction of these firms—MNEs—take advantage of this possibility (Lee & Lemieux, 2010).

Since we extensively prune the data to obtain a strongly balanced subsample, our estimations lose many degrees of freedom. This reduction becomes even more rigorous when we cluster standard errors according to Abadie et al. (2017) at match-year levels. While the latter has ambiguous effects on standard errors, the vast reduction in degrees of freedom increases the variance and impedes the rejection of a statistical test for a given level of significance. To avoid any over-interpretation of individual outliers from the yearly estimates, we therefore consider three-year changes that average out these irregularities.

In Table 3, column (1) presents the results for the full subsample of matched firms that are, two years prior to investment, very similar in size, growth, wage bill, skill composition, location and industry. After investment, the MNEs' growth rate suddenly decreases relative to the non-MNEs. Now, as one of the matching variables is employment growth from six to two years prior to investment, we do not observe significant differences prior to FDI. Then, the employment of MNEs grows more slowly in the initial years after FDI until six to nine years after investment. On average, MNEs' relative growth slackens by ~1.6 percentage points per year. Note that these estimates depict the upper bound of MNE growth, on the one hand, because of the effects of unobserved covariates as described in Section 3 and, on the other hand, because the data set contains no information on firm trade, especially that of intermediates. This channel could affect employment growth of non-MNEs similarly to FDI and hence attenuate our estimates.

Columns (2) to (9) further distinguish sectors and skill levels. It becomes apparent that manufacturing MNEs' relative growth becomes significantly negative immediately after the year of FDI. This strong and early drop suggests the relocation of some stages of production and closing of domestic plants.¹⁷ Across skill groups, the relative growth of low-skilled workers diminishes more strongly than the respective estimate for medium-skilled workers. High-skilled workers, in contrast, exhibit no change; it seems that they are not substituted by foreign labour. In the service sector, the drop in the relative growth of MNEs comes with a time lag from FDI, which may be explained by the indirect relocation of production, in which service firms successively recruit low-wage labour in the affiliate companies.¹⁸ Note that this substitution is not necessarily associated with low-skilled workers. In fact, the drop in the number of low-skilled workers after FDI is not statistically significant. Instead, medium-skilled workers experience the strongest relative downturn, while high-skilled workers are also less frequently recruited relative to non-MNEs.

In sum, the low-skilled intensive manufacturing sector offshores low- and medium-skilled labour, while the high-skill intensive service sector tends to offshore medium- and high-skilled labour.¹⁹ With respect to the considered economic sector, our results thus combine

¹⁷Among (unmatched) multisite manufacturing MNEs, the average number of plants drops by 2.3% within 3 years after investment. In the service sector, this number increases by 4.4% in the respective period. We exclude the top percentile due to the extreme behavior of the largest service MNE.

¹⁸The result is in accordance with findings by Yeaple (2003) that most FDI follows complex integration strategies.

¹⁹In doing so, the respective jobs do not necessarily need to be located in Germany prior to FDI. It could also be that firms expand production abroad instead of in the domestic economy.

TABLE 4 Regression results for wage bill of real wages

Dependent variable: $\Delta \log$ wage bill	All sectors			Manufacturing sector			Service sector		
	All (1)	By skill group		All (2)	By skill group		All (6)	By skill group	
		Low (3)	Medium (4)		High (5)	Low (7)		Medium (8)	High (9)
6–3 years prior	0.0346 (1.50)	0.0400** (2.09)	0.0546 (0.91)	0.0503** (2.32)	0.121 (1.53)	0.0404 (0.73)	–0.0736 (–0.47)	0.0536 (1.05)	0.0261 (0.18)
3–0 years prior to FDI	0.0398** (2.15)	0.000346 (0.02)	–0.0447 (–0.68)	0.00295 (0.17)	0.0470 (0.60)	0.0982** (2.52)	0.137 (1.05)	0.0716 (1.45)	0.135 (1.20)
0–3 years after	–0.0384* (–1.85)	–0.0323 (–1.61)	–0.0407 (–0.62)	–0.0318 (–1.44)	0.0615 (0.88)	–0.0533 (–1.34)	0.144 (1.10)	–0.0202 (–0.37)	–0.110 (–0.91)
3–6 years after	–0.0468** (–2.37)	–0.0154 (–0.71)	–0.0633 (–1.14)	–0.0240 (–1.06)	0.102 (1.49)	–0.0893** (–2.34)	–0.140 (–1.07)	–0.137*** (–2.70)	–0.125 (–0.99)
6–9 years after	–0.0291 (–1.28)	–0.0206 (–0.91)	–0.0551 (–1.00)	–0.0294 (–1.36)	0.0572 (0.75)	–0.0202 (–0.40)	–0.0810 (–0.47)	–0.0576 (–0.95)	–0.0726 (–0.49)
Observations	9056	5656	5656	5656	5656	3256	3256	3256	3256

Notes: The regressions include the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie et al., 2017).

p* < .1; *p* < .05; and ****p* < .01.

outcomes from various studies. For service MNEs, production in the Czech affiliates substitutes for high-skilled jobs in German parent companies, which is in line with findings by Marin (2004), that is the German affiliates in the Czech Republic employ a high share of high-skilled workers. Moreover, this finding could explain the nonsignificant relation between offshoring to CEECs and skill upgrading in the pooled MNE sample of Becker et al. (2013, p. 102). For manufacturing MNEs, our results are in line with evidence for skill upgrading, such as Castellani et al. (2008) for Italy, Head and Ries (2002) for Japan and Hansson (2005) for Sweden. Regarding long-run growth, we do not observe a return of MNEs' growth rates as predicted by theories such as Rodríguez-Clare (2010) or Acemoglu, Gancia and Zilibotti (2015) (not reported in the table).

4.3 | Wage bill growth differential among matched firms

Thus far, our estimates suggest that efficiency-seeking FDI reduces the number of workers in the parent company. To obtain a better sense of the labour-demand relationship, we now consider the overall input of labour, measured by the wage bill of all workers with social security. Table 4 shows the results for the matched sample and three-year differences. The development of all matches is similar to that of employment growth: prior to investment, the wage bill of MNEs tends to increase faster than that of reference firms. The investment date then implies a turning point, and some years after investment, the relative wage bill growth of MNEs significantly drops until six years after investment.

Strikingly, the evolution within the manufacturing sector is fairly different. While Table 3 shows that a manufacturing firm's employment grows significantly more slowly after investment, wage bill growth shows more variance. This combination implies that the average wages of the remaining workers increase in many MNEs relative to the reference firms.

In the service sector, an increase in relative wage bill growth is succeeded by a more pronounced decrease that lasts until six years after investment. In particular, medium-skilled firms experience a sharp drop some years after investment, showing a -13.7% difference from reference firms. They are also the group with the largest decline in employment and are often associated with a routine task profile (see Goos, Manning & Salomons, 2014). We explicitly test this relationship in the following subsection.

4.4 | Routine or noninteractive jobs and skills

The following section analyses whether routine or noninteractive jobs are more prone to substitution after FDI within their skill group. This hypothesis originates from the task approach by Autor et al. (2003) and has been theoretically formulated in the context of offshoring by Grossman and Rossi-Hansberg (2008). Closely related empirical analyses are those of, for example Autor, Katz and Kearney (2006), Baumgarten, Geishecker and Görg (2013), Becker et al. (2013) and Goos et al. (2014)

We assess whether jobs with high routine content or few face-to-face interactions have explanatory power in terms of the relative decline in an MNE's employment when we also consider workers' skill level. We thus account for the fact that there are low-skilled jobs such as cleaning, catering, hairdressing and security services that cannot be relocated to foreign countries because they include personal interactions and physical presence. Instead, many jobs held by medium- or

high-skilled workers, such as administrative clerks, highly trained specialists, programmers or mathematicians, are easily offshorable, often because the use of computers makes jobs vulnerable to being relocated abroad since no physical presence is needed (see Blinder, 2009 and Blinder & Krueger, 2013).

Following the recommendation by Autor (2013, p. 195), we employ off-the-shelf measures and borrow the strict definition of the *nonroutine* and *interactive* indices from Becker et al. (2013).²⁰ To obtain a binary classification, we take the distribution of these ranking indices among all workers and then declare those jobs that belong to the lowest 25% to be *routine* or *noninteractive*.²¹ We then interact these jobs with skill to obtain three new groups of workers: low-, medium- and high-skilled workers in routine or noninteractive jobs. According to theory, we would expect that within a skill group, those workers are particularly prone to substitution with foreign labour. To test this expectation, we use these groups as dependent variables in the estimating equation of our matched sample, either by considering their number of employees or their wage bill.

Table 5 shows the results for routine jobs with respect to employment (Panel A) and the wage bill (Panel B). It is striking that employment effects by skill group not only become nonsignificant but also change their direction or become smaller in magnitude than in the regressions that ignored routine content. An exception is low-skilled workers in routine jobs in manufacturing MNEs (Panel A, column (4)), which, however, still lose disproportionately to their overall skill group (Table 3, column (3)). In the evolution of the wage bill (Panel B), we observe delayed decreases for this type of labour in the manufacturing sector. This is in line with Hakkala et al. (2014), who also find that FDI impacts task-specific wage bills rather than employment shares. In the service sector, the relative wage bill of medium- and high-skilled routine jobs increases prior to FDI, possibly because of an increased demand for routine office work. Some of these gains, however, are lost in the aftermath. Note that the wage bill of low-skilled routine jobs tends to increase some years after FDI, but the strong oscillation of the coefficients casts doubt on the generalisability of this effect. Nevertheless, the identification of the specific type of affected labour is an interesting avenue for future research.

Panels C and D in Table 5 report analogous results for noninteractive jobs per skill group. Column (4) suggests that the noninteractive jobs of low-skilled manufacturing workers are slightly more affected by FDI than are those of their low-skilled colleagues (compare with Table 3). In the service sector, the growth of noninteractive jobs does not significantly differ across firm types. This result adds to Becker et al. (2013, Table 7, column (6)), who show that service MNEs expand the share of interactive tasks if they hire workers offshore. In terms of wage sums, we find results similar to those in Panel B, whereas in the service sector, noninteractive jobs of low-skilled workers experience immediate and strong negative effects that are followed by nonsignificant increases. Again, a more thorough analysis of the recomposition of the workforce in light of FDI and occupations/tasks is feasible with IAB-ReLOC data and very desirable for future research.

²⁰The measure is related to the work by Spitz-Oener (2006) and has also been applied by Baumgarten et al. (2013) offshoring.

²¹The threshold is based on Blinder and Krueger (2013), who find that ~25% of the workforce in the United States is offshorable. We apply the same methodology as that of Baumgarten et al. (2020).

TABLE 5 FDI and the growth of routine or noninteractive jobs by skill group

	Dependent variable: Δ log number of workers in routine jobs \times skill level								
	All sectors			Manufacturing sector			Service sector		
	By skill group			By skill group			By skill group		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.000427 (0.02)	0.0189 (0.86)	0.00352 (0.27)	-0.00435 (-0.20)	0.0140 (0.59)	0.0141 (0.84)	0.00954 (0.20)	0.0327 (0.75)	-0.0151 (-0.71)
3–0 years prior	-0.0288 (-1.37)	-0.0293 (-1.49)	0.00559 (0.48)	-0.0230 (-0.80)	-0.0220 (-0.86)	-0.00769 (-0.49)	-0.0391 (-1.33)	-0.0404 (-1.30)	0.0207 (1.17)
0–3 years after	-0.0293 (-1.30)	-0.0361 (-1.55)	0.00578 (0.47)	-0.0734** (-2.40)	-0.0363 (-1.23)	0.00156 (0.09)	0.0164 (0.56)	-0.0333 (-0.95)	0.0108 (0.68)
3–6 years after	-0.0336 (-1.44)	-0.0186 (-0.73)	0.00276 (0.19)	-0.0385 (-1.26)	-0.0219 (-0.70)	0.00386 (0.20)	-0.0319 (-0.94)	0.00544 (0.13)	0.00227 (0.10)
6–9 years after	0.00199 (0.09)	-0.0203 (-0.80)	0.0298* (1.75)	0.000925 (0.04)	-0.0413 (-1.34)	0.0311 (1.35)	0.00446 (0.12)	0.00920 (0.21)	0.0276 (1.12)
Observations	9530	9530	9530	5936	5936	5936	3446	3446	3446
	Dependent variable: Δ log wage bill of routine jobs \times skill level								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.0603 (1.01)	0.0671* (1.77)	0.0652 (1.29)	0.0853 (1.38)	0.125*** (3.38)	0.0395 (0.85)	0.0240 (0.19)	-0.0306 (-0.37)	0.126 (1.08)
3–0 years prior	-0.0192 (-0.39)	0.102*** (3.15)	0.116** (2.15)	-0.0572 (-1.04)	-0.00471 (-0.16)	0.0375 (0.64)	0.0274 (0.29)	0.261*** (3.73)	0.235** (2.21)
0–3 years after	-0.0932 (-1.54)	-0.0359 (-1.02)	-0.0498 (-1.04)	-0.0557 (-0.83)	-0.0116 (-0.33)	0.0136 (0.31)	-0.165 (-1.48)	-0.0637 (-0.91)	-0.170* (-1.72)

(Continues)

TABLE 5 (Continued)

Dependent variable: Δ log wage bill of routine jobs \times skill level									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3–6 years after	0.0335 (0.56)	-0.0804*** (-2.63)	-0.0474 (-0.87)	-0.0586 (-0.87)	-0.0280 (-1.07)	-0.0359 (-0.60)	0.201* (1.76)	-0.140** (-2.11)	-0.0620 (-0.58)
6–9 years after	-0.0491 (-0.76)	-0.0144 (-0.35)	-0.111* (-1.77)	-0.105* (-1.76)	0.0154 (0.43)	-0.0718 (-1.11)	0.0392 (0.29)	-0.0541 (-0.52)	-0.148 (-1.09)
Observations	9032	9032	9032	5646	5646	5646	3242	3242	3242
Dependent variable: Δ log number of workers in noninteractive jobs \times skill level									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	-0.00558 (-0.24)	0.0188 (0.87)	0.00234 (0.16)	-0.000347 (-0.02)	-0.00225 (-0.10)	0.0141 (0.72)	-0.0158 (-0.32)	0.0605 (1.31)	-0.0238 (-1.22)
3–0 years prior	-0.0170 (-0.83)	-0.0200 (-1.04)	0.00972 (0.72)	-0.0307 (-1.08)	-0.0285 (-1.19)	-0.00380 (-0.20)	0.00469 (0.17)	-0.00188 (-0.06)	0.0255 (1.50)
0–3 years after	-0.0464** (-2.10)	-0.0408* (-1.80)	-0.00499 (-0.38)	-0.0891*** (-2.96)	-0.0369 (-1.30)	-0.00898 (-0.46)	0.00453 (0.16)	-0.0396 (-1.17)	-0.00626 (-0.43)
3–6 years after	-0.0304 (-1.34)	-0.0264 (-1.10)	0.00318 (0.20)	-0.0650** (-2.27)	-0.0515* (-1.72)	-0.00665 (-0.31)	0.0150 (0.44)	0.0202 (0.51)	0.0130 (0.54)
6–9 years after	-0.00609 (-0.30)	-0.0226 (-1.04)	0.00230 (0.14)	-0.00884 (-0.36)	-0.0421* (-1.67)	0.0114 (0.48)	0.00909 (0.25)	0.0277 (0.70)	-0.0103 (-0.53)
Observations	9530	9530	9530	5936	5936	5936	3446	3446	3446

TABLE 5 (Continued)

Panel D: Dependent variable: $\Delta \log$ wage bill of non-interactive jobs \times skill level		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior		0.0502	0.0425	0.0720	0.0673	0.0929 **	0.0640	0.0297	-0.0332	0.0945
		(0.84)	(1.06)	(1.49)	(1.31)	(2.49)	(1.38)	(0.21)	(-0.37)	(0.87)
3–0 years prior		0.0542	0.0905***	0.125 **	-0.00887	-0.0113	0.0362	0.155	0.247 ***	0.267 **
		(1.10)	(2.62)	(2.37)	(-0.20)	(-0.34)	(0.64)	(1.44)	(3.41)	(2.54)
0–3 years after		-0.114**	0.0258	-0.00661	-0.0165	0.0299	0.0261	-0.266 **	0.0298	-0.0647
		(-1.98)	(0.69)	(-0.13)	(-0.30)	(0.73)	(0.49)	(-2.36)	(0.42)	(-0.65)
3–6 years after		0.0691	-0.0621*	-0.0281	0.000183	0.0115	-0.0271	0.197	-0.151 **	-0.0118
		(1.22)	(-1.91)	(-0.52)	(0.00)	(0.36)	(-0.44)	(1.64)	(-2.31)	(-0.12)
6–9 years after		-0.0616	0.0117	-0.122*	-0.0865*	0.0227	-0.117*	0.0514	0.00506	-0.0904
		(-1.08)	(0.29)	(-1.94)	(-1.92)	(0.61)	(-1.81)	(0.38)	(0.05)	(-0.67)
Observations		9032	9032	9032	5646	5646	5646	3242	3242	3242

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels.
 p* < .1; *p* < .05; and ****p* < .01.

5 | ROBUSTNESS

This section assesses the stability of our results with respect to PSM, different time periods of initial investment, the growth differential of small MNEs and the inclusion of East German states.

5.1 | Propensity-score matching

While the full sample estimation overemphasised external validity, the CEM specifications may have overemphasised internal validity (bias reduction from selectivity). We therefore rerun the baseline regressions using a PSM specification that alleviates strong demands on balancing in favour of more matches and a larger sample size. We do not change the matching variables to maintain the balance of the key characteristics in subsequent regressions. Alternative approaches that include many more additional covariates such as the share of women, mean wage growth and the share of occupational groups (by Blossfeld, 1985) lead to a substantial decline in the similarity of the pre-FDI growth differential within the matches with little improvement in the number of matches.²²

Methodologically, we match each treatment firm to exactly one unique control firm that features very similar propensities to conduct FDI in the Czech Republic in two years (1:1 matching without replacement). As in CEM, we exactly match by economic sector and in the same calendar year. Accordingly, the starting point are firms inside the support region, that is, we do not consider the observation for matching if one matching variable exceeds the highest value of the opposite group (treatment vs. control) by more than three per cent. We then run logit regressions of the FDI event on the same variables as our coarse and exact matching approach, namely firm size, skill shares, growth rate, wage bill, number of establishments, the federal state and the industry of the firm. From the logit models, we predict propensity scores, for which we find the nearest neighbour. If two different treatment firms are closest to the same control firm, we iteratively match those with the closest propensities.

Table 6 exhibits the balancing statistics of the matches. It shows that most of the variables are well-balanced with standardised biases below 0.05 except for the high-skill share in matches in the manufacturing sector and employment growth, as well as the log number of plants in the service sector. The dissimilarity in the matching covariates within the matches is measured by the Mahalanobis distance. Its average is ~16.6% (26.1%) higher in the manufacturing (service) sector than the respective value using CEM. This loss in the balancing statistics implies a loss in the internal validity of the results or the mitigation of selection bias. In this context, we are particularly concerned about the negative employment growth of service MNEs relative to non-MNEs already before the matching year. Such a pretrend is likely to cause a downward bias in the estimation of the growth trend after FDI. For any negative estimate, this would then suggest an underestimation of the true effect (overestimation in absolute terms). Note that in the CEM sample, the (smaller) bias was reversed, so any negative coefficient would rather be a conservative estimate. A substantial advantage of this PSM is, however, the much higher number of matches and the gain in external validity.

For this sample of alternative matches, Table 7 shows the regression results and separates the sample for each sector and skill group. Compared to the outcomes in Table 3, the coefficients become larger in magnitude and statistical significance for low- and medium-skilled workers in manufacturing. The growth rate of the low-skilled labour force in MNEs seems to diminish already in the years

²²A PSM specification using all of these covariates resulted in an average Mahalanobis distance of 0.253 (0.267) and 1442 (1142) firms in the manufacturing (service) sector. See Tables A3, A4, and A5.

TABLE 6 Characteristics of MNEs and Non-MNEs after propensity score matching

	Manufacturing (1420 firms)				Services (1104 firms)			
	MNE	Reference	Balancing		MNE	Reference	Balancing	
Mean	Mean	Mean	Stdd. Bias		Mean	Mean	Stdd. Bias	
Median	Median	Median		Median	Median	Median		
(SD)	(SD)	(SD)	(Var. Ratio)	(SD)	(SD)	(SD)	(Var. Ratio)	(Var. Ratio)
Log employment	4.880	4.834	0.0330		3.616	3.647		-0.0184
	4.934	5.021	.		3.664	3.738		.
	(1.536)	(1.294)	(1.407)		(1.761)	(1.606)		(1.202)
High-skilled (%)	7.752	7.089	0.0715		15.03	15.39		-0.0174
	4.965	4.059	.		5.890	3.818		.
	(9.384)	(9.159)	(1.050)		(20.04)	(21.27)		(0.888)
Medium-skilled (%)	71.70	71.84	-0.00916		77.85	77.10		0.0366
	73.15	73.33	.		82.38	83.33		.
	(15.87)	(15.69)	(1.024)		(19.74)	(20.86)		(0.895)
Low-skilled (%)	20.55	21.07	-0.0308		7.122	7.507		-0.0352
	17.34	17.66	.		2.723	2.538		.
	(16.80)	(16.85)	(0.994)		(10.31)	(11.54)		(0.798)
Employment growth	2.975	2.997	-0.0198		2.760	2.818		-0.0506
	2.765	2.833	.		2.702	2.722		.
	(1.169)	(1.017)	(1.323)		(1.229)	(1.078)		(1.300)
Log wage bill	9.448	9.378	0.0463		8.335	8.339		-0.00212
	9.508	9.578	.		8.426	8.460		.
	(1.637)	(1.381)	(1.405)		(1.877)	(1.666)		(1.269)

(Continues)

TABLE 6 (Continued)

	Manufacturing (1420 firms)				Services (1104 firms)			
	MNE	Reference	Balancing		MNE	Reference	Balancing	
	Mean	Mean	Stdd. Bias		Mean	Mean	Stdd. Bias	
	Median	Median			Median	Median		
	(SD)	(SD)	(Var. Ratio)		(SD)	(SD)	(Var. Ratio)	(Var. Ratio)
Log number of plants	0.222	0.231	-0.0186		0.388	0.439		-0.0622
	0	0	.		0	0	.	.
	(0.463)	(0.496)	(0.872)		(0.815)	(0.841)	(0.939)	(0.939)
Avg. Mahalanobis distance			0.1318					0.1530

Notes: This table reports the summary statistics for one-to-one matched MNEs and non-MNEs two years prior to the (virtual) investment year. The propensity score matching procedure is performed by sector and considers only firms in the support region; that is, it excludes firms with characteristics that exceed the respective maximum in the other group (control or treatment) by more than 3%. We evaluate the balancing quality of the matching for each variable via the standardised bias and variance ratio; that is the quality of the match increases with attenuated standardised biases and variance ratios close to one. The overall dissimilarity of control firms is measured for all matching covariates and for each match by the Mahalanobis distance. The lower the average Mahalanobis distance is, the more similar the characteristics within the matches.

TABLE 7 Regression results of matched firms by FSM

Dependent variable: Δ log Employees	Manufacturing sector				Service sector				
	All	By skill group			All	By skill group			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.00754 (0.52)	0.00875 (0.55)	-0.0147 (-0.70)	0.0112 (0.67)	0.0245 (1.36)	0.00109 (0.04)	-0.0442 (-1.42)	-0.00269 (-0.10)	0.0503* (1.68)
3–0 years prior	-0.00225 (-0.19)	-0.0134 (-1.00)	-0.0482** (-2.28)	-0.0121 (-0.91)	-0.00108 (-0.06)	0.00863 (0.40)	-0.0279 (-0.99)	0.0169 (0.76)	0.0265 (1.05)
0–3 years after	-0.0586*** (-4.48)	-0.0491*** (-3.49)	-0.0774*** (-3.67)	-0.0395*** (-2.72)	-0.00869 (-0.48)	-0.0703*** (-2.88)	-0.0494* (-1.70)	-0.0725*** (-2.92)	0.00154 (0.06)
3–6 years after	-0.0532*** (-4.33)	-0.0234 (-1.63)	-0.0702*** (-3.17)	-0.0238 (-1.56)	0.00716 (0.42)	-0.0894*** (-4.00)	-0.111*** (-3.29)	-0.0900*** (-3.95)	-0.0590** (-2.24)
6–9 years after	-0.0276** (-2.02)	-0.00991 (-0.68)	-0.0362* (-1.66)	-0.00894 (-0.60)	0.0104 (0.56)	-0.0437 (-1.51)	-0.0717* (-1.93)	-0.0420 (-1.44)	-0.0252 (-0.79)
Observations	16,446	10,051	10,051	10,051	10,051	6362	6362	6362	6362

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie et al., 2017).
p* < .1; *p* < .05; and ****p* < .01.

before FDI and lasts until 9 years after investment. A notable change occurs in the service sector. Here, the relative growth of low-skilled workers in MNEs becomes -23.2 percentage points until nine years after investment. Moreover, the negative impact of FDI on the medium-skilled is now substantially larger and sums up to -16.3 percentage points relative to the growth in non-MNEs. In [Table A2](#), we also rerun the regressions of the wage bill for the PSM sample.

5.2 | Different time periods of FDI

To explore whether the years when FDI was conducted affect changes in employment growth, we divide the sample of matched firms into subsamples that differ with respect to the year of initial investment in the Czech Republic (fictitious dates from matching for non-MNEs). We broadly distinguish between three different periods. The first period includes first-mover MNEs from 1990 to 1995, when wage differences between countries were largest and investment risk or fixed costs were relatively high. The second period is from 1996 to 2002 and can be characterised by a relatively homogeneous growth period in terms of gross output and trade, whereas overall unemployment remains fairly similar. In the third period, from 2003 to 2008, offshoring costs to CEECs further decreased, especially for service firms that benefited from EU enlargement.

The outcomes in [Table A6](#) suggest that the employment effect of FDI changed over time. We assume that this change is mainly related to differences in the investment climate and income level of the Czech Republic, as well as to the MNE's size/productivity. Panel A presents the results for the manufacturing sector, clearly showing that adverse effects on low- and medium-skilled conditions occur at the beginning of the sample period. In [Figure A3](#), we show that the average MNE size of initially investing firms decreases over time, so the effects could be related to firm size, which is a caveat that we address in the next subsection.

Panel B displays the results for the service sector. It becomes obvious that in service firms, the sample split renders most of the coefficients nonsignificant, while the coefficient size remains relatively similar for most of the estimates. Hence, we conclude that the baseline specification is sensible in terms of the degrees of freedom in the specification.

5.3 | Small and medium-sized firms

The timing of FDI places even more emphasis on the analysis of small firms, which is one key advantage of using IAB-ReLOC data. We therefore zoom in on the effects that small firms have on the former results and reduce the sample of matched firms to firms that employed 2–100 employees in 1991 (see [Table A7](#) for summary statistics). Since the estimates are similar to those in [Table 3](#) (in terms of direction and magnitude), we report the results in [Table A8](#) and briefly explain the differences. The reduction in statistical significance is notable; it could be, c.p., due to the reduced number of observations and the resulting reduction in degrees of freedom, as in [Table A6](#). This means that if heterogeneity remains the same in the employment responses among small firms, then we should already interpret the coefficients with lower significance levels for the effects (allow for a higher rate of alpha error, that is $p = .1$).

In the manufacturing sector, the relative drop in low- and medium-skilled workers decreased in significance, while the magnitude remained fairly similar over the total 9-year period after FDI. These estimates still suggest a change in the educational composition of the firms' workforce, especially since in the medium run (seven to nine years after investment), the relative

number of high-skilled workers in small MNEs grew faster than the number at comparable non-MNEs. Another important difference from large firms is the lower share of multisite firms. This feature may lead to a substitution of onshore labour without a plant closure but indirectly by increasingly hiring offshore workers. The employment effects following FDI may then come with a time lag. In the service MNEs, we observe that an increase in high-skilled workers relative to non-MNEs prior to FDI is followed by a stronger and remarkable drop in the medium to long run after FDI. We suspect that especially high-skill intensive and small service firms benefit from hiring high-skilled workers in the Czech Republic (and from the good educational system in the CEECs) because they may be unable to compete with the wage premium that large firms pay to high-skilled workers in Germany. Regarding low- and medium-skilled workers, we observe similar effects compared to our baseline specification. Overall, the negative effects of FDI on the employment of small service MNEs are especially noteworthy because, on average, this type of MNE grew faster than the respective non-MNEs in 1990 and especially in the 2000s (see [Figure A4](#)).²³

5.4 | East Germany

We now test the robustness of our results to the inclusion of plants and firms in East Germany.²⁴ To do so, we use the estimating [Equation \(1\)](#) of annual growth and up to 182,872 firm-year observations. Standard errors are clustered at firm-year levels. [Figure A6](#) illustrates the evolution of the growth differences between MNEs and non-MNEs in the total labour force. Again, the year of FDI marks a remarkable turning point for relative development. Up to six years after investment, we observe significant drops in the relative growth of MNEs. With respect to sectors, the lower panels of [Figure A6](#) affirm the previous results, although we detect two substantial differences. In particular, we observe that the effect of FDI on low-skilled workers in both sectors declines, as implied by the attenuated coefficients and weaker statistical significance. This change could be driven by the lower wage rate in East German regions and thus a lower incentive to offshore labour-intensive production. In fact, these regions themselves could act as offshoring destinations for West German firms due to lower average wages. Moreover, we identify a stronger decline in the relative number of high-skilled workers in service MNEs, affirming the results from [Table 3](#).

6 | CONCLUSIONS

We have revisited the effects of firm-level FDI on domestic employment from data on German MNEs that have invested in CEECs. Using an event-study design, we conclude that after investment, the employment growth of German MNEs slackened for ~6–9 years compared to firms without any FDI. In sum, this slack amounted to a drop in MNEs' domestic employment of 10%–14%. The effects, however, are unevenly pronounced between sectors and depend on the educational attainment of workers. Relative to non-MNEs, MNEs in the manufacturing sector decrease the number of medium- and low-skilled jobs, while the impact on high-skilled jobs tends to be positive prior to

²³We also ran the regression on our full sample of West German firms and plotted the estimates in [Figure A5](#). The results are well in line with the results from the matched sample.

²⁴East German establishments have been recorded in the data set since 1993.

FDI and insignificant thereafter. In terms of wage bills, we report insignificant differences from non-MNEs, suggesting that gains from increased productivity are shared with the remaining workforce. For service MNEs, we find drops in the relative growth of medium-skilled and some high-skilled workers (especially in small MNEs) and insignificant drops for low-skilled workers. Compared to the manufacturing sector, these effects come with a time lag, which may be explained by extended hiring in foreign affiliates without plant closures at home. In terms of wage sums in the service sector, we observe increases prior to investment and declines in the aftermath until 6 years after investment. The drop is particularly strong for medium-skilled workers, who make up the group of workers most commonly associated with routine tasks.

To identify the type of labour that is most susceptible to substitution by foreign labour, we analyse skill subgroups of jobs that are intensive in either routine or noninteractive tasks. Strikingly, our analysis on the relative growth of MNEs does not conclude that a job's routine content or interactivity has much explanatory power that reaches beyond what is explained by a worker's educational attainment, especially in the service sector. In manufacturing MNEs, performing noninteractive tasks has higher substitutability with foreign labour than does performing routine tasks. However, a more thorough analysis regarding occupational changes and task-specific changes is very desirable and is possible with this data set and is thus an interesting avenue for future research.

ACKNOWLEDGMENT

Open access funding enabled and organized by ProjektDEAL.

ORCID

Konstantin Koerner  <https://orcid.org/0000-0002-7305-4785>

REFERENCES

- Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. (2017). *When should you adjust standard errors for clustering?* NBER Working Papers 24003. National Bureau of Economic Research.
- Abadie, A., & Spiess, J. (2021). Robust post-matching inference. *Journal of the American Statistical Association*, 1–13. <https://doi.org/10.1080/01621459.2020.1840383>
- Acemoglu, D., Gancia, G., & Zilibotti, F. (2015). Offshoring and directed technical change. *American Economic Journal: Macroeconomics*, 7(3), 84–122. <https://doi.org/10.1257/mac.20130302>
- Antras, P. (2003). Firms, contracts, and trade structure. *The Quarterly Journal of Economics*, 118(4), 1375–1418. <https://doi.org/10.1162/003355303322552829>
- Antras, P., & Helpman, E. (2004). Global sourcing. *Journal of Political Economy*, 112(3), 552–580. <https://doi.org/10.1086/383099>
- Autor, D. H. (2013). The “task approach” to labor markets: an overview. *Journal for Labour Market Research*, 46(3), 185–199. <https://doi.org/10.1007/s12651-013-0128-z>
- Autor, D. H., Katz, L. F., & Kearney, M. S. (2006). The polarization of the US labor market. *American Economic Review*, 96(2), 189–194. <https://doi.org/10.1257/000282806777212620>
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- Bajo-Rubio, O., & Diaz-Mora, C. (2015). On the employment effects of outward FDI: The case of Spain, 1995–2011. *Applied Economics*, 47(21), 2127–2141. <https://doi.org/10.1080/00036846.2014.1002904>
- Baumgarten, D., Geishecker, I., & Görg, H. (2013). Offshoring, tasks, and the skill-wage pattern. *European Economic Review*, 61, 132–152. <https://doi.org/10.1016/j.eurocorev.2013.03.007>
- Baumgarten, D., Irlacher, M., & Koch, M. (2020). Offshoring and non-monotonic employment effects across industries in general equilibrium. *European Economic Review*, 130, 103583. <https://doi.org/10.1016/j.eurocorev.2020.103583>

- Becker, B., Driffeld, N., Lancheros, S., & Love, J. H. (2020). FDI in hot labour markets: The implications of the war for talent. *Journal of International Business Policy*, 3(2), 107–133. <https://doi.org/10.1057/s42214-020-00052-y>
- Becker, S. O., Ekholm, K., & Muendler, M.-A. (2013). Offshoring and the onshore composition of tasks and skills. *Journal of International Economics*, 90(1), 91–106. <https://doi.org/10.1016/j.jinteco.2012.10.005>
- Becker, S. O., & Muendler, M.-A. (2008). The effect of FDI on job security. *The B.E. Journal of Economic Analysis & Policy*, 8(1), 8. <https://doi.org/10.2202/1935-1682.1770>
- Bernard, A. B., Jensen, J. B., & Schott, P. K. (2009). Importers, exporters and multinationals: a portrait of firms in the U.S. that trade goods. In T. Dunne, J. B. Jensen & M. J. Roberts (eds), *Producer Dynamics: New Evidence from Micro Data* (pp. NBER Studies in Income and Wealth vol. 68, 513–552). Chicago and London: University of Chicago Press. <https://doi.org/10.7208/9780226172576-016>
- Blinder, A. S. (2009). How many US jobs might be offshorable? *World Economics*, 10(2), 41–78.
- Blinder, A. S., & Krueger, A. B. (2013). Alternative measures of offshorability: A survey approach. *Journal of Labor Economics*, 31(1), 97–128. <https://doi.org/10.1086/669061>
- Blossfeld, H.-P. (1985). Berufseintritt und Berufsverlauf. *Mitteilungen Aus Der Arbeitsmarkt-und Berufsforschung*, 18(2), 177–197
- Borin, A., & Mancini, M. (2016). Foreign direct investment and firm performance: an empirical analysis of Italian firms. *Review of World Economics*, 152(4), 705–732. <https://doi.org/10.1007/s10290-016-0255-z>
- Borusyak, K., & Jaravel, X. (2018). *Revisiting event study designs: Robust and efficient estimation*. Available at SSRN. <https://ssrn.com/abstract=2826228>
- Buch, C. M., Kleinert, J., Lipponer, A., Toubal, F., Markusen, J. R., & Midelfart, K.-H. (2005). Determinants and effects of foreign direct investment: Evidence from German firm-level data. *Economic Policy*, 20(41), pp. 51+53–110.
- Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), 31–72. <https://doi.org/10.1111/j.1467-6419.2007.00527.x>
- Card, D., Heining, J., & Kline, P. (2013). Workplace heterogeneity and the rise of West German wage inequality. *The Quarterly Journal of Economics*, 128(3), 967–1015. <https://doi.org/10.1093/qje/qjt006>
- Castellani, D., Mariotti, I., & Piscitello, L. (2008). The impact of outward investments on parent company's employment and skill composition: Evidence from the Italian case. *Structural Change and Economic Dynamics*, 19(1), 81–94.
- Castellani, D., & Pieri, F. (2013). R&D offshoring and the productivity growth of European regions. *Research Policy*, 42(9), 1581–1594.
- Crescenzi, R., Ganau, R., & Storper, M. (2021). Does foreign investment hurt job creation at home? The geography of outward FDI and employment in the USA. *Journal of Economic Geography*. *l*bab(016), 1–27. <https://doi.org/10.1093/jeg/lbab016>
- Crinò, R. (2009). Offshoring, multinationals and labour market: A review of the empirical literature. *Journal of Economic Surveys*, 23(2), 197–249. <https://doi.org/10.1111/j.1467-6419.2008.00561.x>
- Davies, R. B., & Desbordes, R. (2015). Greenfield FDI and skill upgrading: A polarized issue. *Canadian Journal of Economics*, 48(1), 207–244. <https://doi.org/10.1111/caje.12126>
- Davis, S., Haltiwanger, J., & Schuh, S. (1996). *Job creation and destruction*. MIT Press.
- Debaere, P., Lee, H., & Lee, J. (2010). It matters where you go: Outward foreign direct investment and multinational employment growth at home. *Journal of Development Economics*, 91(2), 301–309. <https://doi.org/10.1016/j.jdeveco.2009.07.002>
- Desai, M. A., Foley, C. F., & Hines, J. R. (2009). Domestic effects of the foreign activities of US multinationals. *American Economic Journal: Economic Policy*, 1(1), 181–203. <https://doi.org/10.1257/pol.1.1.181>
- Driffeld, N., Love, J. H., & Taylor, K. (2009). Productivity and labour demand effects of inward and outward foreign direct investment on UK industry. *The Manchester School*, 77(2), 171–203. <https://doi.org/10.1111/j.1467-9957.2008.02093.x>
- Egger, H., Kreckemeier, U., & Wrona, J. (2015). Offshoring domestic jobs. *Journal of International Economics*, 97(1), 112–125. <https://doi.org/10.1016/j.jinteco.2015.03.010>
- Elia, S., Mariotti, I., & Piscitello, L. (2009). The impact of outward FDI on the home country's labour demand and skill composition. *International Business Review*, 18(4), 357–372.

- Feenstra, R. C. (2010). *Offshoring in the Global Economy: Microeconomic Structure and Macroeconomic Implications*. MIT Press.
- Fitzenberger, B., Osikominu, A., & Völter, R. (2006). Imputation rules to improve the education variable in the IAB employment subsample. *Schmollers Jahrbuch: Journal of Applied Social Science Studies/Zeitschrift Für Wirtschafts-und Sozialwissenschaften*, 126(3), 405–436. <https://doi.org/10.2139/ssrn.711044>
- Geishecker, I., Görg, H., & Maioli, S. (2008). The labour market impact of international outsourcing. In: D. Greenaway, R. Upward & P. Wright (eds), *Globalisation and labour market adjustment*. Springer, pp. 152–173.
- Goos, M., Manning, A., & Salomons, A. (2014). Explaining job polarization: Routinebiased technological change and offshoring. *American Economic Review*, 104(8), 2509–2526. <https://doi.org/10.1257/aer.104.8.2509>
- Grossman, G. M., & Rossi-Hansberg, E. (2008). Trading tasks: A simple theory of off-shoring. *American Economic Review*, 98(5), 1978–1997. <https://doi.org/10.1257/aer.98.5.1978>
- Hakkala, K. N., Heyman, F., & Sjöholm, F. (2014). Multinational firms, acquisitions and job tasks. *European Economic Review*, 66, 248–265. <https://doi.org/10.1016/j.eurocorev.2013.12.003>
- Hall, C., Fujita, M., Mallampally, P., & Sauvart, K. P. (1998). *Handbook on foreign direct investment by small and medium-sized enterprises: lessons from Asia*. United Nations.
- Hansson, P. (2005). Skill upgrading and production transfer within Swedish multinationals. *The Scandinavian Journal of Economics*, 107(4), 673–692. <https://doi.org/10.1111/j.1467-9442.2005.00428.x>
- Harrison, A., & McMillan, M. (2011). Offshoring jobs? Multinationals and US manufacturing employment. *The Review of Economics and Statistics*, 93(3), 857–875. https://doi.org/10.1162/REST_a_00085
- Head, K., & Ries, J. (2002). Offshore production and skill upgrading by Japanese manufacturing firms. *Journal of International Economics*, 58(1), 81–105. [https://doi.org/10.1016/S0022-1996\(01\)00161-1](https://doi.org/10.1016/S0022-1996(01)00161-1)
- Hecht, V. (2017). Location choice of German multinationals in the Czech Republic: The importance of agglomeration economies. *Economics of Transition*, 25(4), 593–623. <https://doi.org/10.1111/ecot.12131>
- Hecht, V., Hohmeyer, K., Litzel, N., Moritz, M., Müller, J.-A., Phan thi Hong, V. & Schäffler, J. (2013). *Motive, Strukturen und Auswirkungen deutscher Direktinvestitionen in Tschechien*. IAB Discussion Paper 2013/01. Institute for Employment Research.
- Hecht, V., Litzel, N., & Schäffler, J. (2013). *The ReLOC project: Method report for implementing a cross-border company survey in Germany and the Czech Republic*. IAB Discussion Paper 2013/04. Institute for Employment Research.
- Hecht, V., Litzel, N., & Schäffler, J. (2019). Unit nonresponse at the firm level: a crossborder analysis using the IAB-ReLOC data. *Journal for Labour Market Research*, 53(1), 2. <https://doi.org/10.1186/s12651-018-0251-y>
- Heckman, J. J. (1978). Dummy endogenous variables in a simultaneous equation system. *Econometrica*, 46(4), 931–959. <https://doi.org/10.2307/1909757>
- Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American Economic Review*, 94(1), 300–316. <https://doi.org/10.1257/000282804322970814>
- Hijzen, A., Görg, H., & Hine, R. C. (2005). International outsourcing and the skill structure of labour demand in the United Kingdom. *The Economic Journal*, 115(506), 860–878. <https://doi.org/10.1111/j.1468-0297.2005.01022.x>
- Hijzen, A., Jean, S., & Mayer, T. (2011). The effects at home of initiating production abroad: evidence from matched French firms. *Review of World Economics*, 147(3), 457–483. <https://doi.org/10.1007/s10290-011-0094-x>
- Hummels, D., Munch, J. R., & Xiang, C. (2018). Offshoring and labor markets. *Journal of Economic Literature*, 56(3), 981–1028. <https://doi.org/10.1257/jel.20161150>
- Iacus, S. M., King, G., & Porro, G. (2012). Causal inference without balance checking: coarsened exact matching. *Political Analysis*, 20(1), 1–24. <https://doi.org/10.1093/pan/mpr013>
- Jäckle, R., & Wamser, G. (2010). Going multinational: What are the effects on homemarket performance? *German Economic Review*, 11(2), 188–207. <https://doi.org/10.1111/j.1468-0475.2009.00473.x>
- King, G., & Nielsen, R. (2019). Why propensity scores should not be used for matching. *Political Analysis*, 27(4), 435–454. <https://doi.org/10.1017/pan.2019.11>
- Lee, D. S., & Lemieux, T. (2010). Regression discontinuity designs in economics. *Journal of Economic Literature*, 48(2), 281–355. <https://doi.org/10.1257/jel.48.2.281>

- Marin, D. (2004). 'A nation of poets and thinkers' - less so with Eastern Enlargement? Austria and Germany. CEPR Discussion Paper 4358. Centre for Economic Policy Research.
- Marin, D. (2006). A new international division of labor in Europe: Outsourcing and off-shoring to Eastern Europe. *Journal of the European Economic Association*, 4(2–3), 612–622. <https://doi.org/10.1162/jeea.2006.4.2-3.612>
- Marin, D., Schymik, J., & Tarasov, A. (2018). Trade in tasks and the organization of firms. *European Economic Review*, 107, 99–132. <https://doi.org/10.1016/j.eurocorev.2018.06.001>
- Markusen, J. R. (2004). *Multinational firms and the theory of international trade*. MIT press.
- Moritz, M., Hecht, V., Noska, P., & Schäffler, J. (2020). Types of FDI and determinants of affiliate size: the classification makes the difference. *Czech Journal of Economics and Finance*, 70(4), 312–331.
- Muendler, M. A., & Becker, S. O. (2010). Margins of multinational labor substitution. *American Economic Review*, 100(5), 1999–2030. <https://doi.org/10.1257/aer.100.5.1999>.
- Navaretti, G. B., Castellani, D., & Disdier, A.-C. (2010). How does investing in cheap labour countries affect performance at home? Firm-level evidence from France and Italy. *Oxford Economic Papers*, 62(2), 234–260. <https://doi.org/10.1093/oenp/gpp010>
- Noorbakhsh, F., Paloni, A., & Youssef, A. (1999). *Low wages or skilled labour?: Prospects for foreign direct investment in developing countries*. Department of Economics, University of Glasgow.
- Pflüger, M., Blien, U., Möller, J., & Moritz, M. (2013). Labor market effects of trade and FDI—recent advances and research gaps. *Journal of Economics and Statistics*, 233(1), 86–116. <https://doi.org/10.1515/jbnst-2013-0107>
- Ramondo, N., Rappoport, V., & Ruhl, K. J. (2016). Intrafirm trade and vertical fragmentation in US multinational corporations. *Journal of International Economics*, 98, 51–59. <https://doi.org/10.1016/j.jinteco.2015.08.002>
- Ripollone, J. E., Huybrechts, K. F., Rothman, K. J., Ferguson, R. E., & Franklin, J. M. (2020). Evaluating the utility of coarsened exact matching for pharmacoepidemiology using real and simulated claims data. *American Journal of Epidemiology*, 189(6), 613–622. <https://doi.org/10.1093/aje/kwz268>
- Rodríguez-Clare, A. (2010). Offshoring in a Ricardian world. *American Economic Journal: Macroeconomics*, 2(2), 227–258. <https://doi.org/10.1257/mac.2.2.227>
- Schäffler, J. (2014). *ReLOC linkage: A new method for linking firm-level data with the establishment-level data of the IAB, FDZ Methodenreport 2014/5*. Institute for Employment Research.
- Schäffler, J., Hecht, V., & Moritz, M. (2017). Regional determinants of German FDI in the Czech Republic: New evidence on the role of border regions. *Regional Studies*, 51(9), 1399–1411. <https://doi.org/10.1080/00343404.2016.1185516>
- Schmidheiny, K., & Siegloch, S. (2019). *On event study designs and distributed-lag models: Equivalence, generalization and practical implications*. CEPR Discussion Paper 13477. Centre for Economic Policy Research.
- Sethupathy, G. (2013). Offshoring, wages, and employment: Theory and evidence. *European Economic Review*, 62, 73–97. <https://doi.org/10.1016/j.eurocorev.2013.04.004>.
- Spitz-Oener, A. (2006). Technical change, job tasks, and rising educational demands: Looking outside the wage structure. *Journal of Labor Economics*, 24(2), 235–270. <https://doi.org/10.1086/499972>
- UNCTAD Secretariat. (1998). Foreign direct investment by SMEs: Lessons from Asia. *Foreign Trade Review*, 33(1–2), 78–96.
- Yeaple, S. R. (2003). The complex integration strategies of multinationals and cross country dependencies in the structure of foreign direct investment. *Journal of International Economics*, 60(2), 293–314. [https://doi.org/10.1016/S0022-1996\(02\)00051-X](https://doi.org/10.1016/S0022-1996(02)00051-X)
- Yeung, H.-W.-C. (2017). Global production networks and foreign direct investment by small and medium enterprises in ASEAN. *Transnational Corporations*, 24(2), 1–42. <https://doi.org/10.18356/bf2ab1ca-en>

How to cite this article: Koerner, K., Moritz, M., & Schäffler, J. (2022). Foreign direct investment and onshore employment dynamics: Evidence from German firms with affiliates in the Czech Republic. *The World Economy*, 45, 1773–1829. <https://doi.org/10.1111/twec.13223>

APPENDIX

TABLE A1 Regression results of the full sample

Dependent variable: $\Delta \log$ of Employees	Full sample		Manufacturing sector			Service sector			
	All		By skill group			By skill group			
	(1)	(2)	Low	Medium	High	All	Low	Medium	High
6 years prior	0.00990 (1.28)	0.00583 (0.76)	-0.00149 (-0.14)	0.00765 (0.98)	0.0129 (1.35)	0.0166 (1.10)	0.0188 (1.18)	0.0207 (1.39)	0.0138 (0.93)
5 years prior	0.0243*** (2.86)	0.0127 (1.50)	-0.00588 (-0.50)	0.0113 (1.21)	0.0203** (2.17)	0.0406** (2.48)	0.00877 (0.52)	0.0351** (2.18)	0.0242 (1.47)
4 years prior	0.00189 (0.23)	-0.00609 (-0.63)	-0.0220* (-1.67)	0.00119 (0.12)	0.00264 (0.26)	0.0143 (1.02)	-0.0170 (-1.10)	0.00841 (0.60)	0.0385*** (2.69)
3 years prior	-0.000314 (-0.05)	0.00115 (0.15)	0.00484 (0.47)	0.000470 (0.05)	0.0172* (1.84)	0.0000282 (0.00)	-0.00566 (-0.40)	-0.00663 (-0.55)	0.0305*** (2.33)
2 years prior	0.00288 (0.41)	-0.00496 (-0.59)	-0.00798 (-0.77)	-0.00626 (-0.76)	-0.00544 (-0.55)	0.0152 (1.30)	0.0150 (1.15)	0.0127 (1.02)	0.0323*** (2.82)
1 year prior	0.00524 (0.71)	0.000109 (0.01)	-0.0173 (-1.50)	0.000175 (0.02)	0.00111 (0.11)	0.0153 (1.29)	-0.0139 (-1.03)	0.0191 (1.57)	0.0159 (1.48)
year of FDI	0.0187* (1.90)	0.0197 (1.31)	0.00641 (0.40)	0.0180 (1.28)	0.0488*** (3.09)	0.0199 (1.63)	-0.00786 (-0.63)	0.0182 (1.48)	0.0307*** (2.43)
1 year after	-0.0107 (-1.47)	-0.0240*** (-2.64)	-0.0316*** (-2.65)	-0.0252*** (-2.60)	-0.00391 (-0.39)	0.00571 (0.49)	-0.00380 (-0.29)	0.00140 (0.12)	0.00897 (0.81)
2 years after	-0.0200*** (-3.29)	-0.0273*** (-4.01)	-0.0350*** (-3.78)	-0.0252*** (-3.53)	-0.00452 (-0.52)	-0.0104 (-1.01)	-0.0113 (-0.85)	-0.0192* (-1.81)	0.0180* (1.73)

TABLE A1 (Continued)

Dependent variable: $\Delta \log$ of Employees	Full sample		Manufacturing sector				Service sector			
	All (1)	All (2)	By skill group			All (6)	By skill group			All (9)
			Low (3)	Medium (4)	High (5)		Low (7)	Medium (8)	High (9)	
3 years after	-0.0158** (-2.49)	-0.0108* (-1.79)	-0.0216** (-2.45)	-0.00974 (-1.51)	-0.00256 (-0.29)	-0.0193* (-1.68)	-0.00503 (-0.36)	-0.0192 (-1.62)	-0.00896 (-0.79)	
4 years after	-0.0292*** (-4.87)	-0.0214*** (-2.58)	-0.0344*** (-2.89)	-0.0173* (-1.80)	-0.000300 (-0.04)	-0.0352*** (-4.08)	-0.0386*** (-3.09)	-0.0384*** (-4.12)	-0.0222*** (-2.24)	
5 years after	-0.0185** (-2.43)	-0.0143 (-1.51)	-0.0256** (-2.11)	-0.0154* (-1.65)	-0.00415 (-0.39)	-0.0203* (-1.66)	-0.0188 (-1.26)	-0.0206 (-1.61)	-0.0205* (-1.78)	
6 years after	-0.00882 (-1.43)	-0.00588 (-0.75)	-0.0209* (-1.78)	-0.00414 (-0.50)	0.00443 (0.47)	-0.00887 (-0.91)	-0.00953 (-0.61)	-0.00786 (-0.75)	-0.0205*** (-1.97)	
7 years after	-0.0151* (-1.86)	-0.00316 (-0.35)	-0.0198 (-1.53)	0.000206 (0.02)	0.00896 (0.97)	-0.0293*** (-2.01)	-0.0453*** (-2.54)	-0.0348*** (-2.23)	-0.0258* (-1.80)	
8 years after	-0.0109 (-1.40)	-0.00766 (-0.80)	-0.0247* (-1.94)	-0.00913 (-1.00)	-0.00955 (-0.90)	-0.0134 (-1.05)	0.0138 (0.82)	-0.0194 (-1.53)	0.00110 (0.08)	
9 years after	-0.00921 (-1.02)	-0.00694 (-0.62)	-0.0129 (-0.93)	-0.00729 (-0.64)	0.00145 (0.13)	-0.0112 (-0.75)	0.01000 (0.58)	-0.0109 (-0.70)	-0.0139 (-0.88)	
Observations	164,410	86,094	86,094	86,094	86,094	78,316	78,316	78,316	78,316	

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at firm-year levels (see Abadie & Spiess, 2021).
p* < .1; *p* < .05; and ****p* < .01.

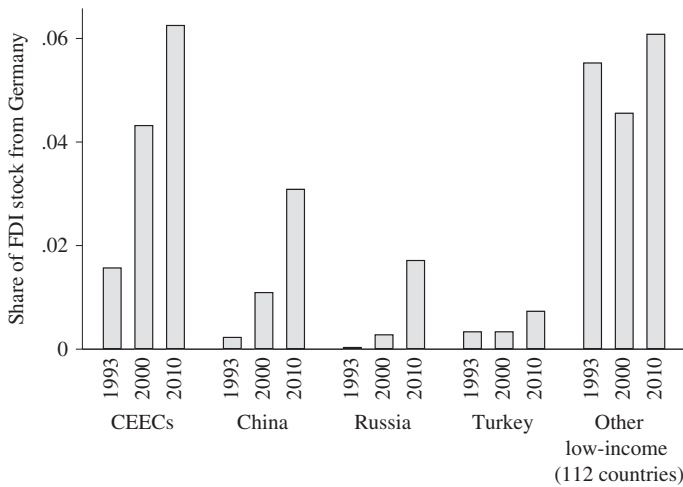


FIGURE A1 Importance of CEECs as a German FDI Destination.

Notes: The bar chart of Figure 1 illustrates the share of German outward FDI stock to low- or medium-income countries according to the World Bank classification. The CEECs comprise the Czech Republic, Hungary, Poland and Slovakia. In addition to including all other low-income countries in the OECD data set, the group ‘other low-income countries’ also contains information on important FDI destinations such as Brazil or Mexico. *Source:* OECD Globalisation/FDI statistics (3rd edition).

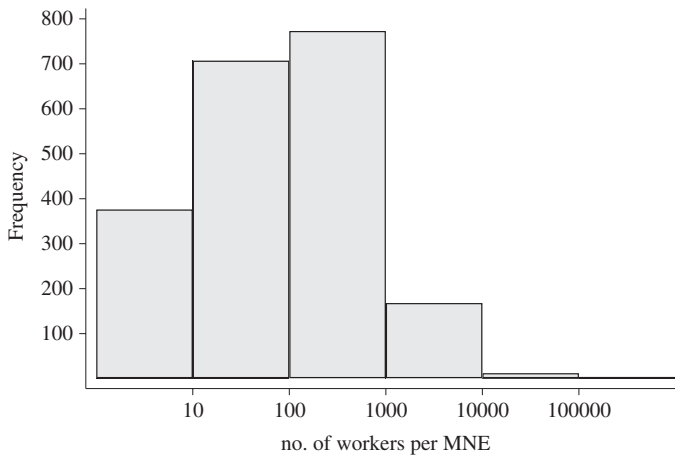


FIGURE A2 Relative Frequencies of MNEs According to Size.

Notes: The histogram in Figure 2 highlights the high fraction of small- and medium-sized enterprises that invested in the Czech Republic. For a better comparison with Becker and Muendler (2008) and Becker et al. (2013), the number of workers includes regular employees, apprentices, trainees and marginal workers. Note that the x-axis is logarithmic, and so it graphically understates smaller firms

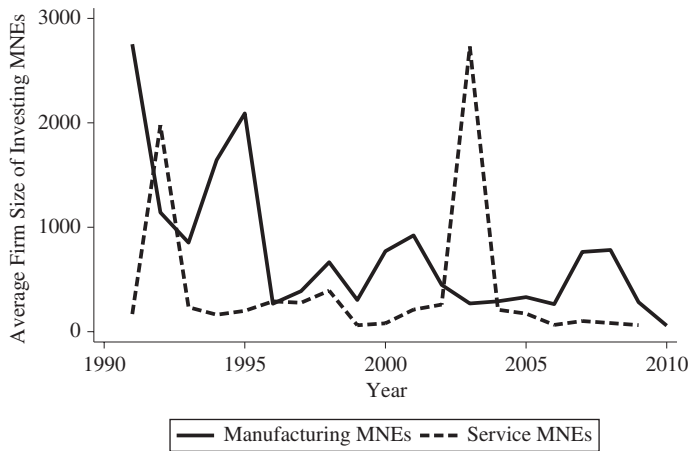


FIGURE A3 Average Size of Investing MNEs.

Notes: Figure 3 illustrates the average size per investing MNE separately for the manufacturing (bold line) and service (dotted line) sectors. For a better comparison over time, the average firm size includes only regular workers and no apprentices, trainees or marginal workers (marginal workers are reported from 1999 onward in the IAB Establishment Panel)

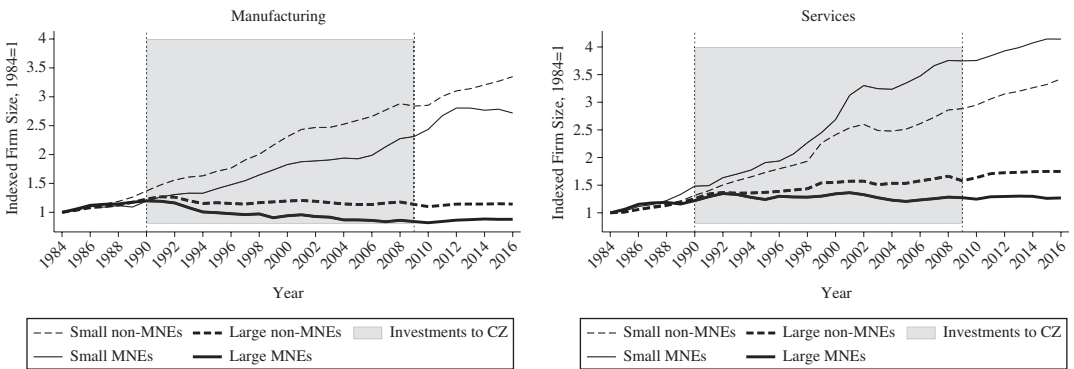


FIGURE A4 Indexed Average Firm Size of MNEs and Non-MNEs by Initial Firm Size.

Notes: Figure A4 illustrates an evolving growth differential of firms in the West German manufacturing (left) and service (right) sectors after 1990. The index considers changes in the average onshore employment of MNEs (solid line) and firms without any FDI (dotted line) around the period of expansion to the Czech Republic (grey area). Firms above 100 employees in 1984 are drawn in bold. The table does not include employment in East German plants, firm entrants or firms that were liquidated between 1984 and 2016

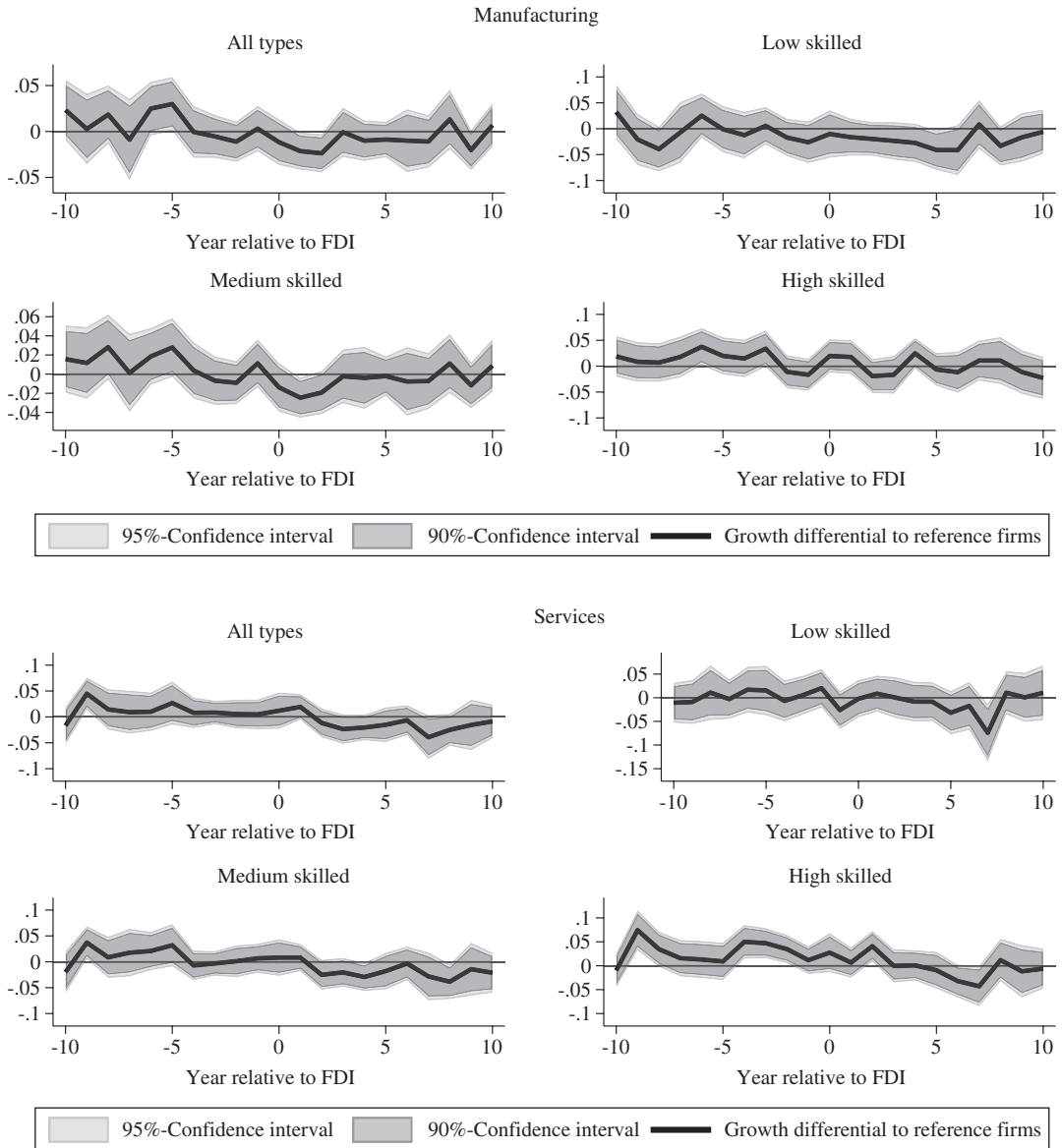


FIGURE A5 Growth Differential between Small MNEs and Non-MNEs.

Notes: Figure A5 presents the growth differential between MNEs and non-MNEs, separately, by sector and skill group. We only include firms that had 2 to 100 regular workers in 1991. The grey area is the 95% confidence interval, which tests whether a coefficient is individually different from zero. If it crosses the zero line, then no significant difference between MNEs and non-MNEs is measured. Standard errors are clustered at firm-year levels

FIGURE A6 Employment Growth Differential of MNEs and Non-MNE Including East Germany.

Notes: Figure 6 presents the growth differential between MNEs and non-MNEs for the pooled sample and separately by sector and skill group. It also includes employment in East Germany. The grey area is the 95% confidence interval, which tests whether a coefficient is individually different from zero. If it crosses the zero line, then no significant difference between the MNEs and non-MNEs is measured. Standard errors are clustered at firm-year levels. The respective output is drawn from Table A9 in the appendix

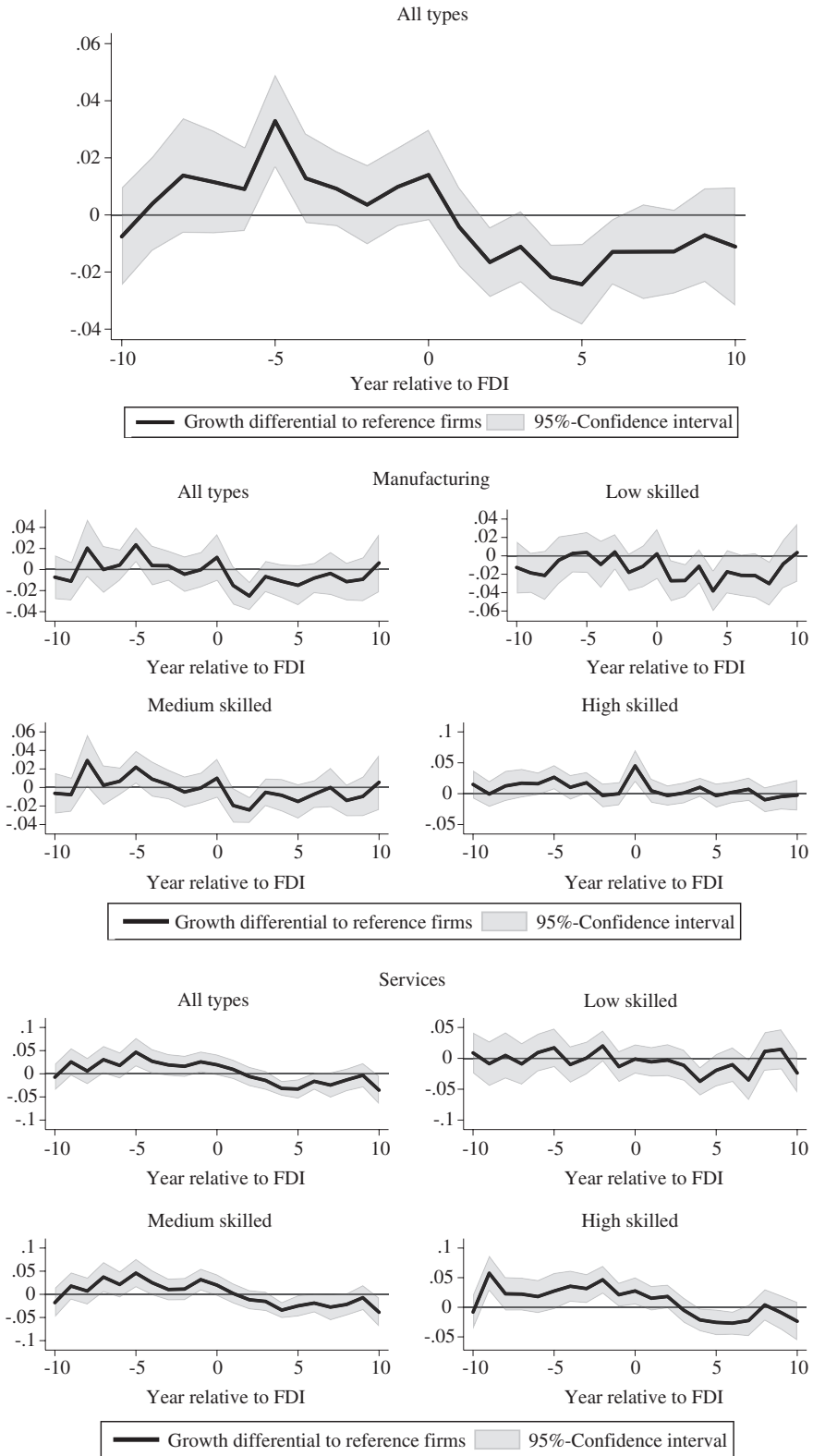


TABLE A2 Regression results for wage bill of real wages using PSM sample

Dependent variable: $\Delta \log$ wage bill	All sectors			Manufacturing sector			Service sector			
	All (1)	All (2)	All (3)	By skill group			All (6)	Low (7)	Medium (8)	High (9)
				Low (4)	Medium (5)	High (6)				
6–3 years prior	0.0378** (2.37)	0.0324* (1.85)	-0.0118 (-0.24)	0.0456* (1.95)	0.0998 (1.57)	0.0413 (1.35)	-0.0927 (-0.84)	0.0423 (1.02)	0.141 (1.40)	
3–0 years prior to FDI	0.0141 (1.03)	-0.0110 (-0.76)	-0.0947** (-1.97)	-0.0124 (-0.82)	-0.0126 (-0.21)	0.0434* (1.67)	-0.0215 (-0.21)	0.0316 (0.96)	0.0285 (0.34)	
0–3 years after	-0.0448*** (-2.92)	-0.0472*** (-3.06)	-0.115*** (-2.62)	-0.0526** (-2.51)	-0.0779 (-1.44)	-0.0238 (-0.93)	-0.0676 (-0.77)	-0.0436 (-1.25)	0.00511 (0.06)	
3–6 years after	-0.0379*** (-2.77)	-0.0130 (-0.88)	-0.106** (-2.34)	-0.0220 (-1.35)	0.0333 (0.72)	-0.0815*** (-3.01)	-0.255*** (-2.61)	-0.0995*** (-3.62)	-0.138 (-1.41)	
6–9 years after	-0.0222 (-1.46)	-0.0155 (-0.96)	-0.0924* (-1.74)	-0.0214 (-1.31)	0.0518 (0.87)	-0.0309 (-0.98)	-0.0522 (-0.44)	-0.0524 (-1.40)	0.0710 (0.63)	
Observations	14,990	9172	9172	9172	9172	5514	5514	5514	5514	

Notes: The regressions include the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie & Spiess, 2021).

p* < .1; *p* < .05; and ****p* < .01.

TABLE A3 Characteristics of MNEs and Non-MNEs after alternative PSM

	Manufacturing (1442 firms)			Services (1142 firms)		
	MNE	Reference	Balancing	MNE	Reference	Balancing
	Mean	Mean	Stdd. Bias	Mean	Mean	Stdd. Bias
	Median	Median		Median	Median	
	(SD)	(SD)	(Var. Ratio)	(SD)	(SD)	(Var. Ratio)
Wage growth	0.0370	0.0378	-0.00489	0.0660	0.0568	0.0306
	0.0238	0.0245	.	0.0439	0.0357	.
	(0.204)	(0.153)	(1.774)	(0.334)	(0.261)	(1.635)
Female (%)	31.22	30.26	0.0473	39.95	40.08	-0.00566
	25.93	23.87	.	36.36	34.78	.
	(20.55)	(20.24)	(1.031)	(23.16)	(24.18)	(0.917)
Agricultural occ. (%)	0.0457	0.0622	-0.0490	0.147	0.0580	0.0841
	0	0	.	0	0	.
	(0.199)	(0.431)	(0.212)	(1.429)	(0.424)	(11.36)
Low-skilled manufacturing cc. (%)	36.61	37.24	-0.0263	5.512	5.028	0.0344
	37.42	38.89	.	0	0	.
	(24.53)	(23.97)	(1.047)	(14.18)	(13.98)	(1.029)
High-skilled manual occ. (%)	20.07	20.17	-0.00543	4.166	4.796	-0.0595
	14.63	14.87	.	0	0	.
	(18.74)	(18.18)	(1.063)	(10.02)	(11.12)	(0.812)
Technicians (%)	9.426	9.037	0.0402	5.205	6.094	-0.0678
	7.692	7.074	.	0	0	.
	(10.18)	(9.113)	(1.248)	(12.01)	(14.13)	(0.723)

(Continues)

TABLE A2 (Continued)

	Manufacturing (1442 firms)				Services (1142 firms)			
	MNE	Reference	Balancing		MNE	Reference	Balancing	
	Mean	Mean	Stdd. Bias		Mean	Mean	Stdd. Bias	
	Median	Median	(Var. Ratio)		Median	Median	Median	
	(SD)	(SD)			(SD)	(SD)	(SD)	(Var. Ratio)
Engineers (%)	3.580	3.534	0.00687		4.056	4.432		-0.0301
	1.688	1.010	.		0	0		.
	(5.945)	(7.330)	(0.658)		(12.25)	(12.71)		(0.929)
Low-skilled service occ. (%)	6.163	6.303	-0.0179		17.16	17.28		-0.00507
	4.082	4.332	.		5.882	5.882		.
	(8.073)	(7.588)	(1.132)		(23.97)	(23.83)		(1.011)
High-skilled service occ. (%)	0.198	0.247	-0.0543		0.796	0.825		-0.00731
	0	0	.		0	0		.
	(0.837)	(0.960)	(0.760)		(3.892)	(3.975)		(0.958)
Semi-professions (%)	0.222	0.195	0.0172		0.255	0.267		-0.00676
	0	0	.		0	0		.
	(1.711)	(1.401)	(1.490)		(1.735)	(1.654)		(1.099)
Professions (%)	0.254	0.185	0.109		0.459	0.671		-0.0791
	0	0	.		0	0		.
	(0.683)	(0.573)	(1.422)		(2.375)	(2.958)		(0.645)
Low-skilled commercial and admin. occ. (%)	3.667	3.325	0.0562		11.24	10.06		0.0700
	1.754	1.521	.		3.896	3.659		.
	(5.674)	(6.475)	(0.768)		(17.76)	(15.81)		(1.262)

TABLE A2 (Continued)

	Manufacturing (1442 firms)				Services (1142 firms)			
	MNE	Reference	Balancing		MNE	Reference	Balancing	
	Mean	Mean	Stdd. Bias		Mean	Mean	Stdd. Bias	
	Median	Median	(Var. Ratio)		Median	Median	(Var. Ratio)	
	(SD)	(SD)			(SD)	(SD)		(Var. Ratio)
High-skilled commercial and administrative occ. (%)	16.76	16.67	0.00776		44.53	43.87		0.0227
	14.34	14.29	.		40.85	40		.
	(11.54)	(11.80)	(0.957)		(28.48)	(29.38)		(0.939)
Managers (%)	2.431	2.233	0.0526		6.099	6.150		-0.00449
	1.484	1.415	.		2.410	1.796		.
	(3.977)	(3.540)	(1.262)		(11.19)	(11.54)		(0.940)
Log employment	4.980	4.904	0.0547		3.664	3.623		0.0244
	5.011	5.124	.		3.761	3.664		.
	(1.508)	(1.260)	(1.431)		(1.767)	(1.533)		(1.329)
High-skilled (%)	7.860	7.194	0.0703		15.33	16.62		-0.0619
	4.941	4.255	.		5.882	5.474		.
	(9.838)	(9.079)	(1.174)		(20.58)	(21.25)		(0.938)
Medium-skilled (%)	71.82	72.24	-0.0267		77.25	75.32		0.0932
	73.13	74.18	.		82	80.65		.
	(15.82)	(15.28)	(1.072)		(20.42)	(21.01)		(0.944)
Low-skilled (%)	20.32	20.57	-0.0151		7.426	8.063		-0.0550
	17.14	16.87	.		2.817	3.226		.
	(16.57)	(16.52)	(1.006)		(10.97)	(12.20)		(0.808)

(Continues)

TABLE A2 (Continued)

	Manufacturing (1442 firms)				Services (1142 firms)			
	MNE	Reference	Balancing		MNE	Reference	Balancing	
	Mean	Mean	Stdd. Bias		Mean	Mean	Stdd. Bias	
	Median	Median	(Var. Ratio)		Median	Median	(Var. Ratio)	
	(SD)	(SD)			(SD)	(SD)		(Var. Ratio)
Employment growth	3.008	2.996	0.0111		2.802	2.745		0.0505
	2.765	2.833	.		2.722	2.722		.
	(1.176)	(1.006)	(1.366)		(1.257)	(0.988)		(1.619)
Log wage bill	9.542	9.469	0.0494		8.367	8.312		0.0310
	9.583	9.655	.		8.488	8.443		.
	(1.615)	(1.346)	(1.440)		(1.907)	(1.621)		(1.383)
Log number of plants	0.270	0.251	0.0363		0.392	0.415		-0.0304
	0	0	.		0	0		.
	(0.549)	(0.537)	(1.044)		(0.779)	(0.768)		(1.028)
Avg. Mahalanobis distance			0.253					0.267
Avg. Mah. d. of former subset			0.132					0.151

Notes: This table reports the summary statistics for one-to-one matched MNEs and non-MNEs two years prior to the (virtual) investment year. The propensity score matching procedure is performed by sector and considers only firms in the support region; that is, it excludes firms with characteristics that exceed the respective maximum in the other group (control or treatment) by more than 3%. We evaluate the balancing quality of the matching for each variable via the standardised bias and variance ratio; that is the quality of the match increases with attenuated standardised biases and variance ratios close to one. The overall dissimilarity of control firms is measured for all matching covariates and for each match by the Mahalanobis distance. A second measure of the average Mahalanobis distance only considers the subset of the matching covariates from Table 2 and Table 6. The lower the average Mahalanobis distance the more similar are the characteristics within the matches.

TABLE A4 Regression results of matched firms by alternative PSM

Dependent variable: Δ log Employees	Manufacturing sector				Service sector				
	All	By skill group			All	By skill group			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.0197 (1.31)	0.00686 (0.43)	-0.00577 (-0.29)	0.00469 (0.29)	0.0346* (1.91)	0.0323 (1.14)	-0.0181 (-0.59)	0.0379 (1.34)	0.0707** (2.36)
3–0 years prior	-0.00787 (-0.65)	-0.0321** (-2.31)	-0.0504** (-2.33)	-0.0288** (-2.11)	-0.00804 (-0.45)	0.0255 (1.22)	-0.00976 (-0.36)	0.0326 (1.51)	0.0385 (1.59)
0–3 years after	-0.0551*** (-4.22)	-0.0533*** (-3.72)	-0.0859*** (-3.97)	-0.0487*** (-3.40)	0.00630 (0.35)	-0.0566** (-2.39)	-0.0203 (-0.75)	-0.0558** (-2.31)	-0.0113 (-0.46)
3–6 years after	-0.0377*** (-3.19)	-0.0124 (-0.90)	-0.0471** (-2.30)	-0.0129 (-0.92)	0.0149 (0.84)	-0.0701*** (-3.32)	-0.0800** (-2.43)	-0.0711*** (-3.29)	-0.0484** (-1.97)
6–9 years after	-0.0305** (-2.10)	-0.0189 (-1.25)	-0.0486** (-2.18)	-0.0195 (-1.27)	0.0214 (1.15)	-0.0467 (-1.53)	-0.0705* (-1.78)	-0.0495 (-1.60)	-0.0251 (-0.79)
Observations	16,953	10,314	10,314	10,314	10,314	6614	6614	6614	6614

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels.
p* < 0.1; *p* < 0.05; and ****p* < 0.01.

TABLE A5 Regression results for wage bill of real wages using alternative PSM sample

Dependent variable: $\Delta \log$ wage bill	All sectors				Manufacturing sector				Service sector										
	(1)	(2)	By skill group			(3)	(4)	(5)	(6)	By skill group									
			All	Low	Medium					High	All	Low	Medium	High					
6–3 years prior	0.0462*** (2.75)	0.0351** (2.07)	0.0369 (0.80)	0.0368* (1.79)	0.132** (1.97)	0.0654* (1.94)	–0.176* (–1.71)	0.0749** (1.98)	0.239** (2.34)	3–0 years prior	0.00842 (0.62)	–0.0159 (–1.08)	–0.0922* (–1.90)	–0.0134 (–0.89)	–0.0432 (–0.78)	0.0469* (1.85)	0.0515 (0.54)	0.0384 (1.26)	–0.0411 (–0.51)
0–3 years after	–0.0452*** (–2.98)	–0.0388** (–2.48)	–0.120*** (–2.70)	–0.0471** (–2.26)	0.00338 (0.06)	–0.0447* (–1.69)	–0.0141 (–0.17)	–0.0301 (–0.83)	–0.0683 (–0.84)	3–6 years after	–0.0224* (–1.70)	–0.00366 (–0.26)	–0.0687 (–1.61)	–0.0101 (–0.68)	0.0483 (1.02)	–0.0519** (–2.02)	–0.199** (–2.09)	–0.0719** (–2.44)	–0.0616 (–0.73)
6–9 years after	–0.0167 (–1.08)	–0.0125 (–0.77)	–0.100* (–1.84)	–0.0255 (–1.59)	0.0901 (1.56)	–0.0291 (–0.91)	–0.0780 (–0.66)	–0.0568 (–1.51)	0.0460 (0.48)	Observations	15,480	9454	9454	9454	9454	5772	5772	5772	5772

Notes: The regressions include the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels. * $p < .1$; ** $p < .05$; and *** $p < .01$.

TABLE A 6 Regression results after sample split by time periods

Dep. variable: Δ log employees	1990–1995			1996–2002			2003–2008		
	By skill group			By skill group			By skill group		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Panel A:									
Manufacturing Sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.000324 (0.01)	0.0333 (1.39)	0.0655* (1.77)	0.0262 (0.63)	0.0285 (0.91)	-0.0132 (-0.35)	0.00912 (0.16)	-0.0102 (-0.24)	0.0122 (0.25)
3–0 years prior	-0.0423 (-0.79)	-0.0201 (-0.71)	-0.00914 (-0.22)	-0.0622 (-1.21)	-0.0400 (-1.24)	0.0339 (0.82)	0.0178 (0.35)	-0.0123 (-0.34)	0.0637 (1.35)
0–3 years after	-0.0379 (-0.90)	-0.0486* (-1.85)	0.0272 (0.74)	-0.175*** (-2.60)	-0.0908** (-2.52)	-0.000914 (-0.02)	-0.0111 (-0.20)	0.0397 (0.85)	0.0611 (1.40)
3–6 years after	-0.0850* (-1.84)	-0.0906*** (-2.98)	0.00523 (0.13)	-0.0515 (-1.22)	0.00233 (0.07)	-0.000511 (-0.01)	0.0151 (0.20)	0.102* (1.95)	0.109 (1.63)
6–9 years after	-0.0187 (-0.50)	-0.0313 (-0.95)	0.0106 (0.27)	-0.00430 (-0.13)	0.00267 (0.10)	0.0433 (1.16)	-	-	-
Observations	2412	2412	2412	1976	1976	1976	1478	1478	1478
Panel B:									
Service Sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	-0.0949 (-1.55)	0.0536 (0.98)	0.0874 (1.23)	0.0237 (0.29)	-0.0562 (-1.13)	-0.0463 (-0.67)	0.0122 (0.12)	0.0121 (0.16)	-0.0555 (-0.80)
3–0 years prior	-0.0955 (-1.22)	-0.0127 (-0.25)	0.0816 (1.37)	-0.0260 (-0.40)	-0.0393 (-0.53)	0.0945 (1.31)	-0.0166 (-0.29)	0.0671 (1.18)	0.0913 (1.52)
0–3 years after	0.0745 (1.06)	0.00880 (0.16)	0.0446 (0.78)	-0.0597 (-0.88)	-0.0388 (-0.50)	-0.000941 (-0.01)	0.0376 (0.57)	-0.0383 (-0.76)	0.0420 (0.74)

(Continues)

TABLE A 6 (Continued)

Panel B:	ServiceSector								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3–6 years after	–0.0730 (–0.91)	–0.0726 (–1.46)	–0.0347 (–0.70)	–0.0558 (–0.91)	–0.0559 (–0.93)	–0.0282 (–0.45)	–0.0652 (–0.69)	–0.0474 (–0.72)	–0.0898 (–1.11)
6–9 years after	0.0123 (0.12)	0.0564 (1.00)	–0.0149 (–0.25)	–0.0963 (–1.56)	–0.0812 (–1.17)	–0.130* (–1.83)	- (.)	- (.)	- (.)
Observations	1050	1050	1050	1040	1040	1040	1340	1340	1340

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie & Spiess, 2021). * $p < .1$; ** $p < .05$; and *** $p < .01$.

TABLE A7 Characteristics of small MNEs and Non-MNEs in the full sample

	Manufacturing				Services			
	MNE	Reference	Stdd. Bias	(Var. Ratio)	MNE	Reference	Stdd. Bias	(Var. Ratio)
	Mean	Mean			Mean	Mean		
	Median	Median			Median	Median		
	(SD)	(SD)			(SD)	(SD)		
Employees	61.6993 49 (77.5888)	63.1804 49 (64.9205)	-0.0207 (1.4283)	-0.0207 (1.4283)	73.6598 37 (157.8606)	52.2729 37 (62.4269)		0.1782 (6.3945)
High-skilled (share)	0.0740 0.0412 (0.1056)	0.0472 0.0194 (0.0812)	0.2851 (1.6910)	0.2851 (1.6910)	0.1393 0.0455 (0.1935)	0.0819 0.0128 (0.1596)		0.3235 (1.4701)
Medium-skilled (share)	0.7458 0.7775 (0.1823)	0.7820 0.8250 (0.1767)	-0.2018 (1.0649)	-0.2018 (1.0649)	0.7889 0.8421 (0.2021)	0.8053 0.8824 (0.2090)		-0.0799 (0.9347)
Low-skilled (share)	0.1802 0.1206 (0.1810)	0.1708 0.1134 (0.1758)	0.0526 (1.0610)	0.0526 (1.0610)	0.0718 0.0258 (0.1098)	0.1127 0.0370 (0.1760)		-0.2792 (0.3893)
Employment growth	2.4828 2.6110 (0.9826)	2.4588 2.6595 (0.9947)	0.0243 (0.9758)	0.0243 (0.9758)	2.4861 2.6595 (1.2289)	2.3922 2.6189 (1.0353)		0.0826 (1.4090)
Wage bill	6036.8418 4093.3047 (9535.9927)	5938.3656 4107.2949 (7458.9710)	0.0115 (1.6345)	0.0115 (1.6345)	9536.2447 3965.1399 (23450.5009)	5026.9067 3078.8573 (7382.7030)		0.2594 (10.0896)

(Continues)

TABLE A7 (Continued)

	Manufacturing				Services			
	MNE	Reference	Stdd. Bias	Reference	MNE	Reference	Stdd. Bias	Reference
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	Median	Median	Median	Median	Median	Median	Median	Median
	(SD)	(SD)	(Var. Ratio)	(SD)	(SD)	(SD)	(SD)	(Var. Ratio)
Plants	1.1558	1.2155	-0.0421	1.2155	2.1821	1.5176	0.1047	1.5176
	<i>t</i>	<i>t</i>		<i>t</i>	<i>t</i>	<i>t</i>		<i>t</i>
	(0.6559)	(1.8929)	(0.1201)	(1.8929)	(8.7157)	(2.1563)	(16.3374)	(2.1563)
Firms	284	835		835	312	1116		1116

Notes: This table presents the summary statistics of MNEs and non-MNEs in West Germany that employed between 2 and 100 workers in 1991. MNEs' information is reported for the period two years prior to investment, while information of non-MNEs includes observations of all years, without any missing values. The employment numbers include only regular employment and no apprentices, marginal employment or temporary workers. Employment growth is measured as the log of the employment difference over the last four years. Concerning multisite MNEs, less than 9% of small firms consist of more than one establishment within Germany. For the definitions of standardised bias and variance ratio, see footnote 14.

TABLE A8 Regression results of small matched firms

Dependent variable: Δlog Employees	Manufacturing sector				Service sector				
	All	By skill group			All	By skill group			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6–3 years prior	0.0157 (0.55)	0.0272 (0.68)	-0.00386 (-0.08)	0.0465 (1.17)	0.0230 (0.51)	0.00544 (0.14)	-0.00237 (-0.04)	0.00574 (0.14)	0.0781* (1.71)
3–0 years prior	0.00741 (0.26)	0.00423 (0.12)	0.0399 (0.62)	-0.00238 (-0.07)	0.0182 (0.44)	0.00688 (0.15)	-0.0439 (-0.77)	-0.0178 (-0.37)	0.0183 (0.35)
0–3 years after	-0.0494 (-1.62)	-0.0793** (-2.34)	-0.0544 (-1.21)	-0.0639* (-1.77)	-0.0242 (-0.57)	-0.0114 (-0.26)	0.0236 (0.39)	-0.0159 (-0.37)	0.0249 (0.52)
3–6 years after	-0.0729** (-2.25)	-0.0354 (-0.77)	-0.0811 (-1.47)	-0.0163 (-0.35)	0.0261 (0.45)	-0.100** (-2.07)	-0.0700 (-1.04)	-0.113** (-2.33)	-0.0930* (-1.92)
6–9 years after	-0.0261 (-0.66)	0.0183 (0.40)	-0.0754* (-1.69)	0.0265 (0.64)	0.106* (1.70)	-0.0563 (-0.82)	-0.0764 (-0.95)	-0.0218 (-0.32)	-0.101* (-1.69)
Observations	3108	1612	1612	1612	1612	1456	1456	1456	1456

Notes: The sample includes matched firms that employed 2 to 100 employees in 1991. This amounts to 234 manufacturing and 214 service firms. The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at match-year levels (see Abadie & Spiess, 2021). **p* < .1; ***p* < .05; and ****p* < .01.

TABLE A 9 Regression results including East Germany

Dependent variable: $\Delta \log$ of Employees	Full sample		Manufacturing sector			Service sector			
			By skill group			By skill group			
	All (1)	All (2)	Low (3)	Medium (4)	High (5)	All (6)	Low (7)	Medium (8)	High (9)
6 years prior	0.00910 (1.21)	0.00437 (0.57)	0.00270 (0.25)	0.00556 (0.71)	0.0161* (1.73)	0.0180 (1.24)	0.00936 (0.60)	0.0218 (1.53)	0.0180 (1.26)
5 years prior	0.0329*** (3.93)	0.0236*** (2.76)	0.00377 (0.33)	0.0226** (2.44)	0.0266*** (2.63)	0.0466*** (2.93)	0.0171 (1.06)	0.0417*** (2.66)	0.0273* (1.75)
4 years prior	0.0129 (1.60)	0.00382 (0.40)	-0.00928 (-0.70)	0.00891 (0.91)	0.0103 (1.00)	0.0270** (2.00)	-0.00997 (-0.66)	0.0255* (1.86)	0.0355*** (2.64)
3 years prior	0.00919 (1.37)	0.00361 (0.49)	0.00426 (0.43)	0.00285 (0.35)	0.0177** (2.00)	0.0191 (1.59)	0.000528 (0.04)	0.0120 (0.99)	0.0315** (2.51)
2 years prior	0.00358 (0.50)	-0.00439 (-0.51)	-0.0179* (-1.72)	-0.00511 (-0.59)	-0.00291 (-0.29)	0.0161 (1.37)	0.0200 (1.55)	0.00938 (0.75)	0.0464*** (3.84)
1 year prior	0.00986 (1.40)	-0.000156 (-0.02)	-0.0114 (-0.98)	-0.000211 (-0.02)	-0.0000701 (-0.01)	0.0257** (2.24)	-0.0134 (-1.04)	0.0327*** (2.69)	0.0212** (2.04)
year of FDI	0.0140* (1.73)	0.0115 (1.01)	0.00213 (0.15)	0.00920 (0.85)	0.0450*** (3.33)	0.0194* (1.69)	-0.00108 (-0.09)	0.0175 (1.47)	0.0276** (2.34)
1 year after	-0.00421 (-0.59)	-0.0151 (-1.62)	-0.0271** (-2.37)	-0.0192** (-2.00)	0.00476 (0.48)	0.00942 (0.88)	-0.00568 (-0.46)	0.000778 (0.07)	0.0152 (1.43)
2 years after	-0.0165*** (-2.64)	-0.0251*** (-3.62)	-0.0269*** (-2.93)	-0.0238*** (-3.32)	-0.00299 (-0.35)	-0.00594 (-0.56)	-0.00289 (-0.22)	-0.0122 (-1.14)	0.0182* (1.78)

TABLE A 9 (Continued)

Dependent variable: $\Delta \log$ of Employees	Full sample		Manufacturing sector				Service sector			
	All (1)	All (2)	By skill group			All (6)	By skill group			
			Low (3)	Medium (4)	High (5)		Low (7)	Medium (8)	High (9)	
3 years after	-0.0111* (-1.75)	-0.00666 (-0.87)	-0.0114 (-1.18)	-0.00534 (-0.70)	0.00117 (0.13)	-0.0144 (-1.38)	-0.0112 (-0.87)	-0.0157 (-1.46)	-0.00494 (-0.46)	
4 years after	-0.0218*** (-3.74)	-0.0112 (-1.36)	-0.0381*** (-3.31)	-0.00795 (-0.86)	0.0103 (1.30)	-0.0316*** (-3.83)	-0.0373*** (-3.15)	-0.0360*** (-4.05)	-0.0213*** (-2.17)	
5 years after	-0.0243*** (-3.36)	-0.0150 (-1.53)	-0.0173 (-1.43)	-0.0160* (-1.68)	-0.00313 (-0.31)	-0.0329*** (-3.06)	-0.0193 (-1.44)	-0.0277** (-2.38)	-0.0255*** (-2.30)	
6 years after	-0.0129** (-2.20)	-0.00813 (-1.10)	-0.0212* (-1.84)	-0.00658 (-0.84)	0.00229 (0.26)	-0.0162* (-1.72)	-0.0103 (-0.71)	-0.0191* (-1.81)	-0.0268*** (-2.68)	
7 years after	-0.0129 (-1.52)	-0.00370 (-0.35)	-0.0214* (-1.73)	0.000236 (0.02)	0.00712 (0.73)	-0.0244* (-1.74)	-0.0351** (-2.07)	-0.0276* (-1.84)	-0.0224* (-1.66)	
8 years after	-0.0129* (-1.71)	-0.0115 (-1.25)	-0.0302** (-2.45)	-0.0143* (-1.65)	-0.00989 (-0.95)	-0.0133 (-1.06)	0.0112 (0.70)	-0.0215* (-1.72)	0.00389 (0.28)	
9 years after	-0.00710 (-0.85)	-0.00924 (-0.87)	-0.00881 (-0.65)	-0.00971 (-0.88)	-0.00474 (-0.44)	-0.00329 (-0.24)	0.0146 (0.87)	-0.00602 (-0.43)	-0.00892 (-0.60)	
Observations	182,872	94,969	94,969	94,969	94,969	87,903	87,903	87,903	87,903	

Notes: The regressions include as controls the difference in the log-squared value of firm age, a full set of time fixed effects and a full set of event dummies for MNEs. *t*-statistics are in parentheses. Standard errors are clustered at firm-year levels (see Abadie & Spiess, 2021). **p* < .1, ***p* < .05, and ****p* < .01.