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Abstract

This paper examines the relationship between foreign and domestic investment activity of multinational enterprises. The empirical analysis is based on micro data of German firms and their operations at home and abroad, including information on investment in fixed assets. The empirical approach, which rests upon extensive and intensive margin variation, is shown to produce very robust results. These suggest a positive relationship between foreign and home investment in real capital. This positive effect seems to be mainly related to additional opportunities for tax planning and better access to financing capital. In contrast, we do not find evidence that improved production processes and technology upgrading cause the positive effect on investment at home. Our empirical approach allows us to distinguish between an extensive and intensive margin effect: setting up a new foreign affiliate leads to an immediate positive effect of about EUR 450,000 additional investment; the investment elasticity at the intensive margin is estimated to be approximately 0.13.

Keywords: Outward FDI, Multinational Firms, Domestic Investment, Corporate Taxes, Internal Capital Markets, Technology

JEL classification: F23; F61; H25; L23

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1 Introduction

The broad consensus among economists in favor of increased international integration through trade and investment openness has always been based on the assumption that the gains thereof are sufficiently large to compensate the losers of increasingly globalized economies. Especially the foreign activities of multinational enterprises (MNEs) have raised the concern that, at the end of the day, home countries lose, owing to the shift of production and employment abroad. The most recent contribution to the literature on the consequences of MNE expansion abroad on home activity is that of Desai, Foley, and Hines (2009). Their study concludes that foreign operations of US firms between 1982 and 2004 have, on average, led to greater domestic investment and employee compensation. In contrast to this, other studies come to the opposite conclusion by providing evidence for a negative effect of foreign investment on home activities of MNEs.[1]

Our paper contributes to the literature on the relationship between foreign and domestic investment of MNEs in three ways. First, we use a unique dataset that allows us to observe home and foreign investment activity of German MNEs, in addition to yearly balance-sheet information.[2] Second, our econometric approach is based on propensity score methods and exploits variation at the extensive as well as intensive margin of foreign activity. Note that the *extensive margin* of foreign activity in our paper refers to the decision of setting up a new foreign entity. Hence, an extensive-margin estimate quantifies the treatment effect of foreign activity on investment activity at home. The *intensive margin* refers to the volume of foreign activity (measured in terms of fixed assets or in equity capital invested abroad). Hence, an intensive-margin estimate quantifies the effect of 1% more foreign activity on investment activity at home. One central advantage of our empirical approach is that it allows us to provide reliable estimates on intensive margin elasticities by explicitly modeling and conditioning on the extensive margin. The latter point, i.e., modeling the extensive margin, appears to be crucial as it determines observability and timing of foreign activity and the correlation thereof with endogenous firm characteristics. In numerous tests, we show that our estimation approach appropriately accounts for the simultaneous nature of foreign and domestic operations and other endogeneity issues. Third, and most importantly, we can identify the channel through which foreign activity affects domestic investment. In particular, we focus on three potential sources: technology, tax savings and profit shifting, and internal capital markets.

Our results presented in Section 5 indicate that establishing a new foreign affiliate is associated with more domestic investment activity. The effect is substantial, as our estimates imply a change in real investment activity at home of about EUR 450,000. As for the intensive margin, we estimate elasticities which lie in the range of 0.13 to 0.23, depending on the measure of foreign investment activity. The effect is smaller than the one found by Desai, Foley, and Hines (2009), who estimate that 1 percent greater foreign investment is associated with 0.26 percent greater domestic investment. Using our data, unconditional

[1] We provide a survey on this literature in Section 2.

[2] Our data, which is provided by the German Central Bank (Deutsche Bundesbank), includes firm-level information on investment activity over time and we do not rely on changes in the stock of fixed assets. The latter is used to proxy for investment activity in most studies. Note as well that we also observe employment in our data. We provide additional results for alternative outcomes in Section 5.5, but mainly focus on investment.

estimates suggest significantly higher elasticities in the range of 0.38 to 0.44.

Furthermore, we show that the basic effect of foreign activity on home investment is robust against a large number of sensitivity tests. These tests include (i) alternative measures of the outcome variable, (ii) alternative specifications of propensity score estimates, (iii) variations in treatment-control comparisons, and (iv) the calculation of placebo effects.

Our findings indicate that the main channel through which the positive relationship can be explained is first and foremost related to issues of tax planning and profit shifting, as well as improved access to financing capital. The former allows firms to reduce their cost of capital by avoiding tax payments. The latter finding suggests that newly established foreign affiliates facilitate access to financial capital, which is then provided via an internal capital market to the home location. It is difficult, however, to clearly distinguish these two channels – profit shifting and internal financing –, as they harness the same vehicle: internal debt. Quantifications show that the effect of establishing a new affiliate abroad becomes about twice as large if the tax differential between Germany and the foreign country is 17 percentage points higher than the average tax differential. A surprising new result is that foreign activity does not boost total factor productivity (TFP) or similar measures of productivity at home. Additional tests indicate that the effect is also not related to vertical foreign direct investment (FDI), which is usually associated with production substitution, outsourcing, and productivity gains from technology upgrading through vertical integration (Grossman and Rossi-Hansberg, 2008; Navaretti, Castellani, and Disdier, 2010). While we cannot clearly distinguish between horizontal and vertical FDI, many of our results seem to be consistent with the notion of horizontal FDI as a provider of intra-firm services (including financing and tax planning).

The remainder of the paper is structured as follows. The next section provides an overview of the related literature. Section 3 contains a concise introduction to the econometric methodology. Thereafter, we provide information on the panel dataset used for the empirical investigation and present descriptive statistics. The basic results from our empirical analysis are discussed in Section 5, including a comprehensive assessment of their robustness. In the subsequent section, we present three channels through which the observed effects might be explained. The last section serves as a conclusion: it summarizes the major findings and discusses some policy implications.

2 Related literature

Previous contributions to the literature do not provide clear evidence on whether domestic investment and FDI are substitutes or complements.[3] The majority of empirical studies rely on country-level or sectoral data. Macroeconomic contributions predominantly point to a positive relationship (Desai, Foley, and Hines, 2005), although Herzer and Schrooten (2008) suggest a substitution effect for German MNEs in the long run. Hejazi and Pauly (2003) as well as Arndt, Buch, and Schnitzer (2010) use sectoral panel data to provide a more nuanced picture on the relationship between FDI and the domestic capital stock: Hejazi and Pauly (2003) argue that the destination country of FDI is crucial when analyzing

[3] A different strand of the literature deals with the impact of FDI on the labor market in home countries. Even though the results vary substantially across studies, overall, FDI appears to have negative employment effects in home countries (Becker, Ekholm, Jaeckle, and Muendler, 2005; Federico and Minerva, 2008; Buch and Lipponer, 2010; Debaere, Lee, and Paik, 2010; Jaeckle and Wamser, 2010).

domestic effects, while Arndt, Buch, and Schnitzer (2010) highlight that the effect varies with the production structure of industries. To the best of our knowledge, aside from Desai, Foley, and Hines (2009), only few studies are based on firm-level data. Monarch, Park, and Sivadasan (2017) use U.S. microdata to analyze the short- and long-run effects of offshoring on several key indicators of domestic activity: employment, wages, output, and productivity. They find a substantial decline in domestic employment and output, yet no significant impact of offshoring events on productivity and wages.

The literature on the channels through which FDI may affect domestic investment can be broadly grouped into domestic capital market imperfections on the one hand, and the organization of production within the MNE on the other hand. In the presence of financial frictions, an increase of investment in a foreign location, ceteris paribus, raises the cost of capital for domestic investment (Stevens and Lipsey, 1992). In accordance with the theoretical model in Stevens and Lipsey (1992), empirical contributions such as Feldstein (1995) find a substitution effect for home-market and foreign direct investment. In contrast, Desai, Foley, and Hines (2005) and Desai, Foley, and Hines (2009) argue that MNEs mainly finance investment projects via world and internal capital markets, so that financial resources are not necessarily a major constraint.

Predictions from models on the organization of production are similarly ambiguous. While horizontal FDI may affect domestic investment, the net effect depends on whether FDI displaces exports or not (Hejazi and Pauly, 2003; Desai, Foley, and Hines, 2005). In general, cross-border production sharing – as vertical FDI or outside the boundaries of the firm – reflects the characteristics of the various locations, such as relative factor prices and economies of scale (Helpman, 1984, 1985; Markusen, 2004). The resulting efficiency gains suggest a positive effect on an MNE's productivity (Grossman and Rossi-Hansberg, 2008; Navaretti, Castellani, and Disdier, 2010), and possibly on domestic investment as well (Desai, Foley, and Hines, 2005; Arndt, Buch, and Schnitzer, 2010). Alternatively, other authors have emphasized the negative effect on home-market investment resulting from the shift of domestic activities to foreign countries (Hejazi and Pauly, 2003).

A rarely discussed perspective on the domestic effects of FDI relates to corporate taxation and profit shifting.[4] The link between corporate taxation and profit-shifting incentives has been extensively discussed in the literature. Previous studies provide evidence that MNEs' tax-planning strategies exploit international tax rate differentials to shift corporate profits from high-tax to low-tax countries (Huizinga and Laeven, 2008; Weichenrieder, 2009; Heckemeyer and Overesch, 2013). To the best of our knowledge, only Overesch (2009) has directly investigated the implications of profit-shifting opportunities for MNEs' investment decisions. Using a firm-level panel of German inbound FDI, Overesch (2009) analyzes the investment behavior of MNEs in a high-tax country (Germany) as a function of the tax rate applicable to the parent firm. Empirical results confirm the hypothesis that German inbound FDI increases in the tax differential between Germany and the investor's home country. Overesch (2009) explains this result arguing that profit shifting by MNEs from one location to another can reduce the MNE's cost of capital. This, in turn, facilitates investment in high-tax countries like Germany.[5] Thus, profit shifting can be interpreted as a competitive advantage

[4] For an overview of profit-shifting channels and techniques, see Huizinga and Laeven (2008), and Dharmapala (2014).

[5] From a very general perspective, this argument relates to the literature on the theory of investment (Jorgenson, 1963; Jorgenson and Hall, 1967; Jorgenson, 1971; Chirinko, 1993).

for a firm because comparatively high tax rates do not affect investment to the same extent as they would in the absence of profit-shifting opportunities.[6]

3 Methodology

Let us define the indicator variable $TREAT_{i,t}$, which equals 1 if we observe in our data that firm i has established a foreign entity in period t. If this is not the case, $TREAT_{i,t}$ equals 0. The central objective of our paper is to estimate the treatment effect of $TREAT_{i,t}$ on outcome $y_{i,t}$. We are particularly interested in the outcome $\Delta INV_{i,t}$, the first difference of gross investment, but we also analyze a number of alternative outcomes.

A naive comparison of $y_{i,t}$ between the groups of treated firms, where $TREAT_{i,t} = 1$, and untreated firms, where $TREAT_{i,t} = 0$, may lead to biased estimates, as selection into foreign activity is not random. Another source of endogeneity is the simultaneous nature of home and foreign investment. To account for variables that determine selection into foreign activity, we first estimate propensity scores by specifying the following model:

$$TREAT_{i,t} = \boldsymbol{\alpha}\mathbf{X}_{i,t-1} + \boldsymbol{\beta}\mathbf{C}_{k,t-1} + \boldsymbol{\gamma}\mathbf{M}_{\ell,t-1} + \boldsymbol{\delta}\mathbf{I}_{s,t-1} + \phi_t + \psi_s + \varepsilon_{i,t}. \tag{1}$$

Equation (1) may be estimated by way of a standard probability model, such as probit. The specification suggests that $TREAT_{i,t}$ depends on variables measured at the level of firm i, variables measured at the level of counties k and municipalities ℓ, as well as variables measured at the industry-level s;[7] ϕ_t and ψ_s denote time- and sector-specific effects. Note that in our preferred specification, we apply a Mundlak-Chamberlain-type approach (see Mundlak (1978); Chamberlain (1982))[8] and additionally condition on averages of the time-varying explanatory variables (which we may denote by $\overline{\boldsymbol{X}}_i$, $\overline{\boldsymbol{C}}_k$, $\overline{\boldsymbol{M}}_\ell$, and $\overline{\boldsymbol{I}}_s$).

As a first and central effect, we estimate an average treatment effect on the treated (ATT), i.e. the impact of $TREAT_{i,t} = 1$ on outcome $y_{i,t}$, by matching on the propensity score. The latter is obtained from estimating the probability model (1). Denoting the sets of treatment and control units by N and J, respectively, we estimate

$$\widehat{ATT}|_{TREAT=1} = \frac{1}{\mathcal{N}} \sum_{i \in N} \left(y_i - \frac{1}{\mathcal{J}_i} \sum_{j \in J_i} \omega_j y_j \right), \tag{2}$$

where $\mathcal{N}$ and $\mathcal{J}_i$ denote the numbers of treated and non-treated units, respectively, and ω_j denotes the weight attached to the respective control unit.[9] Thus, expression (2) implies that matching is basically a weighting scheme, as from the set of comparison units (non-treated

[6] Egger, Merlo, and Wamser (2014) provide evidence that MNEs vastly differ with respect to their ability to shift profits and, thus, their potential to avoid taxes. Using a panel of German MNEs, they find that investments of successful tax avoiders do not respond to taxation in high-tax countries, while investments of non-tax avoiding firms do.

[7] Section 4 provides more details on the variables used.

[8] Mundlak (1978) and Chamberlain (1982) show that if firm-specific unobserved effects are correlated with the observed explanatory variables in one period, then this correlation also persists in all other periods. Hence, in order to consistently estimate the coefficients in Equation (1), one should include firm-specific fixed effects. Chamberlain (1982) includes a full set of leads and lags of all explanatory variables to explicitly allow for correlation between the latter and the unobserved effects. We follow Mundlak (1978), who suggests a more parsimonious approach employing the time means of all explanatory variables as additional regressors.

[9] Note that we drop the time index t as we always enforce exact year matching.

units) J_i, we match observations to the treated unit i using specific weights (Dehejia and Wahba, 2002).
We usually determine $\frac{1}{\mathcal{J}_i}\sum_{j\in J_i}\omega_j y_j$ by using caliper or radius matching, where comparison units within a given propensity-score radius are matched.[10] $\mathcal{J}_i$ is therefore associated with all matched units, where each unit receives a weight ω_j equal to 1. It is important to notice that the propensity score matching approach relies on two fundamental assumptions. First, unconfoundedness needs to hold. This requires that, conditional on observable characteristics, the outcome is independent of treatment. For this purpose, we aim at conditioning on a set of covariates as outlined in (1). Second, given that assignment to treatment is random, if two firms have the same propensity score, the distribution of variables used in the estimation of the propensity score should also be the same for these two firms. This second feature is referred to as the balancing property of the propensity score and can be tested. Results in this regard are presented in Table A.4 in the Appendix.

4 Data and descriptive statistics

4.1 Data

To analyze the relationship between domestic investment and FDI, we mainly use two datasets, both provided by the German Central Bank (Deutsche Bundesbank). The micro data is confidential and only accessible in anonymized form at the headquarters of the Bundesbank in Frankfurt, Germany. Information on the foreign activity of German firms is obtained from *MiDi* (Microdatabase Direct Investment; for detailed information, see Lipponer (2011)), a comprehensive annual database of German FDI positions. *MiDi* provides information on each foreign affiliate's balance sheet, ownership structure and additional information such as an industry classification. A particular advantage of *MiDi* is that reporting by firms is mandatory by German Federal Law.[11] We use parent-affiliate-year observations in order to identify whether a new foreign affiliate was established by the parent company in a given year.[12] In addition, we supplement affiliate-level variables with information on

[10] Apart from some robustness checks, where we apply kernel matching techniques.

[11] German Federal Law (Foreign Trade and Payments Regulation) states that a parent company is obliged to report its FDI to Deutsche Bundesbank if both of the following criteria are fulfilled: (i) the parent company controls at least 10 percent directly or 50 percent indirectly of a foreign company's voting rights, (ii) the balance-sheet total of the foreign affiliate exceeds EUR 3 million. Indirect ownership of 50 percent or more means that the parent company together with at least another company in the multinational group holds at least 50 percent of the affiliate's shares. The dataset features a structural break in 2002 when the thresholds for the voting shares and the foreign affiliate's balance sheet total were adjusted. Observations prior to 2002 that do not satisfy these requirements are excluded from the analysis. Moreover, we do not consider associated branches in order to ensure that only independent affiliates are part of our sample.

[12] Note that a new entry in the *MiDi* database can be due to greenfield investments or mergers and acquisitions. In addition, a new observation may also indicate that an existing affiliate exceeded the voting rights limit or the balance-sheet threshold for the first time. In order to make sure that the latter group of affiliates does not severely distort the clear distinction between treated and non-treated firms, we have produced additional results excluding observations prior to 2002 (the year of the change in the threshold level; see above). The results remain fully robust, indicating that the uniform threshold assumption we make throughout the empirical analysis in this paper does not bias our estimates.

the country where the newly established affiliate is located.[13] Information on domestic investment and other parent-level variables is taken from the Bundesbank's corporate balance sheet database for Germany, *Ustan* (Unternehmensbilanzstatistik). The data are primarily extracted from annual accounts (balance sheet, profit and loss accounts) and financial statements. Most notably for our purpose, the database includes information on firms' domestic investment. This feature is unique, as most studies define investment as the change in fixed assets reported in the balance sheet, which is a proxy for net investment.[14] In addition, we make use of firm-specific information on total assets, fixed assets, value added and employment at the domestic parent company's location.

We match *Ustan* with *MiDi* and keep matched observations as well as unmatched observations from *Ustan*.[15] These unmatched units serve as additional control units in the subsequent analysis. Finally, we complement the two firm-level datasets with regional information. These data are merged using a correspondence between firms' German postal codes and a municipality identifier. Most of the variables vary at the county level, while municipality information is used if available. All in all, we end up with an unbalanced panel for the time period between 2000 and 2013, with 2,234 multinationals, 37,299 purely domestic companies, and 197,761 firm-year observations.

4.2 Descriptive statistics

Table 1 provides summary statistics of all explanatory variables used to estimate the probability of establishing a new foreign affiliate (as suggested by Equation (1)). These can be categorized into variables at the firm level, denoted by i (log of total assets, $TA_{i,t-1}$, value added per employee, $VA_{i,t-1}/EMP_{i,t-1}$, fixed assets per employee, $FA_{i,t-1}/EMP_{i,t-1}$, log of total assets of an MNE's affiliates, $TA_{i,t-1}(Affiliates)$, an MNE dummy indicating whether firm i was an MNE in the year before entry, $MNE_{i,t-1}$[16] sector-level variables denoted by s ($Sectoral\ Sales\ Growth_{s,t-1}$), and regional-level variables denoted by k or ℓ ($County\ GDP_{k,t-1}$, $County\ GDP\ per\ Worker_{k,t-1}$, $County\ Income\ per\ Capita_{k,t-1}$, $County\ Share\ High\ Skilled_{k,t-1}$, $Municipality\ Population_{l,t-1}$, $Municipality\ Business\ Tax_{l,t-1}$). For a comprehensive list of definitions and data sources, see Table A.1 in the Appendix. Figure 1 suggests that including regional variables might be important. It documents the number of firms per county with at least one foreign affiliate established in the time period between 2000 and 2013.[17] The figure clearly shows that agglomeration effects play a role as most firms establishing foreign affiliates are located in large metropolitan areas such as Munich city, Munich county, Frankfurt, Cologne, Dusseldorf and Hamburg (from southeast to northwest). Another salient feature is the obvious east-west divide. In short, the geographic distribution of the extensive margin of FDI (setting up a

[13] In case more than one new affiliate was established in a given year, we compute sums or weighted averages across newly established affiliates using fixed-asset weights.

[14] Using gross investment avoids problems related to reporting the book value of fixed assets and depreciations, which may in part be related to tax considerations.

[15] For more details regarding the matching methodology and the quality of the match, see Schild and Schultz (2016).

[16] Note that $TA_{i,t-1}(Affiliates)$ and $MNE_{i,t-1}$ are set equal to zero in case no such activity is observed, which is naturally the case when firm i is a domestic one.

[17] Note that for illustration purposes we do not use all information from *MiDi* in Figure 1, since for reasons of confidentiality, regions with fewer than three parent companies cannot be displayed.

Table 1: Determinants of establishing a new foreign affiliate

	Mean	SD	P25	Median	P75
$TA_{i,t-1}$	9.441	1.946	8.073	9.230	10.631
$VA_{i,t-1}/EMP_{i,t-1}$	4.616	0.754	4.171	4.479	4.896
$FA_{i,t-1}/EMP_{i,t-1}$	3.246	1.864	2.109	3.146	4.045
$TA_{i,t-1}$ (*Affiliates*)	0.648	2.568	0.000	0.000	0.000
$MNE_{i,t-1}$	0.062	0.241	0.000	0.000	0.000
Sectoral Sales Growth$_{s,t-1}$	-0.425	20.042	-1.051	4.344	9.194
County GDP$_{k,t-1}$	8.857	0.943	8.176	8.775	9.363
County GDP per Worker$_{k,t-1}$	4.056	0.192	3.929	4.036	4.153
County Income per Capita$_{k,t-1}$	3.062	0.197	2.942	3.064	3.195
County Share High Skilled$_{k,t-1}$	0.087	0.042	0.055	0.076	0.107
Municipality Population$_{\ell,t-1}$	10.578	1.793	9.351	10.433	11.764
Municipality Business Tax$_{\ell,t-1}$	0.134	0.019	0.119	0.133	0.150

More information on variable definitions and sources is provided in Table A.1 in the Appendix.

new foreign entity) reflects differences in economic fundamentals at home which we aim at capturing by including a range of regional variables.

Table 2 provides an overview of the main outcome variables used. It distinguishes between the whole sample as well as between treatment and control group. A simple comparison between both groups without controlling for other variables shows that, on average, gross investment seems to be substantially larger for firms with new affiliates. This holds for the level, $INV_{i,t}$, and the first difference of gross investment, $\Delta INV_{i,t}$, while there is no clear difference between the groups when gross investment relative to fixed assets, $INV_{i,t}/FA_{i,t-1}$, is considered. For net investment, $NINV_{i,t}$,[18] we cannot confirm the clear pattern, which could be due to differences in the application of depreciation rules or the composition of fixed assets.

Table 3 provides information on the characteristics of the new foreign affiliates and their host countries. In total, 9,844 new foreign affiliates were established between 2000 and 2013.[19] The majority of new affiliates were set up in Western Europe, followed by Eastern Europe, Asia and North America. For each region, we provide average values of the foreign affiliates' (denoted by a) sales, $SALES_{a,t}$, employment, $EMP_{a,t}$, fixed tangible and intangible assets, $FA_{a,t}$, and total assets, $TA_{a,t}$. There is substantial variation in the characteristics of host countries such as GDP per capita ($GDPPC_{c,t}$), the statutory tax rate ($STR_{c,t}$), and a variable measuring the depth of the local capital market, domestic credit provided to the private sector relative to country c's GDP ($DCP_{c,t}$). The variables are potentially correlated with the motives of the parent company for investing abroad, and we exploit variation therein when studying the channels of the effect on domestic investment in Section 6.

[18] Changes in fixed assets equal fixed assets in the previous period plus investment expenditures and other additions, less depreciations and other withdrawals.

[19] The number of treated firms is lower since some parent companies establish more than one new foreign affiliate in a given year. The data in Table 3 correspond to the respective years in which the new foreign affiliates were established.

Figure 1: Geographic distribution of German firms establishing new foreign affiliates

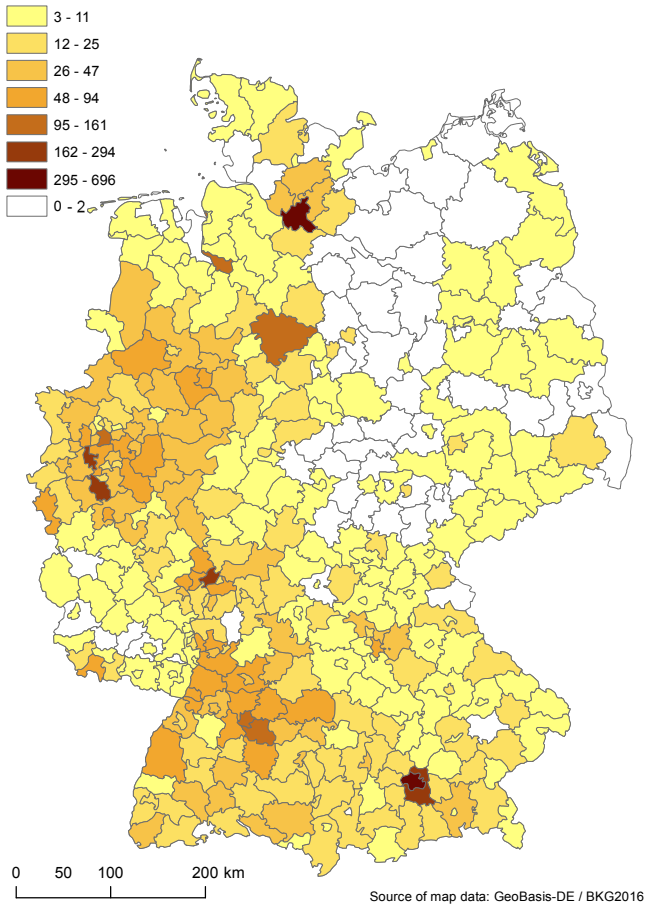


Table 2: Descriptive statistics (outcome variables)

	All Firms			Treatment Group			Control Group		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
$INV_{i,t}$	3,333.748	10,599.811	195,784	12,878.203	21,687.560	3,352	3,167.492	10,222.915	192,432
$\Delta INV_{i,t}$	10.077	3,308.505	193,808	337.972	6,529.722	3,202	4.569	3,226.796	190,606
$INV_{i,t}/FA_{i,t-1}$	0.384	0.529	193,808	0.369	0.464	3,520	0.384	0.530	190,288
$NINV_{i,t}$	-489.983	4,190.902	192,857	-1,657.708	8,476.977	3,156	-470.556	4,078.930	189,701
$\Delta NINV_{i,t}$	-42.608	4,879.730	191,954	-1.697	10,144.162	3,168	-43.295	4,741.838	188,786
$NINV_{i,t}/FA_{i,t-1}$	-0.072	0.431	192,857	-0.071	0.449	3,502	-0.072	0.431	189,355

Table 3: Characteristics of new foreign affiliates and their host countries

	Number of new foreign affiliates	$SALES_{a,t}$ Mean	$EMP_{a,t}$ Mean	$FA_{a,t}$ Mean	$TA_{a,t}$ Mean	$GDPPC_{c,t}$ Mean	$STR_{c,t}$ Mean	$DCP_{c,t}$ Mean
Western Europe	4,168	49,515.595	116.883	16,081.102	115,159.827	10.587	0.305	133.788
Eastern Europe	1,738	27,173.188	155.930	11,546.246	26,655.468	9.832	0.218	38.905
Africa	203	23,024.631	187.729	5,047.212	20,626.823	9.009	0.301	95.425
Middle East	178	12,735.955	70.376	4,132.506	16,559.247	10.485	0.144	54.641
North America	1,390	113,551.079	193.509	52,216.710	221,143.018	10.649	0.363	161.159
Caribbean	30	10,833.333	108.233	9,855.800	31,762.033	9.477	0.101	35.377
Central/South America	408	28,620.098	148.868	11,826.199	39,108.284	9.447	0.317	42.399
Asia	1,558	55,212.452	173.497	20,563.657	59,620.666	9.444	0.292	115.832
Oceania	171	26,497.076	80.667	11,303.877	39,233.561	10.506	0.313	109.725

5 Basic results

This section presents the results of our empirical analysis using the propensity score matching method as outlined above. The structure follows the steps of the practical implementation. First, we present the results from estimating the probabilities of establishing a new affiliate. Thereafter, we estimate an ATT associated with establishing a new foreign affiliate on domestic investment. Following these extensive margin considerations, we also present intensive margin elasticities. Then, we provide a thorough sensitivity analysis of our main results, estimate ATTs for alternative outcomes and consider potential heterogeneity in treatment effects with respect to characteristics specific to firms or destination countries.

5.1 The probability of establishing a new foreign affiliate

We estimate the probability of establishing a new foreign affiliate based on Equation (1), including Mundlak-Chamberlain means of the time-varying explanatory variables as well as time and sector effects. All subsequent estimates of the treatment effect are based on this specification.[20] Table 4 presents the results of the probit estimate for all time-varying explanatory variables.[21] We employ lagged variables (i.e., in the year before foreign market entry) as regressors, and observe a high level of significance for most factors. The positive coefficients for total assets and fixed assets per employee indicate that large and capital-intensive firms are more likely to expand abroad, which is consistent with previous findings (Tomiura, 2007). While most theoretical models suggest that productivity plays an important role for foreign trade and investment (Melitz, 2003; Helpman, Melitz, and Yeaple, 2004; Helpman, 2006), we do not find an additional effect of labor productivity on the probability of establishing a new foreign affiliate after controlling for size and capital intensity.[22] Furthermore, the results reveal that greater foreign activity in the preceding year (measured by the sum of total assets of existing affiliates) is associated with a higher probability of setting up another foreign affiliate. If the firm is already an MNE with foreign affiliates, it is less likely that we observe further foreign activity after controlling for the size of existing affiliates. While the latter result is conditional on many covariates, it indicates that our data include both existing MNEs expanding their foreign affiliates networks and domestic firms becoming new MNEs. Turning the focus to potential determinants on a regional level, we find that most variables are insignificant in the probability model, although there is substantial variation across the approximately 400 counties and 12,000 municipalities. Only for (i) GDP and (ii) the share of high-skilled labor in the (German) county where the firm is located, we observe a negative (and weakly significant) effect. In contrast to this, there is no evidence that per capita measures of economic wealth such as county GDP per worker and county income per capita have a distinct impact on the propensity to expand abroad. Moreover, variables measured at the municipality level are not found to be significant either. The lack of significant evidence for factors at the county and municipality level is surprising, as these characteristics are usually expected to affect an MNE's decision of whether to ex-

[20] Table A.3 in the Appendix provides estimation results for alternative probit specifications.

[21] An F-test indicates joint significance of the Mundlak-Chamberlains means, which are included as regressors to control for unobserved firm heterogeneity.

[22] However, note that our results are not directly comparable to these models, since they focus on selection into foreign activity, while we consider the extensive margin of FDI in a somewhat broader sense.

pand or not (and also exhibit substantial time variation). Overall, our results suggest that firm-specific characteristics are the driving force behind the investment decision in question.

Table 4: Probability of establishing a new foreign affiliate

	(1)
$TA_{i,t-1}$	0.361***
	(0.048)
$VA_{i,t-1}/EMP_{i,t-1}$	-0.056
	(0.039)
$FA_{i,t-1}/EMP_{i,t-1}$	0.064**
	(0.025)
$TA_{i,t-1}$ (*Affiliates*)	0.069***
	(0.023)
$MNE_{i,t-1}$	-1.216***
	(0.227)
Sectoral Sales Growth$_{s,t-1}$	0.083
	(0.109)
County GDP$_{k,t-1}$	-1.339**
	(0.578)
County GDP per Worker$_{k,t-1}$	0.976
	(0.628)
County Income per Capita$_{k,t-1}$	0.557
	(0.396)
County Share High Skilled$_{k,t-1}$	-3.748*
	(2.072)
Municipality Population$_{\ell,t-1}$	-0.004
	(0.230)
Municipality Business Tax$_{\ell,t-1}$	-0.372
	(2.856)

Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively. A Wald test indicates joint significance of the Mundlak-Chamberlain means, which are not shown.

5.2 The effects of investing abroad

Using the propensity scores obtained from above, we estimate an average treatment effect on the treated (ATT) associated with establishing a new foreign affiliate on domestic investment. We use radius matching with a caliper of 0.01 and match observations exactly by year in order to ensure that we only compare firm-year observations of the same year. We then apply weighted regressions (with weights obtained from the propensity score matching) to estimate ATTs. In these regressions, we additionally condition on year-specific effects and imbalanced covariates, in case conditioning on the propensity score does not fully remove

significant differences in the means of pre-treatment characteristics.[23]

Table 5: ATT of establishing a new foreign affiliate

	ATT	SE	No. treated	No. untreated
$INV_{i,t}$	1,274.485***	394.017	2,998	188,493
$\Delta INV_{i,t}$	458.126***	152.253	3,021	188,806
$INV_{i,t}/FA_{i,t-1}$	0.044***	0.009	2,979	185,120
$NINV_{i,t}$	669.878***	181.350	2,880	186,484
$\Delta NINV_{i,t}$	-72.639	219.040	2,900	185,867
$NINV_{i,t}/FA_{i,t-1}$	0.030***	0.010	2,955	184,178

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on *County Income per Capita*$_{k,t-1}$.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 5 presents the results of the ATT estimates for six different measures of domestic investment.[24] We find that establishing a new affiliate in a foreign country has a highly significant and positive effect on domestic investment of the parent company. Our preferred estimate is the ATT for $\Delta INV_{i,t}$, since (i) gross investment is unaffected by the application of depreciation rules as argued above, and (ii) focusing on changes in outcome variables effectively combines propensity score matching with a difference-in-differences approach (Heckman, Ichimura, Smith, and Todd, 1998; Blundell, Dias, Meghir, and van Reenen, 2004). The results suggest that a newly established foreign affiliate is associated with an increase in domestic investment activity of EUR 458,000. This is a substantial effect, given that the average firm in the treatment group invests EUR 12,878,000 per year. Similarly, domestic investment relative to fixed assets in the previous period is 4.4 percentage points higher as a result of increased foreign activity. For the level of domestic investment we obtain a slightly larger ATT of EUR 1,275,000. The results for net investment, defined as changes in fixed assets, with the exception of the ATT for changes in net investment, $\Delta NINV_{i,t}$, are similar to those of gross investment. The level of net investment is EUR 670,000 larger and the growth rate of the capital stock ($NINV_{i,t}/FA_{i,t-1}$) 3.0 percentage points higher as a consequence of establishing a new foreign affiliate. Altogether, we can draw the preliminary conclusion that the impact of FDI on domestic investment is positive and substantial, irrespective of the particular measure of domestic investment under consideration.

5.3 Intensive margin elasticities

While our basic results mainly focus on the effects at the extensive margin of FDI, we are also interested in comparing our estimates to the ones of previous studies. To a large extent, existing research has provided estimates on elasticities at the intensive margin. As in Section 5.2, we run a weighted regression of outcome $y_{i,t}$ on $TREAT_{i,t}$, based on the weights obtained from the matched sample. To this parsimonious regression, we now add

[23] The common support condition is guaranteed to hold for treated and non-treated firms in each year. Moreover, as shown in Table A.4, all variables except *County Income per Capita*$_{k,t-1}$ are well balanced between the treatment and control group in our main specification. Hence, we usually condition only on the latter variable.

[24] We should highlight that all estimates shown in this paper have to be interpreted as short-run effects. Producing long-run estimates on the consequences of foreign activity requires some additional years of data.

an interaction term between $TREAT_{i,t}$ and $\overline{FDI}_{a,t}$. The latter variable denotes demeaned measures of foreign activity. To be precise, we define $\overline{FDI}_{a,t} = FDI_{a,t} - MFDI$, where $MFDI$ denotes the sample mean of $FDI_{a,t}$. By doing so, we guarantee that the coefficient on the uninteracted treatment indicator still provides an estimate of the ATT (Wooldridge, 2010; Egger, Merlo, Ruf, and Wamser, 2015). The index a indicates that we measure the latter at the level of the foreign affiliate. We use three variables to capture foreign activity: fixed tangible and intangible assets ($FA_{a,t}$), equity capital of FDI ($EFDI_{a,t}$), and the consolidated sum (equity capital plus internal debt) of FDI ($CFDI_{a,t}$). The estimated coefficient on $TREAT_{i,t} \times \overline{FDI}_{a,t}$ provides an estimate of the intensive margin effect of investing abroad. For the sake of comparability, in Table 6, we report elasticities rather than the coefficients

Table 6: Intensive margin elasticities

	(1) $INV_{i,t}$	(2) $INV_{i,t}$	(3) $INV_{i,t}$
$\varepsilon^{\overline{FA}}$	0.127***		
	(0.019)		
$\varepsilon^{\overline{EFDI}}$		0.183***	
		(0.033)	
$\varepsilon^{\overline{CFDI}}$			0.228***
			(0.032)

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on *County Income per Capita*$_{k,t-1}$. Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

on $TREAT_{i,t} \times \overline{FDI}_{a,t}$. The respective elasticities are defined as $\varepsilon^{\overline{FDI}} = \frac{\Delta INV}{INV} / \frac{\Delta \overline{FDI}}{\overline{FDI}}$, for $\overline{FDI} = \{\overline{FA}, \overline{EFDI}, \overline{CFDI}\}$.[25] The findings suggest that 1% more foreign activity (measured by fixed assets) leads to about 0.13% more investment at home. The elasticities for equity capital of FDI and the consolidated sum of FDI are somewhat bigger but go in the same direction. Since investment at home is measured in fixed assets, our preferred estimate is the one on $\varepsilon^{\overline{FA}}$.

Compared to previous studies, the estimated elasticities presented in Table 6 are lower. For example, Desai, Foley, and Hines (2009) find an elasticity of about 0.26. We believe, however, that our approach has some advantages compared to previous work. First, we specifically account for selection into foreign activity. We do this not only by conditioning on the vector of observables as shown in Equation (1), but also by explicitly modeling selection into treatment. This also allows us to separate the extensive effect from the intensive one and provide estimates for both. Second, the robustness tests in Section 5.4 show that firm,

[25] Note that the elasticities reported are based on specifications in which we define the outcome in levels and the volume of FDI in logs. We have chosen this specification to ensure comparability with our benchmark results on the ATT. Slightly different specifications where the outcome is defined in logs as well, or where FDI is defined as $log(FDI + 1)$ (as $FA_{a,t}$ is equal to zero in some cases, while $EFDI_{a,t}$ and $CFDI_{a,t}$ can also be negative), yield very similar results. Note also that $\varepsilon^{\overline{FA}}$ is our preferred estimate as taking logs of $FA_{a,t}$ implies the smallest loss of observations.

regional, industry, and time effects fully capture that specific types of firms invest in a given period for specific reasons (selection into treatment). Then, the estimates on FDI should also be consistent under the same assumptions (which are fairly weak compared to a linear regression model) as imposed above (see Section 3). It is also interesting to note that the basic effect of $TREAT_{i,t}$ is virtually not affected when the interaction terms are included. It seems that, once we condition on the variables in Equation (1), the amount of FDI is almost orthogonal to $TREAT_{i,t}$. Third, and related to the first point, the approach generally solves the problem of not observing foreign activity in $t-1$, i.e. before treatment, neither for the treated, nor for the untreated. This leads to bias in a linear regression model – as the extensive margin is not modeled explicitly and a linear relationship is assumed.

5.4 Sensitivity analysis

5.4.1 Propensity score estimation and matching algorithm

We assess the robustness of our main result by using a range of different specifications for estimating the propensity score and by varying the matching algorithm. The goal of estimating Equation (1) is to obtain the best estimate for the selection into treatment. In principle, propensity score models including higher-order terms of the covariates can be used, although over-parameterization remains a concern (Augurzky and Schmidt, 2001; Bryson, 2002). Hence, as a robustness test, we include quadratic and cubic terms of all the explanatory variables in the estimation of the propensity score model in order to account for potential nonlinear relationships (Table 7, (1) and (2)).

Our baseline estimate captures the influence of changes in time-varying covariates on treatment assignment, while controlling for time-invariant characteristics of the firm by employing the Chamberlain-Mundlak device. Alternatively, we could ignore the panel dimension of our data and directly estimate a pooled probit for selection into treatment (Table 7, (3)). Similarly, propensity scores can be estimated on a yearly basis, which implies that estimated scores are based on smaller samples, in which unobserved heterogeneity as in our benchmark specification cannot be accounted for (Table 7, (4)).

In order to test the sensitivity of the results with regard to our choice of the matching algorithm, we also apply nearest neighbour matching with replacement, allowing for a maximum of 100 neighbors and using a caliper of 0.01 (Table 7, (5)). Moreover, we also apply kernel matching with a caliper of 0.01 (Table 7, (6)). In our baseline specification, we compare firms from different geographic locations in Germany as well as different sectors with each other. As far as there are systematic differences in the effect between these groups – for example, states at the border versus states in the interior, or manufacturing firms versus services firms –, this could be a potential point of concern. To address this issue, we also exactly match firms by state and sector (Table 7, (7) and (8)). By insisting on an exact match, we only compare those firms with each other that are in the same state and sector (Heckman, Ichimura, and Todd, 1997; Heckman, Ichimura, Smith, and Todd, 1998). Although the latter approach seems to be quite restrictive, the estimated ATTs remain almost unaffected.

While the balancing property of the propensity score holds for all variables with the exception of county income per capita, we also provide estimates where we control for all explanatory variables used in the first stage when calculating the ATT (Table 7, (9)).

Table 7: Additional sensitivity checks (outcome: $\Delta INV_{i,t}$)

	ATT	SE	No. treated	No. untreated
(1) Probit: 2nd order polynomial	453.453***	145.035	3005	188806
(2) Probit: 3rd order polynomial	465.018***	143.242	2966	188806
(3) Probit: Pooled estimation	468.465***	155.246	3010	188806
(4) Probit: Estimated year-by-year	312.118*	160.576	2987	167008
(5) Nearest neighbor matching	466.693***	152.802	3021	188806
(6) Kernel matching	390.086***	122.534	3189	188806
(7) Exact matching by state	495.628***	152.136	2443	188806
(8) Exact matching by sector	366.926**	157.104	2687	188343
(9) Condition on all first stage variables	459.837***	153.713	3021	188806

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on imbalanced covariates.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 7 illustrates that all alternative specifications leave the ATT by and large unchanged in terms of significance and sign. Although the size of the treatment effect varies slightly, we maintain a highly significant and positive effect of FDI on domestic investment.

5.4.2 Placebo and permutation tests

In the following, we present further results using placebo treatments and a permutation test. A placebo test can shed light on the question of whether changes in domestic activity in the treatment year can actually be interpreted as the effect of establishing a new affiliate abroad. Similar tests are also frequently used in the treatment literature to evaluate the common trends assumption in difference-in-differences models. In our case, the common trends assumption requires that treated and control firms would have evolved similarly in the absence of treatment. We address both points by considering changes in domestic investment in the year before establishing a new foreign affiliate. Table 8 reports estimates of the ATT for the year prior to treatment as well as the ATT for the actual treatment year for the same sample of firms.[26] The ATT in the year of treatment is estimated to be positive and strongly significant, which is consistent with Table 5. The placebo ATT in the year prior to treatment clearly suggests the absence of a placebo effect, indicating that the increase in investment coincides precisely with the establishment of a new affiliate abroad.

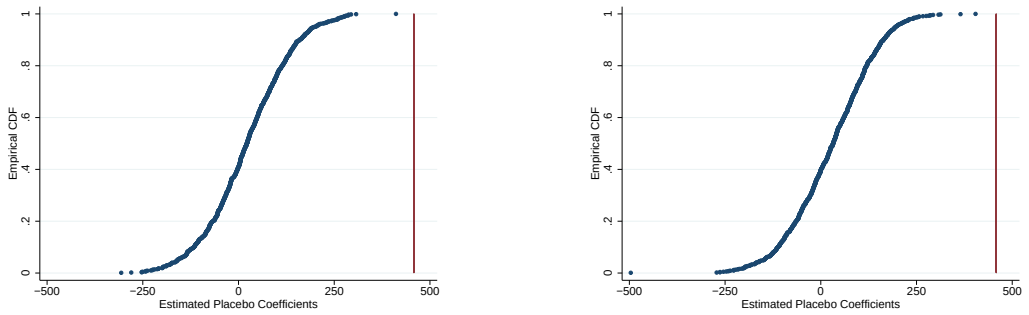
Table 8: Placebo treatments in year t-1

	ATT	SE	No. treated	No. untreated
$\Delta INV_{i,t-1}$	86.764	179.040	1,704	156,067
$\Delta INV_{i,t}$	494.778***	140.600	1,704	156,067

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on $MNE_{i,t-1}$ and *County GDP per Worker*$_{k,t-1}$.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

A second concern pertains to the calculation of standard errors for our difference-in-differences estimates, which may be biased downward in the presence of serial correlation

[26] This is done for the sake of comparability of placebo and actual-year-of-treatment effects. The sample of firms considered in the placebo test is smaller than for the baseline ATT due to the requirement of three consecutive observations and the absence of successive treatments.



(a) Same number of treatments (b) Same years and number of treatments

Figure 2: Distribution of placebo estimates

(Bertrand, Duflo, and Mullainathan, 2004). We address this issue by implementing two nonparametric permutation tests for the ATT (Fisher, 1922; Chetty, Looney, and Kroft, 2009). That is, we simulate an empirical distribution of placebo estimates to which our actual ATT can be compared. There are several possible ways of re-shuffling treatment across firms. First, we randomly select 3,021 firm-year observations[27] from the subset of MNEs in our dataset.[28] Second, we keep the structure of treatment timing and randomly select 332 firm-year observations for the year 2000, 314 for 2001, and so on (cf. Table A.2). We then reestimate selection into treatment as well as the ATT, and we repeat this procedure 1,000 times. Figure 2 provides the empirical distribution of the placebo ATTs for $\Delta INV_{i,t}$ and both permutation alternatives. The vertical lines indicate the treatment effect as reported in Table 5. In both cases they are clearly located to the right of the 1,000 simulated ATTs and suggest significance at the 1% level. Thus, the permutation tests confirm that the establishment of new foreign affiliates treatment is related to a significant increase in domestic investment.

5.4.3 Weighted regressions conditioning on firm-specific variables

We further evaluate the robustness of our main result by estimating a series of regressions with additional covariates. The literature suggests several firm-level characteristics that are considered important for domestic investment decisions. We use lagged sales growth, $Q_{i,t}$, which is a commonly used proxy for Tobin's Q of unlisted firms (Whited, 2006; Bloom, Bond, and Van Reenen, 2007). In addition, we include measures of financing constraints such as cash flow relative to total assets (Fazzari, Hubbard, Petersen, Blinder, and Poterba, 1988), $CF_{i,t}$, intangible assets relative to total assets (Almeida and Campello, 2007), $INTANG_{i,t}$, and firm leverage (Whited, 1992), $LEV_{i,t}$. Table 9 presents the results from a set of weighted regressions, additionally conditioning on these four variables. In all specifications, the treatment effect remains positive and highly significant. Column (1) indicates that a one percentage point increase in cash flow relative to total assets is associated with an increase in domestic investment of around EUR 30,000 (additional domestic investment). Tobin's Q,

[27] This corresponds to the number of firm-year observations with newly established foreign affiliates (Table 5).

[28] MNEs are more likely to establish new foreign affiliates than purely domestic firms. Repeating both permutation tests for the full dataset yields qualitatively similar results.

the ratio of intangible to total assets and the debt-to-equity ratio have no significant effect on changes in domestic investment for the firms in our sample (columns (2) to (4)). Simultaneously including all four variables in one regression also leaves the ATT unaffected (see column (5)).

Table 9: Weighted regressions conditioning on firm-specific variables

Dependent variable: $\Delta INV_{i,t}$	(1)	(2)	(3)	(4)	(5)
$TREAT_{i,t}$	449.636***	451.922***	457.356***	481.402***	474.630***
	(151.239)	(170.643)	(152.846)	(155.438)	(172.882)
$CF_{i,t}$	2,980.256***				3,214.630***
	(675.778)				(808.765)
$Q_{i,t}$		-248.142			-505.553
		(524.615)			(559.115)
$INTANG_{i,t}$			-1,755.949		-2,472.489
			(5,114.082)		(5,395.584)
$LEV_{i,t}$				-6.166	-8.524
				(7.136)	(8.345)

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on *County Income per Capita*$_{k,t-1}$. Standard errors in parentheses.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5.5 Alternative outcomes

Our identification strategy also allows us to shed light on the effect that the establishment of new foreign affiliates has on other domestic activities. We therefore provide estimates for three different measures of firm size, as well as compensation per employee. The variables we are interested in are the first differences in total assets ($\Delta TA_{i,t}$), total sales ($\Delta SALES_{i,t}$), employees ($\Delta EMP_{i,t}$) and wages ($\Delta WAGES_{i,t}$). Table 10 shows that total assets (EUR 4.8 million), total sales (EUR 1.6 million) and labor demand (6 employees) all become greater in response to an increase in foreign activity. Our results are broadly in line with Desai, Foley, and Hines (2009) who find that foreign and domestic asset, sales and employment growth are complementary. We do not find evidence that treated firms pay higher wages. This, however, is perfectly consistent with the results below, where we show that treatment does not lead to an increase in productivity. Note that the focus of our paper is mainly on investment in real capital, and therefore we do not provide a more detailed discussion and tests on the alternative outcomes.

Table 10: Alternative outcomes

	ATT	SE	No. treated	No. untreated
$\Delta TA_{i,t}$	4,752.288***	832.019	2,721	186,893
$\Delta SALES_{i,t}$	1,638.517*	918.076	2,814	186,634
$\Delta EMP_{i,t}$	6.247***	1.640	2,817	184,032
$\Delta WAGE_{i,t}$	0.221	0.175	2,797	182,560

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on imbalanced covariates.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5.6 Heterogeneity in treatment effects

In Table 11 we test whether our treatment effect varies in variables usually employed in gravity-type models of trade. In particular, we interact the treatment indicator with the following three variables: $\overline{DIST}_c$, $\overline{GDP}_{c,t}$ and $\overline{GDPPC}_{c,t}$, where the bar indicates that all variables are demeaned in the same manner as described in Section 5.3.
$DIST_c$ measures the log distance between Germany and host country c, $GDP_{c,t}$ is the log of the host country's GDP, and $GDPPC_{c,t}$ the log of the host country's GDP per capita. Only $TREAT_{i,t} \times \overline{GDPPC}_{c,t}$ turns out to be statistically significant. The positive coefficient implies that the treatment effect becomes larger in the per capita income of the host country. This could be interpreted as evidence against the hypothesis that the positive treatment effect is in any form related to firms' outsourcing to low-wage or low-productivity countries. We come back to this issue below, as this finding is consistent with the interpretations concerning the potential drivers behind the positive effect of $TREAT_{i,t}$.

Table 11: Heterogeneity in treatment effects

	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$
$TREAT_{i,t}$	444.467***	447.368***	447.547***
	(153.033)	(153.204)	(153.137)
$TREAT_{i,t} \times \overline{DIST}_c$	86.652		
	(93.415)		
$TREAT_{i,t} \times \overline{GDP}_{c,t}$		-20.801	
		(76.843)	
$TREAT_{i,t} \times \overline{GDPPC}_{c,t}$			364.814**
			(172.806)

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on imbalanced covariates. Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

6 What explains the positive relationship between foreign and domestic investment?

So far, our empirical analysis has mainly been concerned with estimating ATTs associated with setting up a new foreign affiliate. In the following sections, we complement these basic results by identifying the potential channels that may explain the finding of a positive treatment effect. First, we examine productivity gains linked to the re-organization of production. Second, we analyze tax savings and profit-shifting opportunities. Finally, we shed light on financing aspects and internal capital markets.

6.1 Production and technology channel

We start by examining whether the positive relationship between FDI and domestic investment can be explained by changes in the organization of production of the MNE. In

particular, the existing literature has emphasized potential differences in the home market effects of FDI, depending on the specific type of FDI. Efficiency-seeking or vertical FDI is expected to have positive effects if efficiency gains prevail over the direct losses from offshoring parts of the production process (Hejazi and Pauly, 2003; Desai, Foley, and Hines, 2005; Arndt, Buch, and Schnitzer, 2010). The net effect of market-seeking or horizontal FDI is assumed to depend on whether FDI displaces exports or not (Desai, Foley, and Hines, 2005; Hejazi and Pauly, 2003). In the following, we focus on potential productivity gains from vertical FDI. We use the approach proposed by Levinsohn and Petrin (2003) to obtain value-added-based estimates of total factor productivity, $TFP_{i,t}$. Based on these estimates, we estimate ATTs on TFP.[29] In addition, we interact four proxies of vertical/horizontal FDI with the treatment indicator. First, we use a dummy for the manufacturing sector, $MANU_{i,t}$, as vertical specialization across borders is more prevalent in manufacturing compared to services (see for example Chen, Kondratowicz, and Yi (2005)). This variable is defined at the level of firm i. Second, we construct a proxy for vertical FDI, $VERT_{a,t}$, which equals one if the parent company operates in a different sector than the new foreign affiliate, and is zero otherwise (Arndt, Buch, and Schnitzer, 2010). Third, we interact the treatment indicator with the share of current claims on affiliated enterprises relative to total assets of the newly established affiliate, $IGCA_{a,t}$, which is expected to be larger in the presence of intermediates trade with an affiliate a. Fourth, we use a dummy for new foreign affiliates in Central, Eastern and Southeastern Europe (CESEE), $CESEE_{a,t}$, which has been a popular offshoring destination for German MNEs. All proxies for vertical FDI are demeaned, as above.

Table 12: Production and technology channel

	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta TFP_{i,t}$	$\Delta TFP_{i,t}$	$\Delta TFP_{i,t}$	$\Delta TFP_{i,t}$
$TREAT_{i,t}$	458.009***	458.045***	458.128***	458.257***	-0.260	-0.257	-0.257	-0.257
	(152.270)	(152.245)	(152.257)	(152.258)	(0.165)	(0.165)	(0.165)	(0.165)
$MANU_{i,t}$	-191.736				-0.251			
	(197.650)				(0.230)			
$TREAT_{i,t} \times \overline{MANU}_{i,t}$	467.796				0.351			
	(296.816)				(0.371)			
$TREAT_{i,t} \times \overline{VERT}_{a,t}$		-113.271				0.074		
		(225.928)				(0.268)		
$TREAT_{i,t} \times \overline{IGCA}_{a,t}$			26.780				-0.542	
			(832.104)				(1.090)	
$TREAT_{i,t} \times \overline{CESEE}_{a,t}$				-210.082				-0.305
				(265.637)				(0.324)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates.
Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 12 suggests that the ATTs for $\Delta TFP_{i,t}$ are small and not significant in any of the four specifications. The absence of a productivity effect is consistent with the observation that establishing a new foreign affiliate does not make MNEs pay higher wages (c.f. Section 5.5). The interactions of the vertical FDI proxies with $TREAT_{i,t}$ are also insignificant, both for changes in investment and productivity. From this relatively clear picture, we conclude that the re-organization of production, in particular regarding productivity gains from

[29] Using revenue-based measures of TFP (Levinsohn and Petrin, 2003) or labor productivity (value added per employee) yields similar results.

vertical FDI, does not seem to be a relevant channel for explaining the positive link between FDI and domestic investment.

6.2 Tax savings and profit shifting channel

In this subsection, we provide evidence that treatment effects are heterogeneous in corporate tax differentials. Moreover, we analyze changes in tax payments as an additional outcome. The findings leave scope for a profit-shifting interpretation, which we discuss in the following.

A substantial literature has argued that international investment decisions of MNEs are not only related to production, trade and the opening up of new markets, but moreover represent a strategic location choice crucially influenced by tax-planning and profit-shifting opportunities (Huizinga and Laeven, 2008; Buettner and Wamser, 2013; Dharmapala, 2014). Common practices in this regard include the manipulation of intra-firm transfer pricing schemes (Davies, Martin, Parenti, and Toubal, 2017) and the use of internal capital markets (Heckemeyer and Overesch, 2013). While transfer pricing is hard to detect and is not discussed in more detail here, we are able to establish an empirical link between MNEs' foreign and domestic activities, intra-company loans and tax savings.

Table 13 presents evidence on treatment effects being heterogeneous with respect to corporate tax differentials.[30] In all specifications, we estimate ATTs on $\Delta INV_{i,t}$, explicitly controlling for corporate tax rate differentials ($\overline{DSTR_{c,t}}$), transfer pricing documentation requirements ($\overline{DCE_{c,t}}$), and intra-group loans ($\overline{IGL_{a,t}}$) provided by the newly established affiliate a, respectively. ($\overline{DSTR_{c,t}}$) is defined as the German statutory tax rate plus the business tax rate at the municipality level minus the statutory tax rate of the country where the newly established foreign affiliate is located.

We would expect that ΔINV is positively related to low taxes abroad. The firm may particularly use the newly established entity to shift profits and save taxes, which gives rise to the positive treatment effect via a reduction in the cost of capital at home. For the interaction term with the transfer pricing indicator, which is equal to 1 if the host country has implemented transfer pricing documentation requirements, and zero otherwise, we expect a negative estimate as countries use documentation requirements to prevent abusive use of transfer pricing for the purpose of profit shifting. The intra-group loans variable is defined as the balance-sheet position lending to affiliated entities relative to the total assets of affiliate a at time t. If internal loans are used to shift profits, rather than the manipulation of transfer pricing or other means of profit shifting, we would expect the positive treatment effect to be positively related to $\overline{IGL}_{a,t}$.

All specifications have in common that the main effect of setting up a foreign affiliate on domestic investments remains very stable in terms of size and significance. Moreover, our results suggest that the treatment effect is in fact heterogeneous with respect to the corporate tax rate. The larger the tax differential between Germany and the destination country, the larger is the positive and significant impact of foreign activity on domestic investments as measured by $\Delta INV_{i,t}$.

In contrast to these significant factors, the existence of transfer pricing documentation requirements as well as a high share of intra-group loans do not seem to be associated with a significant deviation from the ATT. The insignificant coefficient in the last line indicates that

[30] In addition to the data utilized so far, we employ corporate taxes taken from Steinmüller, Thunecke, and Wamser (2017). For a detailed overview of all data sources, see Table A.1 in the Appendix.

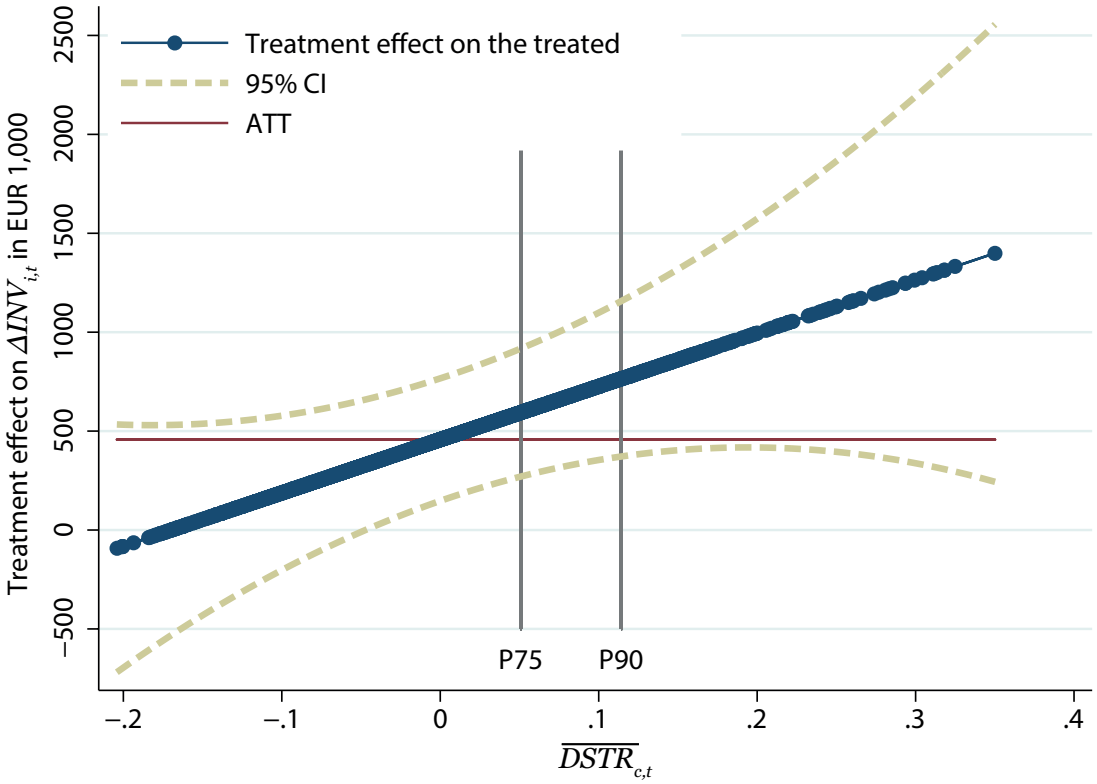
Table 13: Tax savings and profit shifting channel

	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$
$TREAT_{i,t}$	456.886***	457.539***	458.075***	458.155***
	(152.208)	(152.292)	(152.246)	(152.251)
$TREAT_{i,t} \times \overline{DSTR}_{c,t}$	2,692.343**			
	(1,313.292)			
$TREAT_{i,t} \times \overline{DCE}_{c,t}$		-72.147		
		(238.975)		
$TREAT_{i,t} \times \overline{IGL}_{a,t}$			-1,239.272	
			(1,500.496)	
$TREAT_{i,t} \times \overline{IGL}_{a,t} \times DSTR_{P75}$				-1,645.562
				(2,277.915)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

if we only consider firms as treated if they set up affiliates in countries where the demeaned tax differential with respect to Germany lies in the upper quartile, intra-group loans do not have a significant impact on $\Delta INV_{i,t}$ either. In order to get more detailed insights into the

Figure 3: Heterogeneous tax effects



interplay of MNEs' investment behavior and tax incentives, we depict the heterogeneity of the treatment effect in Figure 3. Displaying the treatment effect on $\Delta INV_{i,t}$ on the vertical

axis as a function of the demeaned tax differential confirms our findings from Table 13. The solid horizontal line illustrates the ATT. The positively sloped solid line shows the treatment effect on the treated as increasing in the tax differential. The necessity of employing the tax differential in its *demeaned* form becomes particularly evident here: the two solid lines cross at a treatment effect value of EUR 457,000 and a demeaned tax differential of zero. This is of course no coincidence, but merely follows from the definition of the ATT and the demeaned tax differential. The treatment effect of EUR 457,000 is essentially the same as the ATT measured in Table 5, which is associated with an average tax differential, hence a value of zero on the horizontal axis.

To the right of this intersection, the tax differential between Germany and the respective destination country is larger than the average. This is associated with a treatment effect on domestic investments which is larger than the ATT. Vice versa, to the left of the intersection, the treatment effect is comparatively smaller. For a tax differential only slightly below average, the ATT is still positive and significant; however, for demeaned tax differentials smaller than around -0.05, the treatment effect on investments becomes insignificant. On the one hand, this finding is consistent with the tax incentives suggested above. On the other hand, we see that in both tails of the tax differential distribution, the confidence bands as depicted by the dotted lines in Figure 3 are broadening. Particularly for high values of the demeaned tax differential, this can be explained by a lower support of observations. As a consequence, the larger the deviation from the average tax differential, the more difficult it is to precisely estimate the treatment effect.

In order to reinforce the previous results, we estimate the ATT on domestic investments with a refined definition of the treatment group. First, we only include MNEs with affiliates in countries for which the demeaned tax differential exceeds the 75th percentile. Second, we even restrict the treatment group to FDI in countries exceeding the 90th percentile of the demeaned tax differential distribution. Table 14 presents the estimated ATTs in this regard. The results indeed suggest that the ATTs are larger if new affiliates are set up in

Table 14: Tax savings and profit shifting channel

	ATT	SE	No. treated	No. untreated
$(DSTR > P75)\Delta INV_{i,t}$	668.052***	255.145	756	188,806
$(DSTR > P90)\Delta INV_{i,t}$	754.181**	374.165	303	188,806

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

low-tax countries. For the subset of treated MNEs in the upper quartile of the tax differential distribution, setting up a new foreign affiliate is associated with an increase in $\Delta INV_{i,t}$ of EUR 668,000. Considering only those MNEs as treated which expand into countries for which the tax differential exceeds the 90th percentile, the ATT is even more pronounced (EUR 754,200).

The findings in this section so far have shown that domestic investment behavior is sensitive towards tax incentives afforded by the establishment of new foreign affiliates. An obvious goal of choosing affiliate locations for tax optimization reasons is to reduce the overall tax burden of the firm. Hence, an additional way to analyze how tax incentives affect investment behavior is to take a closer look at how FDI affects domestic tax payments. To

this end, we estimate ATTs on $\Delta TAX_{i,t}$, which is the change in taxes paid by the German parent company, and on $\Delta TAX_{i,t}/CF_{i,t}$, which is the change in the tax-to-cash-flow-ratio, a measure that is often used in the literature analyzing backward-looking effective tax rates. The results are shown in Table 15 and Table 16. All explanatory variables and the way they are defined are the same as in Table 13.[31]

Table 15: Tax savings and profit shifting channel

	$\Delta TAX_{i,t}$	$\Delta TAX_{i,t}$	$\Delta TAX_{i,t}$	$\Delta TAX_{i,t}$
$TREAT_{i,t}$	-109.015*	-109.236*	-108.989*	-108.883*
	(58.841)	(58.857)	(58.822)	(58.832)
$TREAT_{i,t} \times \overline{DSTR}_{c,t}$	173.422			
	(512.190)			
$TREAT_{i,t} \times \overline{DCE}_{c,t}$		-46.563		
		(95.653)		
$TREAT_{i,t} \times \overline{IGL}_{a,t}$			-1,562.080**	
			(751.764)	
$TREAT_{i,t} \times \overline{IGL}_{a,t} \times DSTR_{P75}$				-1,842.865
				(1,145.971)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 16: Tax savings and profit shifting channel

	$\Delta TAX_{i,t}/CF_{i,t}$	$\Delta TAX_{i,t}/CF_{i,t}$	$\Delta TAX_{i,t}/CF_{i,t}$	$\Delta TAX_{i,t}/CF_{i,t}$
$TREAT_{i,t}$	-0.010*	-0.010*	-0.010*	-0.010*
	(0.006)	(0.006)	(0.006)	(0.006)
$TREAT_{i,t} \times \overline{DSTR}_{c,t}$	0.021			
	(0.052)			
$TREAT_{i,t} \times \overline{DCE}_{c,t}$		-0.007		
		(0.009)		
$TREAT_{i,t} \times \overline{IGL}_{a,t}$			0.042	
			(0.070)	
$TREAT_{i,t} \times \overline{IGL}_{a,t} \times DSTR_{P75}$				0.013
				(0.091)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Across all specifications, we observe a robust, negative ATT on $\Delta TAX_{i,t}$ and $\Delta TAX_{i,t}/CF_{i,t}$, significant at the 10% level. According to our estimation results, setting up a new foreign

[31] In addition to the ATTs on $\Delta TAX_{i,t}$, we also estimate the effect of a new foreign affiliate on domestic profits. These results are presented in A.5 in the Appendix and show that profits do indeed decline when a new foreign affiliate is established, reinforcing the hypothesis that parts of domestic profits are shifted abroad.

affiliate is associated with a decrease in domestic tax payments of EUR 109,000. Analogous to above, we include interaction terms with $(\overline{DSTR_{c,t}})$, $(\overline{DCE_{c,t}})$ and $(\overline{IGL_{i,t}})$. The empirical findings suggest that the treatment effect neither varies significantly with the demeaned tax rate differential, nor do documentation requirements alter the treatment effect.

In contrast to this, the absolute magnitude of the negative treatment effect strongly increases in the share of intra-group loans to total assets of the newly established affiliate. The estimated coefficient in column 3 of Table 15 indicates that if the new affiliate's intra-group loans increase by 10 percentage points relative to total assets, the decline in $\Delta TAX_{i,t}$ amounts to EUR 156,000. Furthermore, we analyze the impact of the share of intra-group loans only in those treated MNEs which are in the upper quartile of the distribution of the demeaned tax rate differential. The results illustrate that being part of this subset of treated firms increases the ATT additionally, yet the coefficient is not significant.

In a similar way as above, we add to the previous results by separately estimating treatment effects for only those MNEs that set up affiliates in countries for which the tax differential exceeds the 75th percentile and 90th percentile, respectively (Table 17). We find that the average decrease in the amount of taxes paid is higher if the MNE engages in FDI in countries with low tax rates relative to Germany as defined by the 75th percentile, but we do not find a significant effect for the 90th percentile. We should note, however, that for reasons of data availability (taxes paid), the number of treated units becomes relatively small.

Table 17: Tax savings and profit shifting channel

	ATT	SE	No. treated	No. untreated
$(DSTR > P75)\Delta TAX_{i,t}$	-181.257*	109.878	689	186792
$(DSTR > P90)\Delta TAX_{i,t}$	-53.319	173.411	274	186792
$(DSTR > P75)\Delta TAX_{i,t}/CF_{i,t}$	-0.009	0.011	700	185126
$(DSTR > P90)\Delta TAX_{i,t}/CF_{i,t}$	-0.002	0.014	278	185126

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

To sum up, our empirical analysis has shown that MNEs' investment activities are strongly influenced by tax incentives. A common vehicle to exploit tax differentials is internal borrowing and lending. The next subsection discusses the characteristics of internal capital markets, tests whether the prospect of better access to financial capital is a driver of the treatment effect and highlights the interdependencies between this 'financing channel' and the 'profit shifting and tax savings channel'.

6.3 Financing channel

One of the distinguishing features of large firms in general and multinationals in particular is that they can borrow and lend on an internal capital market (Gertner, Scharfstein, and Stein, 1994; Stein, 1997; Bolton and Scharfstein, 1998; Scharfstein and Stein, 2000). Egger, Keuschnigg, Merlo, and Wamser (2014) argue that internal capital markets are established for reasons which can be broadly grouped into two categories: (i) profit shifting via debt shifting and tax savings; (ii) frictions in economic fundamentals and efficient resource allocation.

Their model suggests that differences in economic fundamentals – such as weak institutional quality, underdeveloped financial markets, or high productivity – produce different levels of excess returns at host locations. Capital should be allocated to those entities where this excess return is highest. In our context, establishing a new foreign entity may facilitate access to financial capital (at host locations). Through a firm's internal capital market, internal financing then becomes available for operations at home and more investment projects may be realized there. Thus, we hypothesize that the positive treatment effect found in the basic results may reflect better access to financial capital.

Our tests of the financing channel hypothesis focus on two aspects. First, we use variables on the development of the local capital market and interact these measures with $TREAT_{i,t}$. That is, we allow the effect of $TREAT_{i,t}$ on $\Delta INV_{i,t}$ to vary with the quality of the capital market at host country c. The variables we use are all taken from the World Bank's World Development Indicators (WDI) and the Global Financial Development Database (GFDD), and are often used in the literature to measure financial market depth.[32]

Table 18: Financing channel

	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$	$\Delta INV_{i,t}$
$TREAT_{i,t}$	434.301***	429.171***	409.011**
	(153.678)	(153.696)	(160.946)
$TREAT_{i,t} \times \overline{DCP}_{c,t}$	188.711		
	(174.852)		
$TREAT_{i,t} \times \overline{DCPB}_{c,t}$		124.648	
		(187.296)	
$TREAT_{i,t} \times \overline{SMC}_{c,t}$			370.000**
			(151.860)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The results are presented in Table 18. They show that a higher stock market capitalization in the destination country is associated with higher domestic investment, while the variables measuring credit to the private sector are not statistically significant at conventional levels.

A second way to test the financing channel hypothesis is to look at alternative outcomes. We do so by using information on (internal) loans from affiliated enterprises, i.e. internal debt $ID_{i,t}$. If newly established affiliates increase the scope for intra-group borrowing of the parent company, this should be reflected in $ID_{i,t}$. We find that both $\Delta ID_{i,t}$ as well as $\Delta ID_{i,t}/TA_{i,t}$ (which measures the change in the share of internal borrowing in total assets,

[32]The three variables are (a) Domestic Credit to the Private Sector ($DCP_{c,t}$), (b) Domestic Credit to the Private Sector by Banks ($DCPB_{c,t}$), and (c) Stock Market Capitalization ($SMC_{c,t}$). The first two are taken from the World Bank's WDI database, while the latter comes from the GFDD; (a) and (b) measure all domestic credit provided to the private sector (in % of GDP), where (b) accounts only for credit provided by banks; (c) measures the total value of all listed shares in the stock market (in % of GDP). Larger values of all three variables are associated with a higher degree of financial depth and a more favorable (local) capital market.

i.e., the internal-debt-to-asset ratio) are positively related to $TREAT_{i,t}$.[33] The effect on $\Delta ID_{i,t}/TA_{i,t}$ is, though significant at the 5% level, relatively small. Interestingly, the effect of the treatment on the capital structure is comparable to the effect of a one percentage point change in tax incentives found in the tax literature (see Feld, Heckemeyer, and Overesch (2013)). Using the same interactions with the variables measuring the quality of the local capital market, we find positive and statistically significant coefficients for stock market capitalization, while credit to the private sector is only significant when the dependent variable is $\Delta ID_{i,t}$. This finding suggests that deeper and more developed capital markets allow firms to raise capital locally for the purpose of lending and borrowing on the internal capital market. All findings together support the hypothesis that the financing channel

Table 19: Financing channel

	$\Delta ID_{i,t}$	$\Delta ID_{i,t}$	$\Delta ID_{i,t}$	$\Delta ID_{i,t}/TA_{i,t}$	$\Delta ID_{i,t}/TA_{i,t}$	$\Delta ID_{i,t}/TA_{i,t}$
$TREAT_{i,t}$	443.880**	443.922**	472.258**	0.003**	0.003**	0.003**
	(178.578)	(178.720)	(186.497)	(0.001)	(0.001)	(0.001)
$TREAT_{i,t} \times \overline{DCP}_{c,t}$	419.587**			0.001		
	(200.603)			(0.002)		
$TREAT_{i,t} \times \overline{DCPB}_{c,t}$		365.128			0.001	
		(224.233)			(0.002)	
$TREAT_{i,t} \times \overline{SMC}_{c,t}$			324.085*			0.003**
			(180.269)			(0.001)

Standard errors are obtained from running weighted regressions including year fixed effects, and conditioning on imbalanced covariates. Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

is important and contributes to the positive treatment effect for domestic investment. In particular, the estimates on the alternative outcomes suggest that foreign activity allows firms to allocate capital more efficiently on their internal capital markets. Hence, in view of the contribution by Egger, Keuschnigg, Merlo, and Wamser (2014), it seems that firms are able to make use of potential excess returns at home. However, the findings presented in Table 18 and 19, and the interaction terms, should only be interpreted together with the findings of the tax and profit-shifting channel (Section 6.2), as internal debt is the vehicle through which (i) profits are shifted (ii) and capital is allocated more efficiently.

7 Conclusions

This paper has provided new empirical results on the relationship between foreign and domestic activity of MNEs. While previous contributions have presented ambiguous evidence on whether home-market investment and FDI can be seen as substitutes or complements, our basic results suggest that FDI complements domestic investment at the firm level. The distinct contribution of our paper can be subdivided into three aspects. First, we employ a unique dataset enabling us to observe domestic and foreign investment of German MNEs. Second, we cope with the simultaneous nature of these two investment activities and associated endogeneity concerns by estimating ATTs based on propensity scores. This allows us

[33] Note that the total assets in this case refer to total capital (as the sum of nominal capital, capital reserves, profit reserves and total debt), such that the internal-debt-to-capital ratio, the external-debt-to-capital ratio and the equity-to-capital ratio add up to one. The alternative definition, using the total assets in the denominator, does not change the results.

to control for variables that determine the selection into foreign acticvity. Third, we present three specific channels through which foreign activity may affect domestic investment.

As a baseline result, we have estimated an average treatment effect on the treated which suggests that setting up a new foreign affiliate is associated with about EUR 450,000 additional investment in fixed assets. In addition to this extensive margin estimate, we also exploit variation at the intensive margin of foreign activity and estimate an elasticity between foreign and domestic investment in the range of 0.13 and 0.23, depending on the measure of foreign investment activity. The basic effect of foreign activity on home investment proves to be robust against a large number of sensitivity tests. The latter include (i) alternative measures of outcome, (ii) alternative specifications of propensity score estimates, (iii) variations in treatment-control comparisons, and (iv) calculation of placebo effects.

Trying to explain the observed outcomes, we investigate three channels through which domestic activity might be affected by foreign investment: (i) technology and productivity gains, (ii) tax savings and profit shifting, and (iii) financing and internal capital markets. To the best of our knowledge, we are the first to relate empirical findings from firm-level data in this field to such comprehensive explanatory approaches.

In contrast to previous studies both in theoretical and empirical economics, our empirical results suggest that foreign activity does not enhance total factor productivity at home. Thus, while productivity gains are commonly named as a driver of the positive link between foreign and home activity, this is not reflected in our data.

Instead, our empirical results suggest that the crucial channel determining the positive relation between domestic and foreign investment is mainly associated with MNEs' tax planning and profit-shifting opportunities, as well as improved access to financing capital. On the one hand, MNEs strategically locate affiliates as a response to tax incentives. The larger the tax differential between Germany and the destination country of FDI, the more pronounced is the domestic effect of a new foreign affiliate. Moreover, if FDI is pursued in countries with a large tax differential, the larger is the reduction in taxes paid in Germany. On the other hand, we find evidence that newly established affiliates are lending to firm entities in the home countries. Hence, expanding abroad is associated with improved access to financing capital and allows MNEs to allocate capital more efficiently via an internal capital market. These two channels are closely linked to each other as internal debt is the common vehicle for both profit shifting and a more efficient allocation of capital.

Turning the focus to the policy implications of our findings, we can argue that investing abroad allows MNEs to avoid financial imperfections and hence implies an efficiency gain. In addition to that, however, public policy should recognize as well that tax savings and profit shifting account for some portion of the positive effect associated with investing abroad. If MNEs can exploit differences in taxes across countries, this provides an advantage of MNEs against their domestic competitors. Thus, thoroughly designed policies against profit shifting are needed to guarantee a level playing field. In the end, policymakers face a trade-off between preventing profit shifting and tax avoidance on the one hand and the risk of distorting the optimal allocation of investment capital on the other hand.

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A Appendix

A.1 Description of variables and data sources

Table A.1: Description of variables and data sources

Variable	Definition and source	Variable level
$TA_{i,t}$	Log of total assets of domestic firm i in period t; Source: *Ustan*	Domestic firm i
$FA_{i,t}/EMP_{i,t}$	Log of fixed assets over number of employees of domestic firm i in period t; Source: *Ustan*	
$VA_{i,t}/EMP_{i,t}$	Log of value added over number of employees of domestic firm i in period t; Source: *Ustan*	
$EMP_{i,t}$	Number of employees of domestic firm i in period t; Source: *Ustan*	
$INV_{i,t}$	Gross investment in 1,000 EUR of domestic firm i in period t; Source: *Ustan*	
$NINV_{i,t}$	Net investment in 1,000 EUR of domestic firm i in period t; Source: *Ustan*	
$SALES_{i,t}$	Total sales in 1,000 EUR of domestic firm i in period t; Source: *Ustan*	
$WAGE_{i,t}$	Labor costs in 1,000 EUR over number of employees of domestic firm i in period t; Source: *Ustan*	
$CF_{i,t}$	Cash flow relative to total assets of domestic firm i in period t; Source: *Ustan*	
$Q_{i,t}$	Lagged sales growth of domestic firm i in period t; Source: *Ustan*	
$INTANG_{i,t}$	Intangible assets relative to total assets of domestic firm i in period t; Source: *Ustan*	
$LEV_{i,t}$	Debt-to-equity-ratio of domestic firm i in period t; Source: *Ustan*	
$TFP_{i,t}$	Total factor productivity of domestic firm i, based on value added in period t; Source: *Ustan*	
$TAX_{i,t}$	Taxes in 1,000 EUR paid by domestic firm i in period t; Source: *Ustan*	
$ID_{i,t}$	Internal debt in 1,000 EUR provided by affiliated entities to parent (domestic) firm i in period t; Source: *Ustan*	
$MNE_{i,t}$	Dummy variable equal to 1 if the domestic firm i has been an MNE in period $t-1$, and 0 otherwise; Source: *MiDi*	
$TA_{i,t}(Affiliates)$	Log of the sum of total assets across all affiliates in period t; Source: *MiDi*	
$MANU_{i,t}$	Dummy equal to 1 if domestic firm i operates primarily in the manufacturing sector in period t, and 0 otherwise; Source: *Ustan*	
$SALES_{a,t}$	Sales in 1,000 EUR of affiliate a in period t; Source: *MiDi*	Foreign affiliate a
$EMP_{a,t}$	Number of employees of affiliate a in period t; Source: *MiDi*	
$FA_{a,t}$	Fixed and intangible assets in 1,000 EUR of affiliate a in period t; Source: *MiDi*	
$TA_{a,t}$	Total assets in 1,000 EUR at affiliate a in period t; Source: *MiDi*	
$EFDI_{a,t}$	Equity capital of FDI in 1,000 EUR at affiliate a in period t; Source: *MiDi*	
$CFDI_{a,t}$	Consolidated sum (equity capital plus internal debt) of FDI in 1,000 EUR at affiliate a in period t; Source: *MiDi*	
$VERT_{a,t}$	Dummy equal to 1 if the parent firm operates in a different sector than the new foreign affiliate in period t, and 0 otherwise; Source: *MiDi*	
$CESEE_{a,t}$	Dummy equal to 1 if new affiliate in period t is located in Central, Eastern or Southeastern Europe, and 0 otherwise; Source: *MiDi*	
$IGL_{a,t}$	Intra-group loans over total assets of affiliate a in period t ; Source: *MiDi*	
$IGCA_{a,t}$	Intra-group current claims over total assets of affiliate a in period t ; Source: *MiDi*	
$Sectoral\ Sales\ Growth_{s,t}$	Sales growth in sector s in period t; Source: *MiDi*	Sectoral or regional level
$County\ GDP_{k,t}$	Log of GDP in county k in period t; Source: *Regional Database, German Statistical Office*	
$County\ GDP\ per\ Worker_{k,t}$	Log of GDP per worker in county k in period t; Source: *Regional Database, German Statistical Office*	
$County\ Income\ per\ Capita_{k,t}$	Log of income per capita in county k in period t; Source: *Regional Database, German Statistical Office*	
$County\ Share\ High\ Skilled_{k,t}$	Share of high-skilled workers in county k in period t ; Source: *Federal Employment Agency*	
$Municipality\ Population_{\ell,t}$	Log of population in municipality ℓ in period t; Source: *German Statistical Office*	
$Municipality\ Trade\ Tax_{\ell,t}$	Trade tax applicable in municipality ℓ in period t; Source: *German Statistical Office*	
$GDP_{c,t}$	Log of GDP at purchasing power parity (PPP) (constant 2011 international $) of country c in period t; Source: *World Bank, WDI database*	Country c
$GDPPC_{c,t}$	Log of GDP at PPP (constant 2011 international $) per capita of country c in period t; Source: *World Bank, WDI database*	
$DIST_c$	Log of the geodesic distance between Germany and country c; Source: *CEPII, GeoDist Database*	
$DCP_{c,t}$	Log of domestic credit provided to the private sector in % of GDP of country c in period t; Source: *World Bank, WDI database*	
$DCPB_{c,t}$	Log of domestic credit provided to the private sector by banks in % of GDP of country c in period t; Source: *World Bank, WDI database*	
$SMC_{c,t}$	Log of the total value of all listed shares in the stock market in % of GDP of country c in period t; Source: *World Bank, GFDD*	
$DCE_{c,t}$	Dummy indicating whether transfer pricing documentation requirements exist; if not, the dummy equals 0; Source: Lohse and Riedel (2013)	
$STR_{c,t}$	Statutory corporate tax rate in country c in period t; Source: Steinmüller, Thunecke, and Wamser (2017)	
$DSTR_{c,t}$	Germany statutory tax rate plus the business tax rate at the municipality level minus the statutory tax rate in country c in period t; Source: *German Statistical Office*; Steinmüller, Thunecke, and Wamser (2017)	

A.2 Additional descriptive statistics

Table A.2: Number of observations in different datasets

	Ustan	MiDi	Ext. Margin	Match	Ext. Margin
2000	15,564	5,732	2,196	803	332
2001	14,661	5,966	1,977	852	314
2002	12,954	5,632	1,512	789	199
2003	12,065	5,433	1,293	761	170
2004	12,086	5,337	1,239	771	197
2005	12,038	5,381	1,358	754	230
2006	12,693	5,503	1,590	792	249
2007	13,519	5,682	1,648	872	274
2008	14,607	5,805	1,537	941	292
2009	15,718	5,897	1,388	975	230
2010	16,586	6,097	1,526	1,058	297
2011	16,664	6,286	1,523	1,093	310
2012	16,799	6,475	1,501	1,110	286
2013	11,807	6,467	1,120	884	204
Firm	39,533	12,636	10,022	2,234	1,496
Firm-Year	197,761	86,946	21,408	12,455	3,584

A.3 Additional results

Table A.3: Alternative probit specifications

	(1)	(2)	(3)	(4)	(5)
$TA_{i,t-1}$	0.155***		0.157***	1.583***	2.612***
	(0.007)		(0.008)	(0.103)	(0.567)
$VA_{i,t-1}/EMP_{i,t-1}$	0.053***		0.052***	0.111	0.598***
	(0.015)		(0.015)	(0.073)	(0.222)
$FA_{i,t-1}/EMP_{i,t-1}$	-0.036***		-0.036***	0.028	0.060
	(0.008)		(0.008)	(0.030)	(0.037)
$TA_{i,t-1}$ (*Affiliates*)	0.214***		0.215***	-0.620***	-0.284
	(0.009)		(0.010)	(0.081)	(0.296)
$MNE_{i,t-1}$	-0.734***		-0.744***	2.307***	1.046
	(0.099)		(0.099)	(0.462)	(1.084)
Sectoral Sales Growth$_{s,t-1}$	-0.084		-0.086	0.238*	0.152
	(0.084)		(0.084)	(0.137)	(0.177)
County GDP$_{k,t-1}$		-0.029*	-0.008	-1.286**	-0.676
		(0.015)	(0.020)	(0.623)	(2.421)
County GDP per Worker$_{k,t-1}$		0.481***	-0.031	3.842*	-42.081
		(0.079)	(0.107)	(2.190)	(35.314)
County Income per Capita$_{k,t-1}$		0.264***	0.129	0.246	20.189
		(0.061)	(0.081)	(1.630)	(19.061)
County Share High Skilled$_{k,t-1}$		0.610**	-0.216	-5.355**	2.572
		(0.270)	(0.364)	(2.642)	(4.092)
Municipality Population$_{\ell,t-1}$		0.068***	0.004	-0.226	-0.439
		(0.009)	(0.011)	(0.239)	(0.503)
Municipality Business Tax$_{\ell,t-1}$		-1.861**	-0.813	13.912	52.182
		(0.724)	(0.938)	(10.700)	(73.743)
$(TA_{i,t-1})^2$				-0.054***	-0.142***
				(0.004)	(0.048)
$(VA_{i,t-1}/EMP_{i,t-1})^2$				-0.015***	-0.086***
				(0.006)	(0.031)
$(FA_{i,t-1}/EMP_{i,t-1})^2$				0.006**	-0.008
				(0.003)	(0.007)
$(TA_{i,t-1}$ (*Affiliates*)$)^2$				0.033***	0.004
				(0.004)	(0.027)
$(Sectoral\ Sales\ Growth_{s,t-1})^2$				0.609**	1.044
				(0.282)	(0.646)
$(County\ GDP_{k,t-1})^2$				-0.003	-0.077
				(0.013)	(0.258)
$(County\ GDP\ per\ Worker_{k,t-1})^2$				-0.340	10.397
				(0.255)	(8.336)
$(County\ Income\ per\ Capita_{k,t-1})^2$				0.046	-6.196
				(0.252)	(6.078)
$(County\ Share\ High\ Skilled_{k,t-1})^2$				9.642**	-64.646**
				(4.818)	(28.347)
$(Municipality\ Population_{\ell,t-1})^2$				0.013***	0.034
				(0.004)	(0.047)
$(Municipality\ Business\ Tax_{\ell,t-1})^2$				-49.515	-351.836
				(36.837)	(557.151)
$(TA_{i,t-1})^3$					0.002*
					(0.001)
$(VA_{i,t-1}/EMP_{i,t-1})^3$					0.003**
					(0.001)
$(FA_{i,t-1}/EMP_{i,t-1})^3$					0.001**
					(0.001)
$(TA_{i,t-1}$ (*Affiliates*)$)^3$					0.001
					(0.001)
$(Sectoral\ Sales\ Growth_{s,t-1})^3$					0.858
					(1.140)
$(County\ GDP_{k,t-1})^3$					0.003
					(0.009)
$(County\ GDP\ per\ Worker_{k,t-1})^3$					-0.833
					(0.654)
$(County\ Income\ per\ Capita_{k,t-1})^3$					0.649
					(0.644)
$(County\ Share\ High\ Skilled_{k,t-1})^3$					188.557***
					(70.912)
$(Municipality\ Population_{\ell,t-1})^3$					-0.001
					(0.002)
$(Municipality\ Business\ Tax_{\ell,t-1})^3$					776.068
					(1,389.168)

Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively. A Wald test indicates joint significance of the Mundlak-Chamberlain means in specification (4) and (5), which are not shown.

Table A.4: Balancing property ($\Delta INV_{i,t}$)

	Mean			t-test		
	Treated	Control	%bias	t	p>|t|	V(T)/V(C)
$TA_{i,t-1}$	11.842	11.831	0.6	0.28	0.780	0.70*
$VA_{i,t-1}/EMP_{i,t-1}$	4.990	5.011	-2.6	-0.87	0.382	0.72*
$FA_{i,t-1}/EMP_{i,t-1}$	3.351	3.333	1.0	0.46	0.643	1.06
$TA_{i,t-1}$ (*Affiliates*)	8.789	8.652	3.5	1.11	0.268	1.05
$MNE_{i,t-1}$	0.784	0.787	-1.1	-0.33	0.741	.
Sectoral Sales Growth$_{s,t-1}$	-0.009	-0.013	2.0	0.73	0.467	0.99
County GDP$_{k,t-1}$	9.142	9.131	1.1	0.42	0.676	1.07
County GDP per Worker$_{k,t-1}$	4.122	4.118	2.1	0.79	0.427	1.00
County Income per Capita$_{k,t-1}$	3.123	3.113	5.0	1.99	0.047	0.98
County Share High Skilled$_{k,t-1}$	0.098	0.097	3.9	1.45	0.147	1.06
Municipality Population$_{\ell,t-1}$	11.017	11.004	0.7	0.27	0.784	1.08*
Municipality Business Tax$_{\ell,t-1}$	0.137	0.137	0.8	0.30	0.768	1.02

Table A.5: Treatment effect on different profit measures

	ATT	SE	No. treated	No. untreated
$\Delta OI_{i,t}$	-327.830	207.655	2,736	186,788
$\Delta EBT_{i,t}$	-656.713**	305.517	2,669	186,734
$\Delta NP_{i,t}$	-408.359*	217.671	2,680	186,710
$\Delta OI_{i,t}/SALES_{i,t}$	-0.002*	0.001	2,575	183,157
$\Delta EBT_{i,t}/SALES_{i,t}$	0.001	0.002	2,515	183,210
$\Delta NP_{i,t}/SALES_{i,t}$	0.002	0.002	2,525	183,211

Standard errors are obtained from running weighted regressions including year fixed effects and conditioning on *County Income per Capita*$_{k,t-1}$.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table A.5 shows the effect of the treatment on a range of different profit measures: $OI_{i,t}$ denotes operating income, $EBT_{i,t}$ denotes earnings before taxes, $NP_{i,t}$ denotes net profits, $OI_{i,t}/CF_{i,t}$ denotes operating income relative to cash flow in period t, $EBT_{i,t}/CF_{i,t}$ denotes earning before taxes relative to cash flow in period t, and $NP_{i,t}/CF_{i,t}$ denotes net profits relative to cash flow in period t.