Discussion Paper

Benefits of internationalisation for acquirers and targets – but unevenly distributed

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Non-technical summary

Research Question

Concerning globalisation, some governments have shifted the focus to potential negative effects and this has also been accompanied by a general reweighing of the pros and cons of foreign direct investment (FDI). In this context, issues such as cross-border technology transfer, local divestment with labour layoffs and public risk through new foreign owners are stressed. However, firms may also profit greatly from forming multinationals. Internationalisation can promote firms' sales, productivity and innovativeness, and this may have a positive effect on employment and wages, too. We ask if firms involved in cross-border investment in both the destination and the source countries benefit or if some firms suffer disadvantages from globalisation.

Contribution

We provide new insights as we address FDI flows in both directions for one country. Our analysis deals with German firms that are bought by foreign companies and German firms that act as acquirer abroad (for the first time). Furthermore, we conduct separate analyses for the manufacturing sector and the largely unexplored services sector. We first ask which German firms become international either as target or as acquirer. In a second step, we use this knowledge to analyse the short-term and long-term performance developments at firms through internationalisation. As performance variables, we address firms' productivity, sales, innovativeness and labour costs. We allow for firm heterogeneity to investigate the distribution of potential performance effects across different groups of firms. For our analysis, we rely on a difference-in-differences approach. This we combine with propensity score matching techniques.

Results

Competitive firms take part in the internationalisation process, thereby further improving their competitiveness. Foreign acquirers are especially interested in large target firms. Moreover, they prefer firms with high innovative power and low labour costs in the manufacturing sector, and firms with high productivity in combination with high labour costs in the services sector. German manufacturing companies as international investors are generally larger and endowed with higher innovativeness than their national competitors. The newly formed multinationals largely experience positive economic developments. In both the manufacturing and the services sectors, German entities acquired by foreign

firms reveal positive productivity, sales and innovation effects – often either in the short or the long term. In addition, with respect to German investors, small manufacturing firms show positive productivity, sales and labour cost effects, and these persist in the long term. Furthermore, both for German targets and for acquirers, we find no evidence of an overall domestically harmful outsourcing of activities based in Germany to the rest of the world. Thus, our study provides clear evidence for positive effects of free capital flows in the field of FDI in general. However, we also show that the outcome is heterogeneous, in the sense that not all firms are affected.

Nichttechnische Zusammenfassung

Fragestellung

Seit einigen Jahren rücken die Regierungen einzelner Länder die negativen Begleiterscheinungen von Globalisierung in den Vordergrund, und sie wägen die Vor- und Nachteile auch von ausländischen Direktinvestitionen (foreign direct investment – FDI) neu ab. Bei den negativen Begleiterscheinungen verweisen sie auf einen eventuellen Technologietransfer, eine Rückführung der lokalen Aktivitäten in Verbindung mit Entlassungen sowie eine mögliche Gefährdung der öffentlichen Sicherheit durch neue ausländische Eigner. Allerdings können Firmen auch stark von einer multinationalen Aufstellung profitieren. Internationalisierung kann die Umsätze, die Produktivität und die Innovationsfähigkeit von Unternehmen fördern, und damit können positive Beschäftigungs- und Lohneffekte einhergehen. Wir fragen, ob Unternehmen sowohl im Ziel- als auch im Herkunftsland von grenzüberschreitenden Investitionen profitieren, und ob es auch Firmen gibt, denen von der Globalisierung Nachteile erwachsen.

Beitrag

Unsere Analyse liefert neue Erkenntnisse, da wir beide Richtungen der grenzüberschreitenden FDI-Flüsse für ein Land untersuchen: Wir betrachten sowohl deutsche Firmen, die von ausländischen Firmen gekauft werden, als auch deutsche Firmen, die zum ersten Mal im Ausland investieren. Dabei unterscheiden wir zwischen dem verarbeitenden Gewerbe und dem weitgehend unerforschten Dienstleistungssektor. Wir fragen zunächst, welche Firmen entweder als Zielunternehmen oder als Investor in Erscheinung treten. Darauf aufbauend untersuchen wir die kurz- und langfristige Entwicklung der Unternehmen durch die Internationalisierung. Dabei interessieren uns die Produktivität, der Umsatz, die Innovationsfähigkeit und die Arbeitskosten. Zudem analysieren wir diese Effekte auch für verschiedene Gruppen von Unternehmen separat. Beim ökonometrischen Ansatz greifen wir auf Difference-in-Differences - Schätzungen zurück; diese kombinieren wir mit einem Propensity Score Matching.

Ergebnisse

Es sind die wettbewerbsfähigen Unternehmen, die sich bei der Internationalisierung einbringen und damit ihre Wettbewerbsposition weiter verbessern. Ausländische Firmen interessieren sich in erster Linie für große deutsche Unternehmen, im Falle von Unternehmen aus dem verarbeitenden Gewerbe auch für jene mit hoher Innovationsfähigkeit und

relativ niedrigen Arbeitskosten, im Dienstleistungssektor auch für jene mit höherer Produktivität und höheren Arbeitskosten. Deutsche Firmen aus dem verarbeitenden Gewerbe, die sich im Ausland engagieren, sind im Vergleich zu ihren nationalen Wettbewerbern größer und innovativer. Die neu formierten multinationalen Gesellschaften nehmen weitgehend eine positive Entwicklung: Sowohl im verarbeitenden Gewerbe wie im Dienstleistungssektor weisen deutsche Unternehmen, die von ausländischen Firmen übernommen wurden, positive Effekte in Hinblick auf Produktivität, Umsatz und Innovationsfähigkeit auf – häufig entweder in der kurzen oder in der langen Frist. Umgekehrt zeigen kleine deutsche Unternehmen aus dem verarbeitenden Gewerbe als Investoren – auch langfristig – positive Produktivitäts-, Umsatz- und Arbeitskosteneffekte. Des Weiteren finden wir weder für deutsche Unternehmen, die übernommen werden, noch für die als Investoren im Ausland auftretenden Firmen Anhaltspunkte für ein mit negativen Auswirkungen im Heimatland einhergehendes Outsourcing von bisher in Deutschland angesiedelten Aktivitäten. Alles in allem stützt unsere Studie die These, dass freier Kapitalverkehr im Bereich von FDI generell mit positiven Effekten verbunden ist. Jedoch können wir auch zeigen, dass das Ergebnis heterogen ist, da nicht alle Firmen profitieren.

Benefits of internationalisation for acquirers and targets – but unevenly distributed[1]

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Abstract

In some countries around the world, the advantages of globalisation have been increasingly called into question recently. In particular, takeovers by foreign firms raise suspicions of technology theft and job cuts at the newly acquired local plant. By looking at Germany, as a large open economy, between 1999 and 2018 we first see that both German firms that are acquired by foreign investors and German firms which invest abroad show similar characteristics: they are on average larger, more innovative and productive, but less profitable than purely national firms. With internationalisation, a variety of positive effects emerge. With respect to takeovers of German companies by foreign investors, the productivity and sales of the German affiliate increase while the foreign owners tend to step up expenditure on the labour force in Germany in the aftermath of the acquisition – compared to purely domestically owned firms. In the case of German firms going international, we find positive productivity and sales effects for relatively small companies investing abroad, and this internationalisation is not to the detriment of the domestic labour force. Thus, all in all, this supports a positive view of globalisation. However not all firms benefit: in particular, sector, firm size and time horizon have a bearing on the outcome.

Keywords: globalisation, firm acquisition, M&A, productivity, sales, innovativeness, know-how, technology, labour costs, employment, wages, firm heterogeneity

JEL Classification: D22, D24, F23, G34

1   Introduction

For a long time, globalisation was largely seen as increasing the welfare of all countries involved. However, more recently, some governments have shifted the focus to potential negative effects and this has also been accompanied by a general reweighing of the pros and cons of foreign direct investment. In this context, issues such as cross-border technology transfer (in the sense of theft),[2] local divestment and labour layoffs, or public risk through new foreign owners are stressed. These considerations might also have played a role in European countries introducing new laws which enable governments to forbid foreign takeovers when they consider public security to be jeopardised (see European Union (2019)). Equally, countries such as the US have also introduced trade restrictions, citing potentially unfair competition. However, limitations imposed on foreign acquirers may lead to countermeasures by foreign governments on domestic investment abroad.

Firms may profit greatly from forming multinationals or being part of a multinational group. In general, a distinction is made between vertical and horizontal foreign direct investment (FDI) (see Helpman (1984) and Markusen (1984)). These FDI strategies can promote firms' sales, productivity and innovativeness, and this may have a positive effect on employment and wages as well. Finally, internationalisation is a prerequisite for firms to keep pace on competitive open markets and thus for firms' medium and long-term success in all sectors.

Germany is highly integrated in the world economy through FDI: at the end of 2019 German multinationals' – consolidated – FDI stocks abroad amounted to €1.4 trillion. Foreign parent companies' FDI holdings in affiliates located in Germany, at €0.6 trillion, remained well below that level but were still economically important. In light of these high stocks on both sides, we investigate the benefits of FDI both for firms that are taken over by foreign investors ("targets") and for those investing abroad for the first time ("acquirers" – with investments including both takeovers and greenfield investment) in our analysis – which in this form is unique in the literature. Thus, we not only address potential implications of takeovers of German firms by foreign companies on the one hand, but also look at potential opportunities for domestic firms from going global on the other hand.[3] These opportunities could be jeopardised by potential reciprocity actions from

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[2] Gerstenberger (2018) addresses this discussion with respect to German companies acquired by Chinese firms. And more general, with respect to the post acquisition performance see Fuest, Hugger, Sultan and Xing (2021).

[3] With respect to German investment abroad, we only address German firms investing for the first time in other countries. In addition, the parent companies of already existing multinationals may also profit from

other countries concerned about takeovers by foreigners. Therefore, we see our results as a basis for policymakers to balance the pros and cons of protectionist measures against foreign investors. In addition, we discuss a potential role of firm heterogeneity in the effects of internationalisation. In particular, we are the first – to our knowledge – to discriminate between the manufacturing and the services sector within one setting. Previous studies were mostly limited to the manufacturing sector. However, the services sector has gained economic relevance in the last few decades. The results for the effects of FDI in the services sector may differ in comparison to the manufacturing sector, as the motivations for FDI could deviate across the different sectors. Furthermore, we allow for potential differences in firm size. For national competitors, it may be of relevance if large firms strengthen an already strong position – with potential implications for the overall competition level in a sector – or if small firms are on their way to catching up – perhaps with less strong implications for competitors, at least at the moment.[4] Finally, we investigate the short and long-term effects to understand the dynamics after a firm acquisition. Depending on the performance variable, effects are expected already in the short term – e.g. in the case of sales – or rather in the long term – e.g. in the case of productivity, innovation, or employment. All in all, this heterogeneity allows for different outcomes and the analysis may detect groups of firms that do not profit from internationalisation or are even negatively affected. This in turn could explain existing negative attitudes vis-à-vis globalisation. For the analysis, we rely primarily on German micro data for FDI that we match with firm balance sheet data, which are available for international but also purely national firms – both provided by the Deutsche Bundesbank.

There is already a large amount of literature on the effects of firms' ownership changes on economic efficiency, mainly focused on the manufacturing sector. For the US, Lichtenberg and Siegel (1987) analyse the strong increase in M&As in the 1970s and 1980s. Their study reveals productivity gains in the years after a firm in the manufacturing sector is acquired. Davies and Markusen (2020) suggest a reason for positive effects: multinationals may provide their foreign affiliates with knowledge-based assets – intangible assets – e.g. management, technology, R&D, designs and trademarks. By doing so, they are able to create economies of scale and generate a competitive advantage over local rivals. In recent years, the debate has been reignited and empirically it is nowadays addressed based on rich micro datasets that exist for various countries. Following an acquisition from abroad, Guadalupe, Kuzmina and Thomas (2012) find a substantial increase in manufacturing firms' sales (18%) and productivity (11%) and a higher likelihood to

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free capital markets. In general, if only some countries introduce restrictions, investors may circumvent these policies via other destination economies.

[4] However, we cannot analyse general equilibrium effects such as long-term effects on the market structure.

innovate for the acquired firms. Stiebale and Vencappa (2018) reveal firm heterogeneity with regard to the productivity effect, which is shown to be especially large for small manufacturing firms. Arnold and Javorcik (2009) find that Indonesian target firms in the manufacturing sector have higher productivity as a result of restructuring where acquired plants increased investment, employment and wages. In accordance with this, Javorcik and Poelhekke (2017) provide empirical support for continuous injections of headquarter services into foreign plants. Aitken, Harrison and Lipsey (1996) conclude that wages increase for foreign-owned manufacturing firms in the US, Mexico and Venezuela. Additionally, in the case of the US, they identify spillovers to purely domestically owned firms as well. Conyon, Girma, Thompson and Wright's (2002) estimations for firms acquired from abroad also reveal wage increases. They relate this result to higher productivity levels because of the acquisitions. Egger and Kreickemeier (2013) argue that international companies are more competitive and are thus able to pay higher wages. The findings of Koch and Smolka (2019) – again for the manufacturing sector – support this hypothesis: they provide evidence that the acquired firms hire highly skilled workers and provide worker training which results in higher competitiveness. Moreover, Egger, Jahn and Kornitzky (2020) close the link between wages and qualifications: their study reveals the largest wage premium for highly skilled workers. With respect to the time horizon, the post-acquisition wage effects take a total of four years to develop and remain constant thereafter. Bertrand and Zitouna (2008) observe an increase in productivity but not in profits after a merger. They conclude that firms may redistribute efficiency gains within the firm conglomerate.

However, heterogeneity may cause the results to differ between groups of firms. Chen (2011) finds higher productivity gains only when the foreign parents come from industrial countries rather than developing countries. In addition, the acquisitions through firms located in industrial countries lead to higher sales and employment while the effects are negative in the case of acquirers from developing countries. What is more, Hijzen, Martins, Schank and Upward (2013) show that wage effects are larger in developing countries and post-acquisition employment growth focuses on highly skilled jobs. Moreover, they find no evidence for less job security. Conversely, Stiebale and Vencappa (2018) find stronger wage effects when the acquirers come from technologically advanced countries. Furthermore, solely for establishments in the US, Davis, Haltiwanger and Handley (2014) show that private equity buyouts may produce positive effects for some plants but negative labour effects for other plants, thereby improving the operating margin materially. According to Gugler, Mueller, Yurtoglu and Zulehner (2003), large firm mergers increase profits through higher market power. Thus, this may not increase the prosperity of the

economy as a whole. In the case of mergers between small firms, by contrast, efficiency gains are more likely.

However, acquisitions not only serve to transfer knowledge to newly acquired firms and thus to exploit technological advantages abroad. In return, there is also a flow of intangible assets from the target company to the acquirer. Frey and Hussinger (2011) show by looking at patent stocks of target and acquiring firms that firms with technological capabilities are deliberately chosen to increase the technological competency of the group as a whole. In this way, firms can also profit from technological clusters abroad through local spillovers (see Jaffe, Trajtenberg and Henderson (1993)). Crouzet and Eberly (2019) see a shift in relevance from physical to intangible assets in the US over time.

Before the post-merger effects are assessed, it is necessary to first address which target firms are chosen for acquisition. This is a prerequisite for our estimation of the internationalisation effects to avoid a selection bias.[5] This is also an interesting issue in itself. Guadalupe, Kuzmina and Thomas (2012) already see an interdependency between a firm's decision to make foreign acquisitions and its interest in increasing innovation and productivity. For Spanish manufacturing firms, they find acquisitions focused on the most productive firms within industries. Also, Balsvik and Haller's (2010) analysis yields the finding that foreign firms pick large, high-wage and high-productivity firms, which is also largely corroborated by the literature. Criscuolo and Martin (2009) confirm that the advantage of US plants in the UK over British multinationals is due to the US firms' choice of already productive firms in the UK. To account for this potential selection bias, many authors, e.g. Guadalupe, Kuzmina and Thomas (2012) and Stiebale and Vencappa (2018), first address the acquisition decision and conduct propensity score matching to estimate the likelihoods of firms being chosen for acquisition afterwards. This allows for the calculation of re-weighting estimators which, in a second step, enter difference-in-differences estimations that are applied to identify the post-acquisition effects.

To assess the question of whether internationalisation in the form of FDI is favourable, an overall picture has to be addressed: We look at the performance of targets and acquirers and, with this, the effects on economies acting as both host and source countries for FDI. In our micro approach, we allow for firm heterogeneity. First, we find that larger and more innovative firms participate in the internationalisation process. In a second step, we use this knowledge to analyse the short and long-term economic development of firms in

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[5] Otherwise, a selection problem may arise in the later DiD estimations for the effects of an ownership change. For these estimations, we need treated and untreated firms that resemble each other. Thus, we look at which observable firm characteristics are relevant for acting as target or acquirer and consider comparable firms that stay national.

the aftermath of an acquisition. As a result, in the manufacturing sector, rather small international firms profit from higher sales, productivity and, in some cases, innovation in the short and long term. Thus, our evidence supports the view that FDI serves to establish new distribution channels but also that the new conglomerates are restructured, likely to build up value chains. In the German services sector, sales and productivity increase – in the short and in the long term – for especially large target firms on the one hand, and in terms of sales for small acquirer firms on the other hand. Overall, our results underline that international investments strengthen firms and make them more competitive – though there are also firms that are left behind. In addition, we do not find technology theft, but rather the input of expertise from internationalisation. Thus, the results generally advocate free capital markets in the field of foreign direct investment. In this, they relate to the current debate on protectionism versus open markets.

The remainder of the paper is structured as follows. Section 2 describes our data, followed by the empirical methodology in Section 3. The results are presented in Section 4. Section 5 briefly concludes.

2   Data

To analyse the effect of FDI on domestic performance, we use two micro datasets, both provided by the Deutsche Bundesbank.[6] Information on foreign investors' activities in German firms (inward FDI) and on foreign investment activities of German companies (outward FDI) is obtained from MiDi, a comprehensive annual database of German FDI positions. MiDi provides information on balance sheet items, ownership structure and additional information such as an industry classification of each German affiliate owned by a foreign parent company (and foreign affiliates of German parent firms). One particular advantage of MiDi is that reporting by German firms is mandatory under German Federal law. Information on domestic performance and on several other parent-level variables is taken from the Bundesbank's corporate balance sheet database for German firms, JANIS.[7] This dataset is an extension of the former USTAN (Unternehmensbilanzstatistik). The data are primarily extracted from annual accounts (balance sheet, profit and loss accounts) and financial statements. We make use of firm-specific information on total sales, value added (to estimate productivity), intangible assets (to proxy innovation) and labour costs. We match JANIS with MiDi and keep matched observations as well as unmatched observations. Firms which are German parent companies and German affiliates

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[6] The micro data are confidential and only accessible in anonymised form at the Central Office of the Bundesbank in Frankfurt, Germany.

[7] JANIS is an unbalanced panel. We transform it into a more – but not fully – balanced form for our empirical analysis.

of foreign companies at the same time are excluded from the analysis in order to make a clear distinction between the effects of inward and outward investment.[8] In addition, we only keep firm-year observations for five years in a row.[9]

In the first step, we compare German companies that are taken over ("targets") by foreign firms with firms that remain domestically owned. We only keep those firms in the control group that have no match with any foreign affiliate – no outward FDI – in the period considered. The second step compares German companies engaging in FDI for the first time ("acquirers") with firms that remain purely domestic.[10] In turn, we ensure that our comparison group only consists of purely domestic firms that have no match with a foreign investor in MiDi data – no targets of inward FDI. All in all, we end up with an unbalanced panel for the time period between 1999 and 2018, with about 1,900 German firms taken over by foreign companies, 900 domestic firms going global for the first time, 57,000 purely national companies in our control group, and 360,000 (334,000) firm-year observations in total for "target" ("acquirer") firms.[11]

Table 1 presents data about the German firms involved in takeovers by foreign investors in more detail. We provide descriptive statistics for the firm-year dimension to reduce the complexity of the dataset, since the original dataset is based on the parent-affiliate-year dimension. In accordance with the literature, we concentrate on possible firm characteristics with a time lag of one year which we consider relevant for foreign investors. The panel on the left ("full sample") represents all possible observations for the control group while the panel on the right ("as target") refers to only those observations (number of firms) just at the time when a foreign investor acquires a German firm. We provide summary statistics for all sectors, thereby separating the manufacturing sector and the services sector data provided by the filings of the reporting firms.[12] The sectoral distinction is

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[8] Looking at the original MiDi database (1999 to 2018) without any adjustments, we observe about 18,000 reporting units as German parent companies and about 41,000 domestic affiliates of foreign investors. Indeed, about 2,000 firms are German parent and German affiliate (by a foreign ultimate investor) in the same year.

[9] For our targets and acquirers, we additionally require that they are already in our data at least two years before the takeover and three years afterwards. This is in line with the related literature. An analysis of firms that were already closed earlier is not feasible with the underlying data. The reason is that it is not possible to distinguish between firm closures or missing data.

[10] Firms investing abroad for the first time do not necessarily need to acquire another foreign company. They can also establish a new foreign affiliate ("greenfield investment"). Our dataset does not allow us to distinguish between both types of FDI. Nevertheless, we use the term "acquirers" throughout the paper for the sake of simplicity.

[11] There is a threshold for firms' FDI filings of 3 million euros. Thus, we only consider FDI with some relevance. However, the relative importance of the foreign investment may differ in dependence of the parent companies' size.

[12] The manufacturing sector includes the two-digit NACE 2 codes from 10 to 35. The services sector is composed of the firms under codes 45 to 63, 68 and 69, 71 to 82, and 85 to 96. Thus, we drop the finance

retained for our estimations. We are aware that a clear assignment is rather difficult, especially for large companies as they are often active in both of these areas. Thus, we assume that the core activities reported by the firms are relevant for their foreign investments. As regards German firms going abroad for the first time, we are dealing with relatively small firms for which sectoral assignment is generally clearer. Table 1 highlights significant differences between the treatment and control group – with the exception of prior total factor productivity. The same conclusion arises from Table 2, in which firms going global for the first time are compared to companies that remain purely domestic. We account for these differences in our estimation strategy. Otherwise, we would receive biased estimates. Table 3 illustrates the locations of foreign investors that acquired German companies and the destinations of German investments by firms which are investing abroad for the first time. Again, we also distinguish between the manufacturing and the services sectors. Firms from Western Europe and North America represent the most important investors in German companies – in terms of both the absolute number of firms and the volume of FDI – followed by Asian investors. German firms investing abroad concentrate primarily on Western and Eastern European countries. This could relate to cross-border value chains. Asia and North America play also an essential role as destinations. In addition, we observe a much higher level of "new" foreign direct investment in Germany than that of German companies investing abroad. To interpret these differences, we have to consider the likelihood that a large number of foreign firms already form part of a multinational that is adding a unit to its portfolio of firms. In contrast, our German investors enter the international "playing field" for the first time.[13] Thus, these domestic investors are most likely smaller on average than the acquisitions of foreign firms in Germany, which is reflected in the FDI figures.

3   Empirical approach

In our empirical setting, we try to identify the causal effect of a change from national to foreign ownership on the target firm's performance and of a first investment abroad on the parent company's performance. We can treat these two cross-border investment flow directions in the same way. To keep our description of the econometric procedure short but still comprehensive, we explain our approach below by solely looking at the scenario in which the foreign investor buys a domestic company; foreign direct investment by a

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sector, holdings, households and organisations as they are expected to act differently in comparison to the rest of the services sector.

[13] In our study, we do not consider already existing German multinationals expanding their international investment.

German company can be seen analogously. For our analysis, we rely on a difference-in-differences (DiD) approach that we combine with propensity score matching techniques.

Using the DiD approach, we can isolate the effect of the internationalisation of a firm – treated firm – on variables such as productivity and sales vis-à-vis the firms that remain "national" and serve as control companies. However, for this comparison we have to make sure that we only look at treated and untreated companies that resemble each other with respect to observable firm characteristics before internationalisation. We conduct propensity score matching which provides us with a weighting scheme for our DiD estimation. Dehejia and Wahba (2002) show that in the case of many observable characteristics we can obtain a natural weighting scheme that yields unbiased estimates of the treatment effect. Thus, we can avoid a selection bias – at least with respect to observable firm properties.

The combination of the DiD approach with propensity score matching is quite common in the literature dealing with causal effects from firm acquisitions. Propensity score matching is often conducted in the form of radius (caliper) matching or nearest neighbour matching, e.g. in Blundell and Costa Dias (2000), Arnold and Javorcik (2009), Hijzen, Martins, Schank and Upward (2013), Egger, Jahn and Kornitzky (2020), Javorcik and Poelhekke (2017), Wang and Wang (2015) and Goldbach, Nagengast, Steinmüller and Wamser (2019).[14]

One of our main variables of interest is productivity. Several productivity measures can be employed; see e.g. van Biesebroeck (2008) for an overview. We apply the approach proposed by Levinsohn and Petrin (2003). Our choice of controls is largely in line with the seminal article of Guadalupe, Kuzmina and Thomas (2012). They address as controls especially productivity, sales, firm size, wage and capital. For wages, we have to take recourse on labour costs, as our data misses wages. Besides, as we are interested in the internationalisation effects on intangible assets, we split capital in tangible and intangible assets. Moreover, as profit seeking may be also a motive for internationalisation (see Gugler, Mueller, Yurtoglu and Zulehner (2003)) we additionally include return on equity. Thus, we assume the following production function presented in equation (1):

$$y_{ijt} = \alpha + \beta_l l_{ijt} + \beta_k k_{ijt} + \beta_m m_{ijt} + \omega_{ijt} + \varepsilon_{ijt} \qquad (1)$$

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[14] Guadalupe, Kuzmina and Thomas (2012), Koch and Smolka (2019), and Stiebale and Vencappa (2018) implement a propensity score reweighting estimator. In the case of a firm that occurred more than once as control, they sum the weights by firm and then use this sum as weight. Stiebale and Vencappa (2018) also use propensity score matching with nearest neighbour and radius (caliper) matching as robustness checks. In addition, Chen (2011) applies multiple treatment matching while Girma and Görg (2007) use kernel matching estimators.

where y is the output of firm i in sector j at time t; l is labour; k is capital; m the use of intermediate inputs; ω is the unobserved productivity and ε the error term. In our estimation, we use the costs of the input factors to estimate the productivity measures. The general problem is that the firm-specific productivity is unknown and can be correlated with the other input factors. Levinsohn and Petrin (2003) show that intermediate inputs can serve as valid proxies for the unobserved productivity shocks, since these would react relatively smoothly. As we have information for the deflator of value added on a sector-year basis, we estimate productivity as proposed by the major articles for each two-digit NACE 2 sector level separately.[15] In doing so, we allow for different underlying production functions across sectors.

Before we can address the performance of productivity, sales, innovations and labour costs after an acquisition, we first have to investigate whether firms acquire targets which already display a specific pattern with respect to the variables we wish to explain with our DiD estimation. If so, e.g. if firms are already buying more productive firms, we would have a positive selection bias in our treatment group. In such a case, we observe cherry-picking which we would have to take into account. Thus, we look at the potential impact of productivity, sales, innovations and labour costs on the choice decision. In addition, we allow for the relevance of fixed assets, intangible assets – as a proxy for innovation – and return on equity as a proxy for profits. By using this set of variables, our analysis is consistent with the related literature: in the seminal article by Guadalupe, Kuzmina, and Thomas (2012) and similarly in Stiebale and Vencappa (2018), innovation, capital and capital per employee are included in addition to productivity, sales and sales growth. As we have only few observations for employees, we rely on labour costs. We are aware that this variable is more difficult to interpret as it depends on employees and wages. In addition, as in Bertrand and Zitouna (2008) and Maksimovic, Phillips and Prabhala (2011), we also include profitability, as this may be a further motivation to buy a company. Like Stiebale and Vencappa (2018) we allow for heterogeneity with respect to firm size. We define the binary variable "small" as firms with a lower than median sum of tangible and intangible assets.[16]

To obtain the propensity scores, we estimate the probability that a firm i is acquired at time t with the following probit model:

$$P(F_{it} = 1) = \alpha + \theta X_{it-1} + \vartheta \Delta Y_{it-1} + \tau_s + \rho_t + \varepsilon_{it}, \tag{2}$$

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[15] To do this, we transform our three input factors (labour costs, capital costs and intermediate input costs) using yearly price deflators.
[16] Stiebale and Vencappa (2018) use the median of sales as a threshold. In our view, sales are less appropriate as they are likely to be more affected by the particular sector.

where $F_{it} = 1$ stands for a foreign acquisition in period t and $F_{it} = 0$ for firms remaining in domestic ownership in period t; in both scenarios we condition on firms that survive at least up to *t*+2.[17] X_{it-1} is the vector of exogenous variables (productivity, sales, innovations, labour costs, size (total assets), tangible assets and return on equity) and θ is the corresponding vector of coefficients;[18] ΔY_{it-1} takes up the pre-acquisition growth of one of the performance variables of the subsequent analysis: either productivity, sales, innovations or labour costs with its coefficient ϑ;[19] τ_s and ρ_t are sector and time fixed effects; and α is the constant. To account for serial correlation we cluster at the firm level.

Thus, we first determine the propensity scores based on equation (1) that we estimate for the manufacturing and the services sectors separately. After obtaining these estimates, we can conduct propensity score matching with respect to possibly acquisition-relevant variables: firms in the treatment group are matched to those in the control group according to the smallest absolute distance in their propensity scores. Here, we conduct a propensity score radius (caliper) matching (radius: 0.00075), where we set the requirement that treated and untreated firms are taken from the same two-digit NACE 2 sector and the same year.[20] This procedure provides us with a weighting scheme which allows us to estimate the effect of a foreign acquisition on target firm performance using DiD in an appropriate way.

The propensity score matching tries to identify the best counterfactual. The main identification assumption is the conditional independence assumption (CIA). It ensures that the assignment of firms to the treatment and control groups is random, once the estimation of the propensity score considers the most important observable control variables. Therefore, the selection of these controls is crucial. To assess the quality of the matching subsequently, we test the covariance balancing property. According to this property, the distributions (e.g. mean values) of the explanatory variables of both groups should be as similar as possible. Tests of the covariance balancing show no significant differences in our chosen explanatory variables between the two groups. After obtaining the propensity scores and identifying the firms in the treatment and the control group, we employ the

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[17] The restriction of surviving for at least three years may lead to a positive bias. We also checked for the case that acquired firms survive at least one year. In general, the main results do not change. However, in our data, we cannot identify if firms are closed or if data are missing due to statistical reasons.

[18] Although the explanatory variables are correlated, multi-collinearity does not seem to play an important role. First, we show in the results section that most variables enter significantly in the probit regression. Multi-collinearity would result in insignificant coefficients. Second, the first stage is mostly concerned with the estimation of the propensity scores.

[19] Thus, we conduct separate regressions for each of the performance variables. These allow us to calculate adequate weighting schemes depending on the individual performance variable for the difference-in-differences regressions.

[20] As robustness checks we also apply a one-to-one nearest neighbour matching in addition to further caliper approaches with different radii.

DiD estimator. The central identification assumption of this estimator is the common trends assumption (CTA), which states that in the absence of the treatment, the outcome in the treatment group would have followed the same trend as in the control group. To capture this aspect, we include the lagged pre-acquisition growth of our performance variable in our probit estimation. However, in our key scenarios we do not find significant growth differences.

We now continue with a weighted DiD estimation where the internationalisation effects are isolated by dummies equal to 1 for years after the acquisition, and equal to 0 for the untreated companies. By regressing our dependent variable on that dummy solely at the end of the acquisition year, period t, we grasp a kind of short-term effect. With the accumulation of the coefficients on the dummies from a further two periods (period t-1 to t-2), a more long-term perspective is taken into account.[21] Thus, we can model the regression equation for the weighted estimation of the effects of internationalisation on different firm performance indicators with fixed effects in the following way:

$$y_{it} = \alpha + \sum_{k=0}^{2} \beta_k * F_{it-k} + \mu_i + \rho_{jt} + \varepsilon_{it} \tag{3}$$

where y_{it} stands for our performance variables of interest: factor productivity, sales, innovations and labour costs of firm i in period t – all in logarithms; the dummy F_{ist} equals 1 in the case of an acquisition and 0 otherwise; μ_i and ρ_{jt} are firm and industry-year fixed effects; and α is the constant. Again, we estimate equation (3) separately for the manufacturing and the services sectors. Due to the inclusion of firm-level fixed effects, the coefficient β addresses the effect through the change in ownership – not of ownership itself. To account for serial correlation we cluster at the firm level.

The estimated effects may not only differ with respect to sector and time but also with respect to firm size (with respect to assets):

$$y_{it} = \alpha + \partial * small_i + \sum_{k=0}^{2} \beta_k * F_{it-k} + \sum_{k=0}^{2} \gamma_k * small_i * F_{it-k} + \mu_i + \rho_{jt} + \varepsilon_{it},$$
$$\tag{4}$$

where $small_i$ equals 1 for small firms below or equal to the median of the sum of tangible and intangible assets, and 0 otherwise.

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[21] The effect of the treatment in period t-1 (t-2) on the outcome in t can also be interpreted as the effect of the treatment in period t on the outcome in t+1 (t+2).

4 Results

4.1 Characteristics of firms taking part in internationalisation

4.1.1 German firms as targets of foreign investors

Table 4 presents the results of the first stage probit regressions of equation (1). Columns (1) and (2) illustrate that firm size (measured as log of total assets) is a relevant criterion for foreign companies in search of German targets. The coefficient of firm size in the period preceding the acquisition is significantly positive at the 1% level, which implies that larger firms are on average more attractive. Foreign investors may acquire German firms to benefit from their infrastructure and reputation. Furthermore, Gugler, Mueller, Yurtoglu and Zulehner (2003) see large firm mergers as a means to increase market power. This holds for both the manufacturing and the services sector.

Turning to specific assets, we find that intangible assets are of strong interest to investors in the manufacturing sector – again with a significantly positive coefficient at the 1% level. Thus, the intention behind a cross-border firm buy-off may be to increase the innovativeness and thus the competitiveness of the conglomerate as a whole (see Frey and Hussinger (2011)).

Interestingly, this does not hold for the services sector, where a strong position in innovativeness does not appear to be a significant choice criterion. This may indicate that, in the services sector especially, the innovativeness of the parent company itself is crucial and that only little infrastructure with respect to know-how is necessary for market entry in other countries. We even find a significant negative coefficient for tangible assets. Thus, equipment and buildings seem to be more of a burden than an asset. However, in the case of the services sector, foreign investors are interested in productive firms – also with higher productivity growth before the takeover – and in firms with higher labour costs; the latter may indicate higher qualification levels (see Egger, Jahn and Kornitzky (2020)) or a larger labour force.

In the manufacturing sector, in contrast, lower labour costs represent a purchasing argument. This may not come as a surprise, as Germany has a reputation of being a high-wage country. Accordingly, productivity does not play a significant role.

The empirical evidence for the relevance of sales is less clear. For firms in the manufacturing sector, we see some positive impact, while in the services sector, it is weakly negative – but not significant. We find similar results for profitability, defined as return on equity: in the case of the services sector, its effect is even negative – at the 5% significance level. Thus, already high sales or profitability generally do not make a firm more

attractive to foreign investors, as investors probably intend to increase both after an acquisition.

4.1.2 German firms going international

Table 4, columns (3) and (4), provides insights regarding firms acting as acquirers (or investing abroad via greenfield investment) for the first time. In our sample the number of firms in the services sector that invest abroad is considerably lower than in the manufacturing sector (see Tables 1 and 2). On the one hand, this underlines the high importance of the German manufacturing sector; on the other hand, it raises questions about the international strength of German firms in the services sector. This is even more striking given that foreign acquirers invest fairly equally in manufacturing and services firms in Germany.

Unsurprisingly, internationalisation is of significant interest especially for larger German companies in the manufacturing and services sectors. Obviously, going international requires a large volume of resources in many fields and, thus, large enterprises are generally better equipped for such an undertaking.

In addition, an international branch certainly becomes more beneficial for firms that are especially strong in the field of innovation (intangible assets) – this is significantly positive at the 1% level. The reason is that knowledge-based advantages can also be applied abroad and would allow for scale effects. Aitken, Harrison and Lipsey (1996) observe that multinational firms possess intangible productive assets such as technological know-how, marketing and management skills, export contacts, coordinated relationships with suppliers and customers, and reputation. Moreover, technology-based firms may invest internationally to increase their innovativeness through access to valuable knowledge domiciled in the target firm (see Frey and Hussinger (2011)) or via spillovers from firms in the country of the new affiliate (see Jaffe, Trajtenberg and Henderson (1993)).

Here, no relevance is found for productivity, sales and labour costs – only in the case of the service sector, labour costs are significantly positive.[22] However, the growth in labour costs is positively correlated to the probability of an acquisition (significant at the 5% level).[23] Either this implies firms are already expanding employment at their national

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[22] Besides labour costs, employment and wages are also relevant in this context. However, the information on employment is much less available in our data sources. Many firms would be neglected in our analysis. Therefore, we decided to concentrate on labour costs.

[23] Table 4 provides estimates for the subsequent difference-in-differences estimations of performance effects with respect to (log) total factor productivity, which includes the growth in productivity before the takeover. The regressions for the other performance variables have the same explanatory variables (for the estimation of the propensity score) with only one exception: the growth rate of the performance variable is varied. The results of the estimation with the labour costs growth rate are not shown in the table.

plants or that they face an increase in employment costs, likely due to a workforce with a growing qualification profile – or both. Thus, the dynamic firms are those that search for suitable firms abroad.

In the services sector alone – much like for German target firms in this sector – again the probability of going international increases when there are less tangible assets and when the firms are less profitable. Thus, international expansion relies on knowledge but not on other infrastructure or previous profits.

We perform several robustness checks to validate our central results. Caliendo and Kopeinig (2005) provide some guidance concerning the empirical implementation of propensity score matching and discuss the methods critically. One potential issue is the chosen propensity score estimation strategy with caliper matching. In general, the propensity score matching estimators not only differ in the definition of the neighbourhood of treated individuals but also in the weights which are assigned to the neighbours. Caliper matching has the advantage that bad matches are avoided, which increases the match quality. One problem may be that it is difficult to know a priori what choice of tolerance level is reasonable. We test alternative propensity score matching estimators, such as nearest neighbour matching, and obtain similar results. Therefore, the findings do not seem to depend on the estimation approach.

Another potential problem is the radius of 0.00075. We defined this rather narrow radius to ensure the balancing property conditions – the explanatory variables of treatment and control group have the same distributions – at the cost of lost observations from our treated firms. Robustness checks with a wider radius (0.001) – but also with an even smaller radius (0.0005) – show that the main results do not change.

4.2   Firms' post-acquisition performance

4.2.1   Impact of ownership change on initially national firms

An acquisition from abroad is like a shock to a firm and may have an impact on its economic development. As before, we examine the manufacturing and the services sectors separately. The interpretation of our results for small and large firms refers to the total effect of the acquisition.

With respect to the productivity of firms in the manufacturing sector, we find a significantly – at the 1% level and 10% level – positive short and long-term effects driven by small firms (for these the effects are significant at the 1% and 5% level)(see Table 5, column 2). Thus, the new owners are much more capable of giving small firms especially a stimulus to increase their productivity. This undertaking is probably much more challenging for large firms. This outcome is consistent with Stiebale and Vencappa (2018).

They presume that small manufacturing firms are further away from the technological frontier than large ones and thus can learn more from an acquirer. In the case of firms in the services sector, we again see a short-term effect and this time for both large and small firms (significant at the 10% level in column 6). However, here we also find a significantly positive long-term effect that goes back to the large firms. In the services sector, productivity growth is probably more attainable for large firms because in this sector restructuring may be driven more strongly by management and technological transfer, which has an even greater payoff in the more complex structural settings of larger firms – and this applies in both the short and long term.

Internationalisation promotes sales. One main motive for going global is to benefit from economies of scale. However, again the effects depend on the sector and firm size – apart from the time horizon addressed. Especially small manufacturing firms profit from a significantly positive short-term effect in sales – for large firms the coefficient of sales is much smaller, as Table 6 shows. For the long term, the effect found for the small firms is again significant at the 1% level. Probably, small firms in particular may be chosen to create new distribution channels for the parent company's products – thus displaying a horizontal merger (see Markusen (1984)). For the services sector, we again see positive effects: higher sales occur in the short term for both small and – even stronger for – large firms. However, in the long term, the smaller firms are more strongly affected. Likely, , the reliance on a well-established distribution network is accompanied by higher sales.

The pattern for the impact largely remains when we turn to the effects on innovation (see Table 7). Again, small manufacturing firms profit in the short and long term. This outcome is in line with firms that also profit from higher productivity – both factors are likely related. For the services sector, the positive effects are weak and concentrated on large firms (significance level of 10% and limited to the short term). Again, this comes along with the positive effects on productivity for this group of firms.

Finally, Table 8 shows positive short and long-term effects for labour costs applying for small firms in both the manufacturing (at the 1% significance level) and the services sector (at the 1% or 5% significance level). This tells us that employment was either stepped up or wages increased – perhaps going along with higher qualifications. This result is in line with Hijzen, Pedro, Martins, Schank and Upward (2013) who find positive wage effects through employment growth concentrated in highly skilled jobs with no evidence for greater job insecurity. Egger, Jahn and Kornitzky (2019) also provide reasoning for higher wages: the application of new technologies may require training of workers which is likely accompanied by higher wages. Furthermore, a wage premium may be paid to protect the technological advantage of the multinational. According to Koch and Smolka

(2019), output gains are highest when firms engage in both technology and skill upgrading at the same time. Thus, new foreign owners share profits with the highly skilled workers who are already in the plant before the acquisition (see Balsvik and Haller (2019)). Thus, the fear of job losses is unfounded, and the opposite is even true with respect to small firms.

4.2.2 Impact on firms investing abroad

Above, we saw how a takeover affects the target company. Now we will look at the economic implications for the firms investing abroad. An impact on the performance of the parent company would not come as a surprise as international investments are likely to trigger firm restructuring.[24]

Our evidence for manufacturing firms is quite strong, as Table 9 suggests. With respect to productivity, small manufacturing firms that invest abroad are able to perform better in both the short and long term. Thus, small firms are likely to profit either through the exploitation of economies of scale or through focusing their production processes in a newly established cross-border value chain.

The same applies to the sales volume in the aftermath of internationalisation (see Table 10). Again, small firms increase their sales in both the short and long term. Thus, it seems that they also use their affiliates abroad as a distribution channel for their products produced at home.

However, their innovativeness is not affected by expanding abroad (Table 11). These small dynamic firms probably already have some particular know-how that they wish to also exploit abroad and, at least at the starting stage of the multinational firm's creation, no further efforts are made to increase the parent's technological stance.

Table 12 shows that the geographical expansionary process is accompanied by an increase in labour costs for small manufacturing firms – as before, in the short and long term. Thus, the labour force at home is either increased or better paid – an indicator for dynamic firms. In addition, there is no evidence for negative outsourcing effects that are detrimental to the domestic labour market. Accordingly, Goldbach, Nagengast, Steinmüller and Wamser (2019) find with respect to German multinationals that new foreign affiliates come along with even more investment at home. However, Lichtenberg and Siegel (1987) find firms selling plants that are less productive. In addition, Maksimovic, Phillips

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[24] As already described above, with respect to German outward FDI, we have to limit our investigation to the manufacturing sector as we have too few observations to obtain reliable results for the services sector.

and Prabhala (2011) find extensive restructuring in the aftermath of acquisitions. This may be helpful to increase the competitiveness of a company, too.

As already mentioned, the number of firms investing abroad in the services sector falls substantially below that in the manufacturing sector. Thus, we should interpret our results for the services sector with caution. As one might expect, some results resemble those in the manufacturing sector. Again, we find positive sales and labour cost effects for small firms in both the short and long term. In contrast to our outcome for manufacturing firms, we cannot observe any productivity effects but we see significantly positive effects on small firms' innovation in the long term (at the 10% significance level). Thus, besides access to new markets, the expansion of the knowledge base seems to be a motivation for services firms to go global. Finally, we see a rise in labour costs in the short and the long term.

To check for empirical robustness, similar to the exercises above of the first stage probit regressions, we test whether the estimation strategy and the radius choice influence our main results. Overall, the findings do not change. In addition, we conduct an estimation, which examines the effect of the acquisition in period t on the performance outcomes in t-1. As expected, these estimates have no effect on the lag of the performance measures.

5   Conclusions

The analysis shows that the choice of target firms abroad is taken very consciously. We also see that the change in ownership leads to positive growth effects in some fields vis-à-vis their counterparts that remained nationally owned. In addition, for firms investing internationally for the first time we find no negative repercussions for their home sites. For small acquirers in the manufacturing sector we even find positive effects with respect to productivity and local employment.

All in all, competitive firms take part in the internationalisation process and by doing so they further improve their position. Foreign acquirers are especially interested in large firms. Thus, internationalisation may also result in a concentration of market power – though takeovers at the national level may even be more harmful. In the case of manu-facturing firms, those firms with higher innovative power are also bought – probably an indication of the strong global position of the German "Mittelstand". Furthermore, rela-tively small labour costs are also a purchasing argument in this sector. In contrast, in the services sector, companies from abroad prefer firms with higher productivity in combi-nation with higher labour costs – firms that may be expected to be especially suited to the adaptation of service concepts provided by their new foreign parent companies. However,

less profitable service firms have a higher likelihood to be chosen while sales do not matter. With respect to German companies in the manufacturing sector acting as international investors, these companies are the larger ones and are endowed with higher innovativeness in comparison with their national competitors. Probably, they intend to bring their technological advantages to their acquired firms abroad. This would allow them to profit from economies of scale and to become even more competitive. As these firms show rising labour costs in the pre-acquisition stage, we are confronted with the dynamic German companies: they either expand their workforce and/or increase wages, which is likely to be associated with higher qualifications. Thus, our evidence suggests that the new entities domiciled abroad are generally integrated into the firm structure in a beneficial way. However, productivity, labour costs and sales do not turn up to be relevant.

In addition, we can empirically confirm that these newly formed multinationals largely display positive economic developments in the subsequent years. When we first look at the German entities acquired by foreign firms, both in the manufacturing and, to a lesser extent, in the services sector they reveal positive productivity, sales and innovation effects – partially either in the short or the long term. Thus, as both sectors take part in the internationalisation process, it is not surprising that we also find positive effects for both sectors. Due to the broad similarity of the effects, it is possible to conclude that the motivations for takeovers of German firms by foreigners do not seem to vary widely across the sectors. This outcome adds significantly to the existing literature, most of which does not deal with both sectors within one analysis. While in the manufacturing sector, this tends to apply to small firms and predominantly in the short and long term, in the services sector large firms in particular show significant results. With respect to labour, we find no negative effects but, both in the short and long term, even higher labour costs – indicating more employment and/or higher wages. Thus, overall the positive effects of internationalisation for the services sector are, for many indicators, comparable to the manufacturing sector.

We not only find positive effects of cross-border acquisitions at target firms but also for investing parent companies. Here, our analysis concentrates on the manufacturing sector as we have too few observations for the services sector to produce reliable results – however, the outcome for the services sector still seems to largely match the results for the manufacturing sector. Likely, this already indicates a much stronger international position of the German manufacturing sector in comparison to the services sector. Conversely, in the German services sector there is still substantial potential to be exploited by internationalisation. All in all, small manufacturing firms show positive productivity, sales and labour cost effects and these persist in the long term – however, their innovation position is not affected. Thus, we do not find evidence for an outsourcing of activities based in

Germany to the rest of the world with an overall harmful impact at home. In contrast, internationalisation has a beneficial effect on the domestic site as well, either with respect to activity or employment and/or wages – the latter possibly also associated with higher qualifications.

Thus, our study provides clear evidence for positive effects of free capital flows in the field of FDI – and this applies to both the host and the target country. International investment makes companies more competitive, which is likely to become especially important in the long term. These positive effects would be weakened or lost in the case of protectionist measures hampering FDI. However, we also showed that the outcome is heterogeneous, in the sense that not all firms profit and that we have to discriminate by sector, firm size and time horizon to identify the winners. Though we do not find a statistically significant group of "absolute" losers from internationalisation in general, there are also some unaffected firms. Hence, these firms may be seen, or may see themselves, as "relative" losers from globalisation. With the same reasoning, companies that remain national and perform relatively more poorly than their international competitors may perceive globalisation as disadvantageous. In addition, when internationalisation is accompanied by market concentration, other firms may be negatively affected in the long term – here competition authorities need to remain vigilant. These aspects may explain some of the dissatisfaction with open capital markets, which is also observable in parts of the population.

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Table 1: Descriptive statistics ("targets")

	All sectors							
	No target				**As target**			
	Obs.	**Mean**	**Median**	**Std. Dev.**	**Obs.**	**Mean**	**Median**	**Std. Dev.**
Log Sales$_{it-1}$	358,419	9.13	9.26	1.97	1,911	10.53	10.51	1.52
Log Fixed assets$_{it-1}$	358,419	6.81	6.99	2.72	1,911	7.69	7.96	2.50
Log Innovations$_{it-1}$	358,419	2.46	1.95	2.53	1,911	4.27	4.38	2.90
Log Total assets$_{it-1}$	350,963	7.32	7.38	2.48	1,882	8.45	8.53	2.24
Log Labour costs$_{it-1}$	332,475	7.59	7.63	1.84	1,812	8.88	8.87	1.42
Log TFP$_{it-1}$	321,741	1.58	1.49	0.76	1,765	1.86	1.77	0.82
Return on equity$_{it-1}$	358,419	2.06	0.25	51.52	1,911	4.75	0.23	96.20

	Manufacturing							
	No target				**As target**			
	Obs.	**Mean**	**Median**	**Std. Dev.**	**Obs.**	**Mean**	**Median**	**Std. Dev.**
Log Sales$_{it-1}$	119,305	9.72	9.74	1.69	998	10.83	10.78	1.29
Log Fixed assets$_{it-1}$	119,305	7.26	7.55	2.36	998	8.51	8.65	1.92
Log Innovations$_{it-1}$	119,305	3.28	3.22	2.59	998	4.87	4.85	2.66
Log Total assets$_{it-1}$	117,777	7.73	7.85	2.19	995	9.04	9.04	1.83
Log Labour costs$_{it-1}$	118,017	8.27	8.28	1.55	972	9.22	9.16	1.23
Log TFP$_{it-1}$	114,875	1.52	1.48	0.59	958	1.74	1.74	0.64
Return on equity$_{it-1}$	119,305	1.35	0.29	30.33	998	3.74	0.22	63.50

	Services							
	No target				**As target**			
	Obs.	**Mean**	**Median**	**Std. Dev.**	**Obs.**	**Mean**	**Median**	**Std. Dev.**
Log Sales$_{it-1}$	237,689	8.83	8.99	2.04	913	10.19	10.16	1.68
Log Fixed assets$_{it-1}$	237,689	6.59	6.65	2.85	913	6.80	6.85	2.73
Log Innovations$_{it-1}$	237,689	2.04	1.10	2.39	913	3.62	3.40	3.02
Log Total assets$_{it-1}$	231,807	7.11	7.08	2.59	887	7.78	7.74	2.45
Log Labour costs$_{it-1}$	213,145	7.22	7.21	1.88	840	8.49	8.53	1.52
Log TFP$_{it-1}$	205,612	1.61	1.49	0.83	807	2.00	1.82	0.97
Return on equity$_{it-1}$	237,689	2.39	0.23	58.72	913	5.84	0.24	122.4

Notes: The displayed variables represent the explanatory variables (chosen or calculated from JANIS dataset) of the probit estimations (first stage of the econometric procedure) which are included in the estimations of the propensity score. "No target" refers to firm observations with no switches in the status national/international. "As target" refers to firm observations at the time when a foreign investor took over an existing German firm.

Table 2: Descriptive statistics ("acquirers")

	All sectors							
	No acquirer				As acquirer			
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.
Log Sales$_{it-1}$	333,840	8.98	9.13	1.92	904	10.99	10.91	1.25
Log Fixed assets$_{it-1}$	333,840	6.70	6.88	2.69	904	8.22	8.43	2.13
Log Innovations$_{it-1}$	333,840	2.28	1.61	2.39	904	5.03	5.22	2.39
Log Total assets$_{it-1}$	326,619	7.18	7.24	2.43	901	9.14	9.19	1.53
Log Labour costs$_{it-1}$	308,919	7.46	7.51	1.79	891	9.26	9.39	1.27
Log TFP$_{it-1}$	298,652	1.55	1.46	0.75	876	1.83	1.77	0.71
Return on equity$_{it-1}$	333,840	2.02	0.26	49.72	904	0.63	0.27	5.85

	Manufacturing							
	No acquirer				As acquirer			
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.
Log Sales$_{it-1}$	105,042	9.49	9.53	1.58	603	10.99	10.92	1.05
Log Fixed assets$_{it-1}$	105,042	7.00	7.31	2.29	603	8.67	8.76	1.65
Log Innovations$_{it-1}$	105,042	2.97	2.89	2.41	603	5.16	5.26	2.12
Log Total assets$_{it-1}$	103,546	7.44	7.60	2.05	602	9.33	9.35	1.28
Log Labour costs$_{it-1}$	104,044	8.06	8.11	1.44	600	9.48	9.58	0.98
Log TFP$_{it-1}$	101,071	1.47	1.44	0.57	595	1.74	1.71	0.58
Return on equity$_{it-1}$	105,042	1.36	0.30	24.66	603	0.66	0.27	7.00

	Services							
	No acquirer				As acquirer			
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.
Log Sales$_{it-1}$	228,497	8.75	8.91	2.00	301	10.75	10.85	1.59
Log Fixed assets$_{it-1}$	228,497	6.56	6.62	2.85	301	7.33	7.47	2.63
Log Innovations$_{it-1}$	228,497	1.95	1.10	2.31	301	4.77	5.16	2.84
Log Total assets$_{it-1}$	222,774	7.06	7.03	2.58	299	8.76	8.72	1.89
Log Labour costs$_{it-1}$	204,584	7.15	7.15	1.86	291	8.82	8.92	1.63
Log TFP$_{it-1}$	197,300	1.59	1.48	0.82	281	2.02	2.00	0.91
Return on equity$_{it-1}$	228,497	2.33	0.23	57.72	301	0.57	0.24	2.15

Notes: The displayed variables represent the explanatory variables (chosen or calculated from JANIS dataset) of the probit estimations (first stage of the econometric procedure) which are included in the estimations of the propensity score. "No acquirers" refers to firm observations with no switches in the status national/international. "As acquirer" refers to firm observations when a German firm engages in FDI for the first time.

Table 3: Geographical distribution

Location of foreign ultimate investor						
	Total		Manufacturing		Services	
	Obs.	Direct investment (€ mn)	Obs.	Direct investment (€ mn)	Obs.	Direct investment (€ mn)
Western Europe	1,211	24,103.27	622	15,192.63	589	8,910.65
North America	428	23,173.64	240	20,651.05	188	2,522.59
Asia	134	1,586.10	68	869.25	66	716.85
Middle East	34	347.77	23	333.06	11	14.71
Eastern Europe	23	260.10	10	56.51	13	203.58
Caribbean	14	181.17	5	73.57	9	107.60
Central and South America	10	107.57	5	74.04	5	33.54

Destinations of firms going global for the first time						
	Total		Manufacturing		Services	
	Obs.	Direct investment (€ mn)	Obs.	Direct investment (€ mn)	Obs.	Direct investment (€ mn)
Western Europe	575	1,886.38	291	1,237.66	284	648.72
Eastern Europe	283	803.15	200	599.81	83	203.34
Asia	210	712.45	163	370.63	47	341.82
North America	210	497.83	163	410.45	47	87.38
Central and South America	28	55.23	17	30.69	11	24.54
Oceania	15	38.80	8	18.63	7	20.17
Middle East	13	29.46	7	20.97	6	8.49

Notes: The upper part of the table ("location of foreign ultimate investor") represents the number and volume of FDI takeovers by foreign investors in the final dataset (matched JANIS-MiDi observations with at least five years of observations). The lower part ("destinations of firms going global for the first time") illustrates the number and volume of outward FDI by German firms. In both cases, the number of acquisitions differs from the sum of observations across all countries. On the one hand we do not have data on all ultimate investors on the other hand firms going abroad may enter several countries at once.

Table 4: Probability of being target and being acquirer

	Target		Acquirer	
	Manufactur-ing	**Services**	**Manufactur-ing**	**Services**
	(1)	**(2)**	**(3)**	**(4)**
Log Total assets$_{it-1}$	0.119***	0.185***	0.300***	0.278***
	(0.030)	(0.021)	(0.034)	(0.030)
Log Innovations$_{it-1}$	0.026***	0.005	0.034***	0.051***
	(0.008)	(0.007)	(0.009)	(0.011)
Log TFP$_{it-1}$	-0.026	0.115***	-0.036	0.019
	(0.039)	(0.027)	(0.052)	(0.045)
Log Labour costs$_{it-1}$	-0.095***	0.118***	0.048	0.075**
	(0.025)	(0.022)	(0.036)	(0.033)
Log Sales$_{it-1}$	0.100**	-0.034	-0.026	-0.050
	(0.036)	(0.025)	(0.043)	(0.034)
Return on equity$_{it-1}$	-0.000	-0.001**	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Log Fixed assets$_{it-1}$	0.006	-0.118***	-0.038***	-0.105***
	(0.013)	(0.010)	(0.014)	(0.014)
TFP growth$_{it-1}$	-0.062	0.005	0.026	-0.019
	(0.042)	(0.039)	(0.045)	(0.054)
Observations	106,908	196,913	95,507	179,246

Notes: Probit estimation. The dependent variable is the binary indicator "*change*" in period *t*. The unit of observation is firm-year observation. The sample period is 2001 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 5: Effect of internationalisation on targets' total factor productivity

	Manufacturing				Services			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Change$_{it}$	0.039*** (0.012)	0.020 (0.017)	0.037*** (0.013)	0.017 (0.018)	0.034** (0.015)	0.031* (0.019)	0.030* (0.017)	0.027 (0.021)
Change$_{it-1}$			0.025** (0.012)	0.011 (0.016)			0.040** (0.017)	0.048* (0.025)
Change$_{it-2}$			-0.004 (0.014)	-0.017 (0.018)			0.041*** (0.015)	0.057*** (0.021)
Small$_{it}$		-0.023 (0.017)		-0.010 (0.019)		-0.004 (0.025)		0.035 (0.025)
Change$_{it}$ x Small$_{it}$		0.036 (0.023)		0.040 (0.025)		0.006 (0.028)		0.005 (0.032)
Change$_{it-1}$ x Small$_{it}$				0.029 (0.024)				-0.014 (0.033)
Change$_{it-2}$ x Small$_{it}$				0.026 (0.028)				-0.031 (0.029)
Change$_{it}$ + Change$_{it}$ x Small$_{it}$		0.056*** p-value: 0.000				0.037* p-value: 0.094		
$\sum_{j=0}^{2} Change_{it-j}$			0.057* p-value: 0.058	0.011 p-value: 0.784			0.111*** p-value: 0.008	0.131** p-value: 0.022
$\sum_{j=0}^{2} Change_{it-j}$ + $\sum_{j=0}^{2} Change_{it-j}$ x Small$_{it}$				0.104** p-value: 0.020				0.091 p-value: 0.106
Observations	118,098	118,098	98,907	98,907	262,449	262,449	215,663	215,663
Adj. R2	0.674	0.674	0.682	0.682	0.802	0.802	0.824	0.824

Notes: OLS estimation. The dependent variable is total factor productivity (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 6: Effect of internationalisation on targets' sales

	Manufacturing				Services			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Change$_{it}$	0.060*** (0.011)	0.029** (0.015)	0.049*** (0.013)	0.013 (0.016)	0.083*** (0.015)	0.094*** (0.023)	0.043** (0.017)	0.036 (0.024)
Change$_{it-1}$			0.039*** (0.013)	0.016 (0.016)			0.059*** (0.020)	0.041 (0.031)
Change$_{it-2}$			0.036** (0.014)	0.012 (0.018)			0.051*** (0.017)	0.044** (0.022)
Small$_{it}$		-0.177*** (0.034)		-0.177*** (0.028)		-0.129*** (0.046)		-0.157*** (0.042)
Change$_{it}$ x Small$_{it}$		0.059*** (0.021)		0.068*** (0.025)		-0.023 (0.030)		0.012 (0.031)
Change$_{it-1}$ x Small$_{it}$				0.047* (0.024)				0.030 (0.037)
Change$_{it-2}$ x Small$_{it}$				0.050* (0.026)				0.009 (0.031)
Change$_{it}$ + Change$_{it}$ x Small$_{it}$		0.088*** p-value: 0.000				0.071*** p-value: 0.000		
$\sum_{j=0}^{2} Change_{it-j}$			0.124*** p-value: 0.001	0.041 p-value: 0.344			0.152*** p-value: 0.001	0.121* p-value: 0.064
$\sum_{j=0}^{2} Change_{it-j} + \sum_{j=0}^{2} Change_{it-j}$ x $Small_{it}$				0.206*** p-value: 0.000				0.173*** p-value: 0.003
Observations	121,810	121,810	101,823	101,823	278,357	278,357	227,664	227,664
Adj. R2	0.842	0.843	0.902	0.903	0.841	0.841	0.904	0.905

Notes: OLS estimation. The dependent variable is total sales (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 7: Effect of internationalisation on targets' innovation

	Manufacturing				Services			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Change$_{it}$	0.057 (0.044)	-0.061 (0.061)	0.098* (0.052)	-0.028 (0.070)	0.034 (0.048)	0.132* (0.070)	0.027 (0.060)	0.140* (0.081)
Change$_{it-1}$			0.103* (0.054)	0.060 (0.074)			0.029 (0.062)	0.114 (0.086)
Change$_{it-2}$			0.012 (0.054)	-0.064 (0.075)			0.007 (0.063)	0.085 (0.087)
Small$_{it}$		-0.904*** (0.089)		-0.892*** (0.091)		-1.154*** (0.103)		-1.118*** (0.108)
Change$_{it}$ x Small$_{it}$		0.219** (0.086)		0.235** (0.099)		-0.203** (0.091)		-0.242** (0.111)
Change$_{it-1}$ x Small$_{it}$				0.081 (0.099)				-0.220* (0.115)
Change$_{it-2}$ x Small$_{it}$				0.161 (0.099)				-0.189 (0.115)
Change$_{it}$ + Change$_{it}$ x Small$_{it}$		0.158*** p-value: 0.009				-0.072 p-value: 0.246		
$\sum_{j=0}^{2} Change_{it-j}$			0.213 p-value: 0.136	-0.033 p-value: 0.865			0.063 p-value: 0.708	0.339 p-value: 0.140
$\sum_{j=0}^{2} Change_{it-j} + \sum_{j=0}^{2} Change_{it-j}$ x Small$_{it}$				0.445** p-value: 0.016				-0.313 p-value: 0.136
Observations	121,974	121,974	101,987	101,987	273,226	273,226	223,656	223,656
Adj. R2	0.698	0.706	0.722	0.728	0.756	0.766	0.790	0.800

Notes: OLS estimation. The dependent variable is innovation (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 8: Effect of internationalisation on targets' labour costs

	Manufacturing				Services			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Change_{it}$	0.032*** (0.009)	0.016 (0.012)	0.029*** (0.010)	0.012 (0.013)	0.022 (0.017)	-0.017 (0.029)	-0.004 (0.019)	-0.037 (0.032)
$Change_{it-1}$			0.028*** (0.010)	0.006 (0.011)			0.002 (0.022)	-0.049 (0.038)
$Change_{it-2}$			0.004 (0.011)	-0.015 (0.017)			0.018 (0.017)	0.001 (0.027)
$Small_{it}$		-0.213*** (0.025)		-0.188*** (0.027)		-0.249*** (0.038)		-0.221*** (0.037)
$Change_{it}$ x $Small_{it}$		0.028 (0.017)		0.031 (0.021)		0.071 (0.033)		0.063* (0.036)
$Change_{it-1}$ x $Small_{it}$				0.042** (0.019)				0.094** (0.041)
$Change_{it-2}$ x $Small_{it}$				0.039 (0.024)				0.032 (0.032)
$Change_{it}$ + $Change_{it}$ x $Small_{it}$		0.044*** p-value: 0.001				0.054*** p-value: 0.002		
$\sum_{j=0}^{2} Change_{it-j}$			0.062** p-value: 0.026	0.003 p-value: 0.926			0.016 p-value: 0.752	-0.086 p-value: 0.308
$\sum_{j=0}^{2} Change_{it-j}$ + $\sum_{j=0}^{2} Change_{it-j}$ x $Small_{it}$				0.115*** p-value: 0.008				0.104** p-value: 0.045
Observations	120,122	120,122	100,486	100,486	269,352	269,352	220,931	220,931
Adj. R2	0.925	0.926	0.940	0.941	0.910	0.912	0.928	0.929

Notes: OLS estimation. The dependent variable is labour costs (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 9: Effect of internationalisation on acquirers' total factor productivity

	Manufacturing				Services			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
$Change_{it}$	0.014 (0.013)	-0.014 (0.016)	0.013 (0.013)	-0.016 (0.016)	0.019 (0.024)	0.011 (0.031)	0.020 (0.028)	0.002 (0.041)
$Change_{it-1}$			0.019 (0.013)	-0.002 (0.019)			0.002 (0.029)	-0.021 (0.044)
$Change_{it-2}$			-0.007 (0.010)	-0.015 (0.014)			0.002 (0.031)	-0.009 (0.044)
$Small_{it}$		-0.004 (0.012)		0.002 (0.013)		-0.036 (0.032)		-0.029 (0.032)
$Change_{it}$ x $Small_{it}$		0.055** (0.023)		0.056** (0.024)		0.013 (0.049)		0.034 (0.057)
$Change_{it-1}$ x $Small_{it}$				0.045* (0.026)				0.045 (0.050)
$Change_{it-2}$ x $Small_{it}$				0.017 (0.020)				0.020 (0.051)
$Change_{it}$ + $Change_{it}$ x $Small_{it}$		0.041** p-value: 0.025				0.024 p-value: 0.506		
$\sum_{j=0}^{2} Change_{it-j}$			0.024 p-value: 0.394	-0.032 p-value: 0.402			0.023 p-value: 0.774	-0.027 p-value: 0.814
$\sum_{j=0}^{2} Change_{it-j}$ + $\sum_{j=0}^{2} Change_{it-j}$ x $Small_{it}$				0.085** p-value: 0.024				0.071 p-value: 0.385
Observations	55,956	55,956	47,340	47,340	194,849	194,849	161,638	161,638
Adj. R2	0.762	0.762	0.771	0.771	0.815	0.815	0.829	0.829

Notes: OLS estimation. The dependent variable is total factor productivity (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 10: Effect of internationalisation on acquirers' sales

	Manufacturing				Services			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Change_{it}$	0.038*** (0.011)	-0.010 (0.014)	0.027** (0.012)	-0.021 (0.015)	0.082*** (0.027)	0.074* (0.040)	0.074** (0.033)	0.062 (0.046)
$Change_{it-1}$			0.042*** (0.013)	0.010 (0.016)			0.079** (0.032)	0.056 (0.042)
$Change_{it-2}$			0.015 (0.013)	0.006 (0.016)			0.079*** (0.028)	0.065* (0.035)
$Small_{it}$		-0.183*** (0.027)		-0.178*** (0.025)		-0.233*** (0.052)		-0.208*** (0.051)
$Change_{it}$ x $Small_{it}$		0.089*** (0.020)		0.088*** (0.022)		-0.010 (0.055)		0.002 (0.057)
$Change_{it-1}$ x $Small_{it}$				0.054** (0.024)				0.025 (0.051)
$Change_{it-2}$ x $Small_{it}$				0.008 (0.030)				0.001 (0.045)
$Change_{it}$ + $Change_{it}$ x $Small_{it}$		0.078*** p-value: 0.000				0.064* p-value: 0.070		
$\sum_{j=0}^{2} Change_{it-j}$			0.083** p-value: 0.014	-0.005 p-value: 0.904			0.232*** p-value: 0.008	0.184 p-value: 0.111
$\sum_{j=0}^{2} Change_{it-j}$ + $\sum_{j=0}^{2} Change_{it-j}$ x $Small_{it}$				0.145*** p-value: 0.005				0.211** p-value: 0.036
Observations	58,827	58,827	49,678	49,678	206,500	206,500	170,804	170,804
Adj. R2	0.832	0.835	0.887	0.889	0.895	0.896	0.924	0.925

Notes: OLS estimation. The dependent variable is total sales (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 11: Effect of internationalisation on acquirers' innovation

	Manufacturing				Services			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Change_{it}$	-0.020 (0.048)	-0.097 (0.074)	-0.041 (0.057)	-0.105 (0.088)	0.028 (0.080)	-0.154 (0.104)	-0.010 (0.094)	-0.224* (0.129)
$Change_{it-1}$			-0.044 (0.063)	-0.086 (0.090)			0.107 (0.093)	-0.052 (0.139)
$Change_{it-2}$			0.044 (0.059)	0.035 (0.085)			0.175** (0.088)	0.049 (0.132)
$Small_{it}$		-0.713*** (0.071)		-0.656*** (0.083)		-0.839*** (0.103)		-0.794*** (0.107)
$Change_{it}$ x $Small_{it}$		0.127 (0.098)		0.103 (0.113)		0.293* (0.153)		0.361** (0.176)
$Change_{it-1}$ x $Small_{it}$				0.039 (0.122)				0.245 (0.180)
$Change_{it-2}$ x $Small_{it}$				-0.026 (0.118)				0.175 (0.169)
$Change_{it}$ + $Change_{it}$ x $Small_{it}$		0.030 p-value: 0.636				0.139 p-value: 0.230		
$\sum_{j=0}^{2} Change_{it-j}$			-0.041 p-value: 0.800	-0.155 p-value: 0.519			0.272 p-value: 0.274	-0.227 p-value: 0.519
$\sum_{j=0}^{2} Change_{it-j}$ + $\sum_{j=0}^{2} Change_{it-j}$ x $Small_{it}$				-0.039 p-value: 0.847				0.554* p-value: 0.070
Observations	58,137	58,137	49,105	49,105	189,217	189,217	156,180	156,180
Adj. R2	0.638	0.647	0.666	0.673	0.778	0.784	0.803	0.808

Notes: OLS estimation. The dependent variable is innovation (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 12: Effect of internationalisation on acquirers' labour costs

	Manufacturing				Services			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Change $_{it}$	0.028*** (0.009)	-0.003 (0.016)	0.024** (0.012)	-0.002 (0.019)	0.058*** (0.019)	0.033 (0.027)	0.046** (0.023)	0.022 (0.032)
Change $_{it-1}$			0.029*** (0.011)	0.014 (0.017)			0.060** (0.024)	0.004 (0.034)
Change $_{it-2}$			0.022* (0.012)	0.013 (0.016)			0.051** (0.024)	0.007 (0.034)
Small $_{it}$		-0.156*** (0.019)		-0.147*** (0.018)		-0.243*** (0.037)		-0.213*** (0.038)
Change $_{it}$ **x *Small*** $_{it}$		0.055*** (0.020)		0.045** (0.023)		0.030 (0.036)		0.030 (0.040)
Change $_{it-1}$ **x *Small*** $_{it}$				0.021 (0.022)				0.097** (0.044)
Change $_{it-2}$ **x *Small*** $_{it}$				0.007 (0.024)				0.073 (0.047)
Change $_{it}$ **+ *Change*** $_{it}$ **x *Small*** $_{it}$		0.052*** p-value: 0.000				0.062*** p-value: 0.007		
$\sum_{j=0}^{2} \textbf{\textit{Change}}_{it-j}$			0.075** p-value: 0.024	0.025 p-value: 0.601			0.158** p-value: 0.015	0.032 p-value: 0.717
$\sum_{j=0}^{2} \textbf{\textit{Change}}_{it-j}$ + $\sum_{j=0}^{2} \textbf{\textit{Change}}_{it-j}$ **x *Small*** $_{it}$				0.098** p-value: 0.015				0.232*** p-value: 0.003
Observations	58,344	58,344	49,294	49,294	183,012	183,012	151,231	151,231
Adj. R2	0.892	0.894	0.913	0.915	0.942	0.947	0.955	0.956

Notes: OLS estimation. The dependent variable is labour costs (in logs). The unit of observation is firm-year observation. The sample period is 1999 to 2018. Firm fixed effects and sector-time-specific fixed effects are included but not reported. Robust standard errors (clustered by firm) are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Appendix

Table A.1: Definition of firm variables

Variable	Definition	Position in JANIS
Log Sales	Log of sales	G30000
Log Fixed assets	Log of tangible assets	A13200
Log Innovations	Log of intangible assets	A13100
Log Total assets	Log of total assets	A10000
Log Labour costs	Log of labour costs	G37000
Return on equity	Operating result / equity	G45000/P21000

Table A.2: Definitions for total factor productivity

Variable	Definition	Position in JANIS
Log Value added	Log (Sales – Expenses for raw materials and consumables and for goods purchased – Expenses for services purchased)	G30000-G35100-G35200
Log Cost of capital	Log of tangible assets	A13200
Log Cost of intermediate goods	Log (Expenses for raw materials and consumables and for goods purchased + Expenses for services purchased)	G35100+G35200
Log Cost of labour	Log of labour costs	G37000