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by

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Foreign and Domestic Takeovers in Germany: Cherry-picking and Lemon-grabbing

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Abstract:

This study focuses on *ex ante* performance of domestic and foreign takeover targets in Germany, one of the most important FDI inflow destinations worldwide. Using a new database from German official statistics, unconditional comparisons as well as binary response model estimations of takeover probabilities were performed for the manufacturing and service sector separately. The results showed a diametrically opposing impact of productivity and profitability on the takeover likelihood. This offers a conciliation of two supposedly opponent hypotheses, known as 'cherry-picking' and 'lemon-grabbing'. The results advocate assumptions of asset-exploiting and information asymmetries in favor of domestic investors but differ only marginally between foreign and domestic targets.

JEL-classification: F21, F23, G34

Keywords: Foreign ownership, Germany, acquisition, firm performance, services, inward FDI, multinational firms, productivity

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1 Motivation

Most of the empirical studies on cross-border Mergers and Acquisitions (M&A) focus on their impact on post-acquisition performance and deal only marginally with the determinants of a takeover decision. This is especially true for Germany, one of the most important destinations for foreign direct investment (FDI) inflows (UNCTAD, 2011) and the host of a leading high-tech sector. This study is intended to fill this gap focusing comprehensively on the *ex ante* performance of foreign takeover targets, using a new database from German official statistics.

Foreign-owned firms enjoy a remarkable economic status in Germany. Although they represent only about one percent of the non-financial sector, in 2008 they accounted for 27 percent of total turnover and 20 percent of value added (Nahm, 2011). The strand of literature which is concerned with the foreign ownership performance premium (see Barba Navaretti and Venables, 2004 and Bellak, 2004 for an overview) is closely related to work which adresses foreign acquisitions. When evaluating the causality of foreign ownership, a comparison of foreign-controlled affiliates with a domestically owned control group may suffer from a general selection problem, since a takeover decision by foreign investors should not be assumed to be random. What kind of targets do foreign investors prefer within the German economy? Do they pick the over performing 'cherries'? Do they grab underperforming 'lemons' instead, or both? It is essential to have solid evidence about these questions in order to consider the selection bias shaping a foreign ownership performance premium. Beside this rather methodological contribution to the literature on foreign ownership premiums, the takeover choice itself is of interest. For example, the constantly increasing share of emerging market acquisitions (UNCTAD, 2011) fuelled fears of a brain drain and a loss of control over R&D efforts in the industrialized countries. Case studies from Germany point to the technology-seeking motives of acquirers in manufacturing[1] (AT Kearney, 2011 and FAZ, 2011) but the role of innovativeness in foreign acquisitions in general is examined in this study for the first time. A further new initiative here is the separate analysis of manufacturing and services, acknowledging the increasing role of service industries in the context of internationalization (see e.g. Nissan, Galindo, and Méndez, 2011 for details). Moreover, foreign acquisition targets can be compared to those of domestic acquisitions in

[1]Recent examples are the cases of the computer manufacturer *Medion* and a producer of concrete pumps, *Putzmeister*, which were both targets of Chinese competitors (Der Spiegel, 2011 and 2012).

order to identify a general takeover selection from actual foreign takeover selection patterns. This area has been investigated by only few studies.[2]

The paper is organized as follows. Section 2 discusses theoretical considerations about the pre-takeover performance of foreign acquisition targets and includes hypotheses related to this. Section 3 introduces a new database and calculation of variables, while Section 4 presents a methodological strategy for empirical analysis. The results are reported and discussed in Section 5. Section 6 is the conclusion.

2 Foreign takeovers and *ex ante* target performance

The selection of target firms for acquisitions is not supposed to be random, no matter whether the acquirer is foreign or indigenous. Instead, the investor chooses a target according to certain criteria. These firm characteristics, in turn, depend highly on the investors' individual strategies. In the M&A literature, several potential motives of investors are categorized according to their target performance requirements in the pre-takeover period (e.g. Harris and Robinson 2002, McGuckin and Nguyen, 1995, Balsvik and Haller, 2010, and Castellani and Zanfei, 2004).

Managers may seek to achieve above average performing targets in order to benefit from their comparative advantages. Examples include achieving a greater market power or internalizing specific knowledge, superior production techniques or patents rights. Evidence for a selection of firms performing at a level above average with regard to acquisitions is provided for instance by Harris and Robinson (2002) in the UK, Huttunen (2005) in Finland, Salis (2008) in Slovenia, Goethals and Ooghe (1997) in Belgium and Oberhöfer, Stöckl, and Winner (2012) in 16 European countries. Contradictory results are presented by Castellani and Zanfei (2004) for Italy and Karpaty (2007) for Sweden, who find no support for a selection of high-performance firms. In the context of FDI, cross-border acquisitions can indicate important access to foreign markets for the investor and in choosing leading firms, the survival in such new markets can be assumed to be more likely. The latter could be a reason why foreign takeovers may be more likely to involve over-performing targets, but a

[2]Examples are studies by Bandick (2011), Balsvik and Haller (2010), Gioa and Thomsen (2004), and Chen and Su (1997).

comprehensive theoretical explanation for why foreign rather than domestic investors should generally acquire the more successful firms cannot be provided by the literature. However, a number of empirical studies give support to the assumption that the performance of future foreign takeover targets is significantly superior compared to that of future domestic takeover targets (e.g., Bandick, 2011 and Balsvik and Haller, 2010). This is especially relevant for the strand of literature which deals with performance differentials between foreign-controlled and domestically controlled firms and which constantly emphasizes a foreign ownership performance premium (for an overview see Bellak, 2004 or Barba Navaretti and Venables, 2004). If foreign investors acquire domestic firms which already had a superior performance before the change of ownership, a simple comparison of indigenous and foreign firms can suffer from a selection bias, since foreign takeovers can work as 'cherry-picking' or 'picking-the-winner' mechanisms. Such a selection bias can have severe implications when causality is in focus. A similar mechanism can be observed for domestic companies, when above average performing firms self-select into multinationality (e.g. Jäckle and Wamser, 2009 for Germany).[3]

On the other hand, reasons can be found to assume that investors - whether they are foreign or domestic - prefer to target firms which have a below average performance. The idea behind this argument is that such poor performing 'lemons' may suffer a mismatch between management and operations, and thus have certain inefficiencies (Lichtenberg and Siegel, 1987). The aim of the acquirer then would be to increase the firm's efficiency through a 'disciplining effect' or 'efficiency-enhancing restructuring', therefore exploiting this comparative management advantage (Bellak, Pfaffermayr, and Wild, 2006). Although this reasoning again does not differentiate between different types of acquirers, the asset-exploiting assumption is known from MNE-theory (e.g. Caves, 1996). For example, Dunning (1988) assumes a comparative advantage in favor of MNEs in terms of superior production technology and organizational competencies. It does not matter whether this advantage has driven a company into multinational operations or has arisen from multinationality itself (for example through shifting activities across national borders). MNEs can be assumed to be endowed with a comparative advantage and seek to exploit this. Therefore, the ability to increase a 'lemons"

[3]This is in line with theoretical models of heterogeneous firms and trade which assume a self-selection of the more productive firms into international activities since they can more easily bear the costs (see Melitz, 2003 and Helpman, Melitz, and Yeaple, 2004).

efficiency, can be expected to lie especially with MNEs. A further reason why underperforming firms could be specifically preferred by foreign investors is described by Akerlof (1970) and Gioia and Thomsen (2004). Normally, information about the real value of a firm is distributed asymmetrically between buyers and targets, to the disadvantage of the external acquirer. Information asymmetries now arise if the investor is located abroad and suffers a 'liability of foreignness' (Hymer, 1977). Consequently, the foreign investor may prefer to buy firms for a relatively low price in order to avoid risk. Along with the hypothesis that poor performers are selected in order to exploit their assets, as described above, these two forms of rationale are referred to as a 'double market-for-lemons' effect (Gioia and Thomsen, 2004). Evidence of 'lemon-grabbing' is relatively scarce as opposed to 'cherry-picking'. Examples are given in the work of Lichtenberg and Siegel (1987) and Chen and Su (1997) for the US, as well as in Gioia and Thomson (2004) for Denmark. Therefore, two conflicting hypotheses emerge from the literature of foreign and domestic acquisitions:

Hypothesis 1: *a) Acquisition targets outperform their competitors already in the pre-takeover period in terms of performance measures. b) This is even more true for foreign acquisitions than for domestic takeovers.*

Hypothesis 2: *a) Acquisition targets reflect rather underperforming firms compared to other domestic firms. b) This is even more true for foreign acquisitions than for domestic takeovers.*

It is possible that both the 'cherry' and the 'lemon' hypotheses need to be rejected. Accordingly, motives for acquisition could be assumed to be much more shaped by managers' own interests in increasing the size of their firms (empire building) (Balsvik and Haller, 2010). Another potential result would be support for both hypotheses, as seems highly plausible in a world of heterogeneous strategies towards firms. However, a selection bias for the group of foreign-controlled firms must be stated when either one or both of the hypothesis 1b) and 2b) find support.

Previous research in Germany on the pre-takeover performance of foreign acquisitions is scarce. Arndt and Mattes (2010), using data from the Micro-database Direct Investment and

information provided by Creditreform, and Mattes (2010), who uses data from the German Institute for Employment Research (IAB), find a higher probability for over- and underperforming establishments (in terms of sales and profits) to become a foreign takeover target. This even holds when only foreign takeovers of domestically owned multinationals are observed (Arndt and Mattes, 2010). Because the focus is on post-takeover performance, the selection of target firms is only scratched. Therefore, further contributions are necessary and include i) a comparison of domestic takeovers with foreign takeovers in order to isolate exclusive selection mechanisms for the latter; ii) A more detailed evaluation of motivations for foreign takeovers. In particular, the important technology-seeking strategies of foreign investors in the technologically sophisticated German manufacturing sector (for a more comprehensive description of technology-seeking see Dalton and Serapio, 1998 and Narula and Zanfei, 2005); iii) An answer to the question of whether considerations of productivity or profitability determine a takeover decision. Regarding this last point, the literature survey does not clearly suggest which performance measure can serve for an evaluation of either the 'cherry' or the 'lemon' hypothesis. The rejection of one hypothesis may therefore depend on the measure of performance considered. This study considers these aspects by examining the additional hypotheses below and by using a new and unique database derived from official German structural business statistics. The new data allows for a separate analysis of the service and manufacturing sectors, which has not been performed to date.

Hypothesis 3: *A considerable proportion of the foreign acquisitions in the German manufacturing sector are driven by the motive of internalizing innovativeness (technology-seeking).*

Hypothesis 4: *There is no significant difference when either profitability or productivity are taken into account as performance measures for evaluating hypotheses H1 and H2.*

3 Data and variables

All European member states are obliged to report statistics on foreign-controlled enterprises operating within their national borders (regulation (EC) 716/2007 and Vergina and Grell, 2009). Information on capital linkages in Germany was not sufficient to meet the Foreign Affiliates Statistics (FATS) guidelines. Therefore, the Federal Statistical Office and the German federal states statistical offices obtained additional information from a commercial data vendor and established an enterprise group database, linked to the core of German structural business statistics, the *Unternehmensregister* (URS). Hence, a variety of industry and topicspecific surveys, whose samples are drawn from the URS, became available for analyzing the activities of foreign-controlled enterprises in Germany since 2007 (for a detailed description of this database see Weche Gelübcke, 2011). For this study, the new FATS-information on foreign-controlled enterprises was merged with the cost structure survey and monthly reports from the manufacturing, mining, and quarrying sectors (see Fritsch, Görzig, Hennchen, and Stephan, 2004) and a structural survey of the service sector (see Vogel, 2009) within the AFiD-Project (Official Firm Data for Germany) (see Malchin and Voshage, 2009). Data are available for 2008 and 2009 for services, and for 2007 and 2008 for manufacturing. The analysis is thus restricted to one pre-acquisition period.

The definition of a foreign-controlled enterprise - according to the FATS statistics manual - is an enterprise of which more than 50 percent is owned by a legal or natural person situated abroad. Capital shares as well as voting rights and other forms of control such as indirect or effective minority control are taken into consideration here (Eurostat, 2009).[4] Accordingly, a foreign takeover was identified when an enterprise was labeled as foreign-owned in t but was under domestic control in t_{-1}. Domestic takeovers are units which had a domestic group head in t but were independent, foreign-owned or group heads itself in t_{-1}. Since the enterprise group database is relatively new, a change in ownership may be merely due to a new identification of a capital link (Monopolkommission, 2010). To counter this, all subsequent analyses were performed for takeover groups which explicitly exclude every

[4]Indirect control refers to the fact that enterprise A is controlled by enterprise B and both are domestic companies but enterprise B is, in turn, controlled from an entity abroad. Then, enterprise A will also be foreign-controlled. Effective minority control is stated when several minority owners with shares of more than 50 percent in sum act in concert.

observation where a 'false ownership change' may be assumed. This is possible because, in the enterprise group database, an enterprise becomes labeled a group head, affiliate or foreign-controlled affiliate when a certain capital link is identified. Enterprises with no label are assumed to be independent units. Therefore, to avoid the identification of 'false ownership changes', all enterprises which became an affiliate in t but were non-labeled firms in t_{-1} have to be excluded. Without controlling for identification failures there are 195 foreign and 455 domestic takeovers in the data for manufacturing, and 273 and 1,130 for services. When all possible identification errors are excluded, there are still 133 foreign and 160 domestic takeovers for manufacturing and 206 and 355 for services.

The efficiency measures of productivity and profitability were calculated for the analysis of firms' performance. Productivity was calculated in terms of the annual gross value added at factor costs per capita[5] and profitability as the ratio of operating profits and total turnover, namely the return on sales. In the manufacturing sector, the productivity of labor was adjusted by wages by dividing labor productivity by average per capita wages (cf. Eurostat 2001).[6] This variable helps to assess whether differences in labor productivity are due to differing human capital intensities.[7] Other variables that demand for a short definition are market power, measured as turnover share within the 2-digit industry of the particular firm, and the R&D intensity, defined as per capita in-house R&D expenses. The latter were again calculated only for the manufacturing sector due to data restrictions.

[5] Unfortunately, there is no information on the actual capital stock in the data which could also be used to account for the efficiency of the capital employed. Although it is generally possible to estimate capital stocks (see Wagner, 2010 for manufacturing) , labor productivity has the advantage of simplicity and is not subject to estimation errors. Furthermore, capital intensity is partly controlled by including two-digit industry covariates in subsequent regression models.

[6] Thus, an adjusted labor productivity rate of 100 percent reflects no additional contribution of an average Euro personnel costs to profits.

[7] Although wage levels do not necessarily reflect qualification levels, a strong correlation can be assumed and unfortunately, there is no information on the qualification or education of the workforce.

4 Empirical strategy

To evaluate hypotheses about the selective behavior of foreign investors, it is useful to compare three groups: firms which will be taken over by foreign entities, those that will be acquired by domestic entities, and a proper control group of non-target domestic enterprises.[8] As a first step, the mean values of all groups and of all performance variables were compared and the t-statistic was used to test the statistical significance of the differences.

To assess whether differences occur only at the mean of a variable or also across entire distributions, kernel density functions were estimated using the Epanechnikov kernel function. Additionally, non-parametric Kolmogorov-Smirnov tests were applied to test for statistically significant differences according to the concept of first order stochastic dominance (for more details see Conover, 1999). As a second step, interest lies with the conditional probability of a takeover. For that reason, a binary response regression model of the probit type was defined, where the probability of a takeover is specified as a function of firm-level characteristics:

$$\begin{aligned} Pr(Acq_{it} = 1) = \alpha &+ \beta_1 LP_Q1_{it-1} + \beta_2 LP_Q2_{it-1} + \beta_3 LP_Q4_{it-1} + \beta_4 LP_Q5_{it-1} \\ &+ \gamma_1 RS_Q1_{it-1} + \gamma_2 RS_Q2_{it-1} + \gamma_3 RS_Q4_{it-1} + \gamma_4 RS_Q5_{it-1} \\ &+ \delta_1 Size_{it-1} + \delta_2 Size^2_{it-1} + \delta_3 MP_{it-1} + \delta_4 Wage_{it-1} + \delta_5 RD_{it-1} \\ &+ \delta_6 EX_{it-1} + IN + \epsilon_{it} \end{aligned}$$

For the evaluation of the 'cherry' and 'lemon' hypotheses, the model includes basically two performance measures, namely labor productivity (LP) and return on sales (RS). Since the focus is on whether the likelihood of being taken over varies when firm performance departs from the average level, dummies are included which reflect certain performance categories. More precisely, observations were grouped into five quantiles according to their performance. Firms in the middle quantile (Q3) are regarded as average performers and were left out for being in the reference category. Accordingly, β and γ are the parameters which report the correlation between the probability of a takeover and the characteristics of being an under or over performing firm, in relation to averagely performing firms. Other exogenous vari-

[8] The data does not provide any information on the multinational status of domestic acquirers. Thus, the group of future domestic takeovers probably contains both MNEs and non-MNEs and, hence, the isolation of a multinationality-effect which may drive selection bias in favor of foreign acquisitions - is not possible.

ables that may determine the probability of acquisitions are firm size, measured as persons employed in full-time equivalents, and per capita wages. The former may indicate the level of awareness to potential acquirers. Since small firms are generally disproportionately less known, and vice versa, the squared firm size needs to be considered additionally. The latter should capture differences in the skill composition of the workforce. With regard to foreign takeovers, the visibility of target firms may depend highly on exporting activities, which are considered in form of a dummy variable EX, which takes the value 1 if at least any turnover is generated abroad and zero otherwise. Also of considerable importance for foreign acquirers may be a market-access motivation. Therefore, the market power (MP) of the target firm is considered in terms of turnover shares (cf. Section 3). Further covariates include R&D intensity (RD) for identifying technology-seeking strategies and 2-digit industry dummies (IN) to control for unobserved determinants. Finally, α denotes the constant, ϵ the error term, and i the establishment subscript.

Following Chen and Su (1997), the model was estimated for separately assessing the probability of being a target of foreign or domestic takeover. A third set of estimates was aimed explicitly at differences between foreign and domestic takeovers by considering the former as $Y = 1$ and the latter as $Y = 0$.

5 Results

5.1 Differences in pre-takeover performance

In the first step in the empirical analysis, the unconditional means of enterprises, which will be acquired by a foreign investor in the next period, and a control group, composed of non-acquired firms, are compared.[9] In manufacturing, a first glance at the results presented in Table 1 shows that foreign acquisition targets are on average larger and more productive. This is common set of circumstances. However, looking at the less common variable of wage-adjusted labor productivity, no difference remains. In other words, the superior productivity of foreign takeover targets may be due to differences in the composition of the workforce. This is supported by the significantly higher average wages, of more than 7,000 EUR on

[9] All computations were programmed in Stata 11 and carried out within the Research Data Center of the statistical office Berlin-Brandenburg via remote access due to confidentiality issues regarding micro data.

average, in foreign takeover targets. Moreover, exporting behavior and R&D intensities also seem to play a role in the acquisition selection process, since foreign target firms report a 17 percentage points higher average export intensity and 3,500 EUR higher per capita R&D investments. Looking at the extensive margins, 93 percent of foreign targets are exporting firms, compared to 79 percent and 77 percent of domestic targets and non-targets. 56 percent of foreign targets invest in R&D in contrast to 48 percent and 31 percent of domestic targets and non-targets. With regard to profitability, evidence does not point to a deviation on average. What can be said so far is that foreign investors obviously pick targets which are over performers on average, at least in terms of labor productivity, size, wages, export and R&D intensities. However, it needs to be stressed that this is not an exclusive habit or ability of foreign investors. It should rather be regarded as a general acquisition pattern since a comparison of domestic takeover targets with non-takeovers reveals almost the same picture (see Table 1). Interestingly, domestic takeover targets seem to be even more productive, as they enjoy a premium of 18,000 EUR compared to 12,000 EUR of foreign targets and even the adjusted productivity is significantly higher on a ten percent error level.

In the service sector, foreign target firms are also larger, pay much higher wages (18,000 EUR premium) and are more intensively engaged in exports compared with non-takeover enterprises. Foreign targets also export more often. 35 percent are exporters compared to 23 percent among non-targets. Just as in manufacturing, a very similar pattern appears for domestic targets. Productivity and profitability do not show any differences for the foreign target group or for the domestic target group.

However, an unconditional mean comparison remains unsatisfying, as neither the distributions nor other determinants of takeover decisions are considered.[10] Referring to the former, an advantageous performance at the mean does not tell anything about whether there is a relevant amount of 'lemons' in the data at the same time, or if the group consists mainly of average performers and of only some 'cherries'. Therefore, the variable distributions within enterprise groups were compared for manufacturing in Figures 1 and 2, and for services in Figures 3 and 4. Figure 1 shows that foreign targets in manufacturing, clearly are

[10]Kolmogorov-Smirnov tests (cf. Section 4) show that differences can be expected along the entire distributions and not only at the mean values. The detailed Kolmogorov-Smirnov test statistics are reported in Table 7 in the Appendix.

larger, pay higher wages, and export more as distributions lie more to the right than those of non-targets. In contrast, distributions for productivity illustrate that a mean comparison is not sufficient. With regard to the adjusted productivity variable, foreign investors pick more targets with either very high or very low productivity (flatter distribution). Rentability graphs indicate such a selection in favor of low performing firms. A comparison between foreign and domestic targets in Figure 2 reveals no significant differences between the two groups, except that the number of employees and export intensity seem to be still higher for foreign targets. Turning to services, the graphs in Figure 3 again show a selection of high and low productive targets as well as low-profit firms. This picture holds for profitability and reverses in terms of productivity when foreign targets are compared to domestic targets in Figure 4.

5.2 The probability of takeovers

The estimated results of the probit model are reported in Table 2 for foreign takeovers and in Table 3 for domestic takeovers. The model, described in Section 4, represents number 6 in the manufacturing sector. Other estimations leave out certain covariates to record changes in coefficients or because they are not available, like R&D in services estimations.

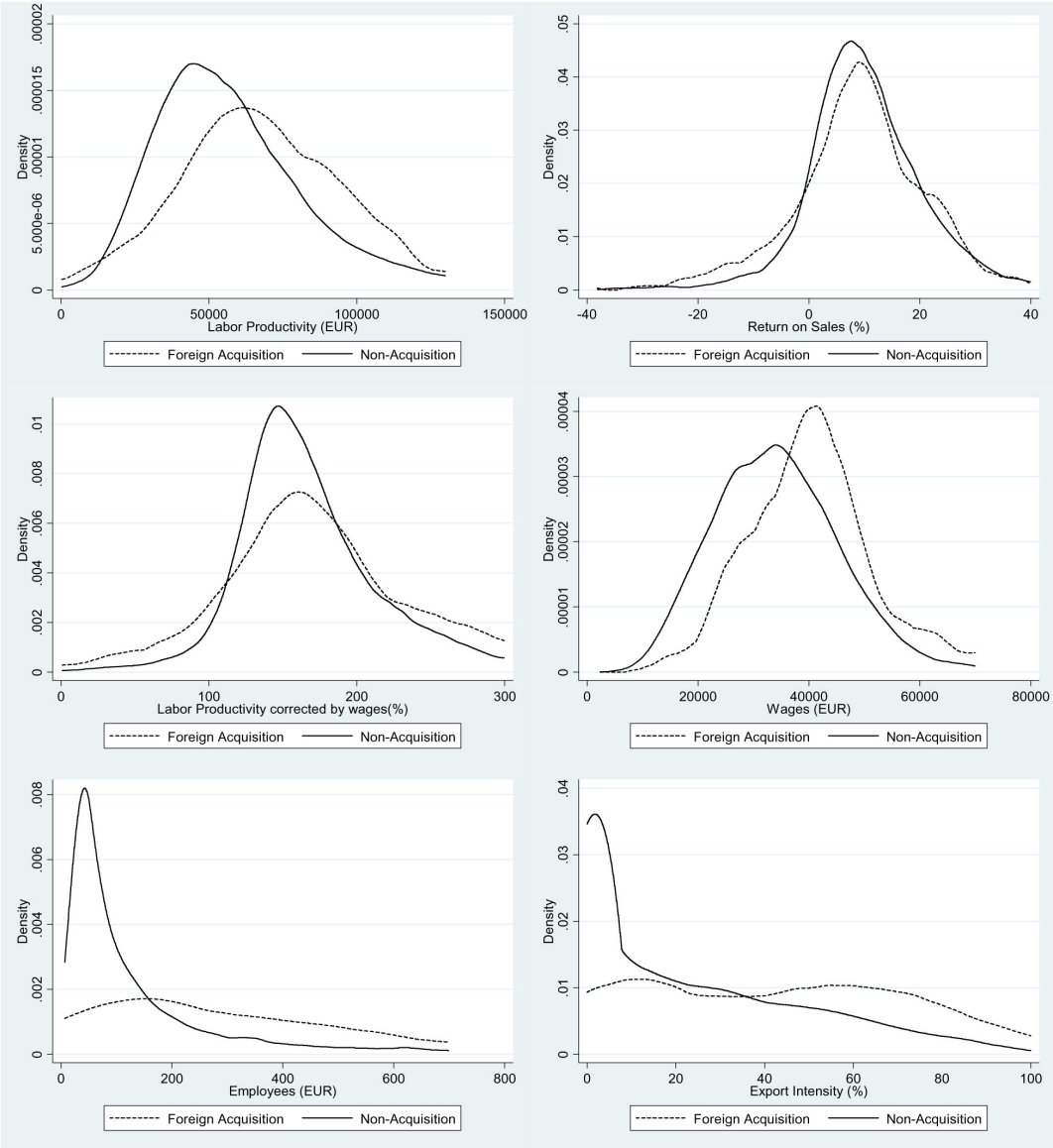
Starting with the service sector, the productivity and rentability coefficients point towards a fairly clear picture. Thus, German enterprises with above average productivity are more likely to become targets for foreign takeovers. At the same time, exactly the opposite is true regarding rentability, where very low performing firms from the lowest quantile are the most likely to become targets. This finding is solid in terms of incorporating other exogenous variables. Furthermore, the equality of particular coefficients was tested with Chi^2-statistics. The results in Table 4 show that the upper quantile coefficient of productivity as well as the lower quantile coefficient of rentability, are statistically different from their neighbors' quantiles. Hence, foreign investors aim not only at firms which depart from the average, but focus on achieving outstanding performance at the upper or lower extremes, depending on the measures used. Given that the coefficients of probit estimates are not interpretable quantitatively, Table 5 reports simulations of hypothetical enterprises with one hundred employees and fixed performance parameters. Apparently, German firms with a high productivity and a high rentability enjoy almost the same takeover probability (0.21

Table 1: Means of performance in the pre-takeover period

	Foreign takeovers	*Domestic takeovers*	*Domestic control group*
Manufacturing	*N = 133*	*N = 160*	*N = 11797*
Labor productivity (EUR)	72940.4***	79150.81***	61190.25
	(40539.91)	(49913.36)	(38335.59)
Adjusted labor productivity (%)	177.81	190.46*	176.57
	(81.97)	(96.22)	(81.4)
Return on sales (%)	5.14	10.94	10.58
	(47.06)	(12.77)	(33.16)
Employees	553.66**	482.65***	269.42
	(1264.19)	(788.88)	(2204.41)
Wage per capita (EUR)	41608.9***	41540.8***	34426.85
	(13465.81)	(11789.36)	(11737.45)
Export intensity (%)	40.88***	32.59***	23.69
	(30.0)	(29.85)	(25.3)
R&D investment per capita (EUR)	5308.06***	4345.17***	1821.5
	(12395.78)	(10209.46)	(6962.88)
Services	*N = 206*	*N = 355*	*N = 57233*
Labor productivity (EUR)	96401.41	123109.5	99676.04
	(336469.7)	(260019.3)	(2527090)
Return on sales (%)	10.11	15.73	17.57
	(37.55)	(28.38)	(1353.15)
Employees	288.64***	254.69***	66.48
	(689.51)	(1064.42)	(897.2)
Wage per capita (EUR)	44017.11***	42354.9***	26058.37
	(30887.98)	(25829.02)	(30546.2)
Export intensity (%)	8.12***	7.48***	3.65
	(19.69)	(17.93)	(13.23)

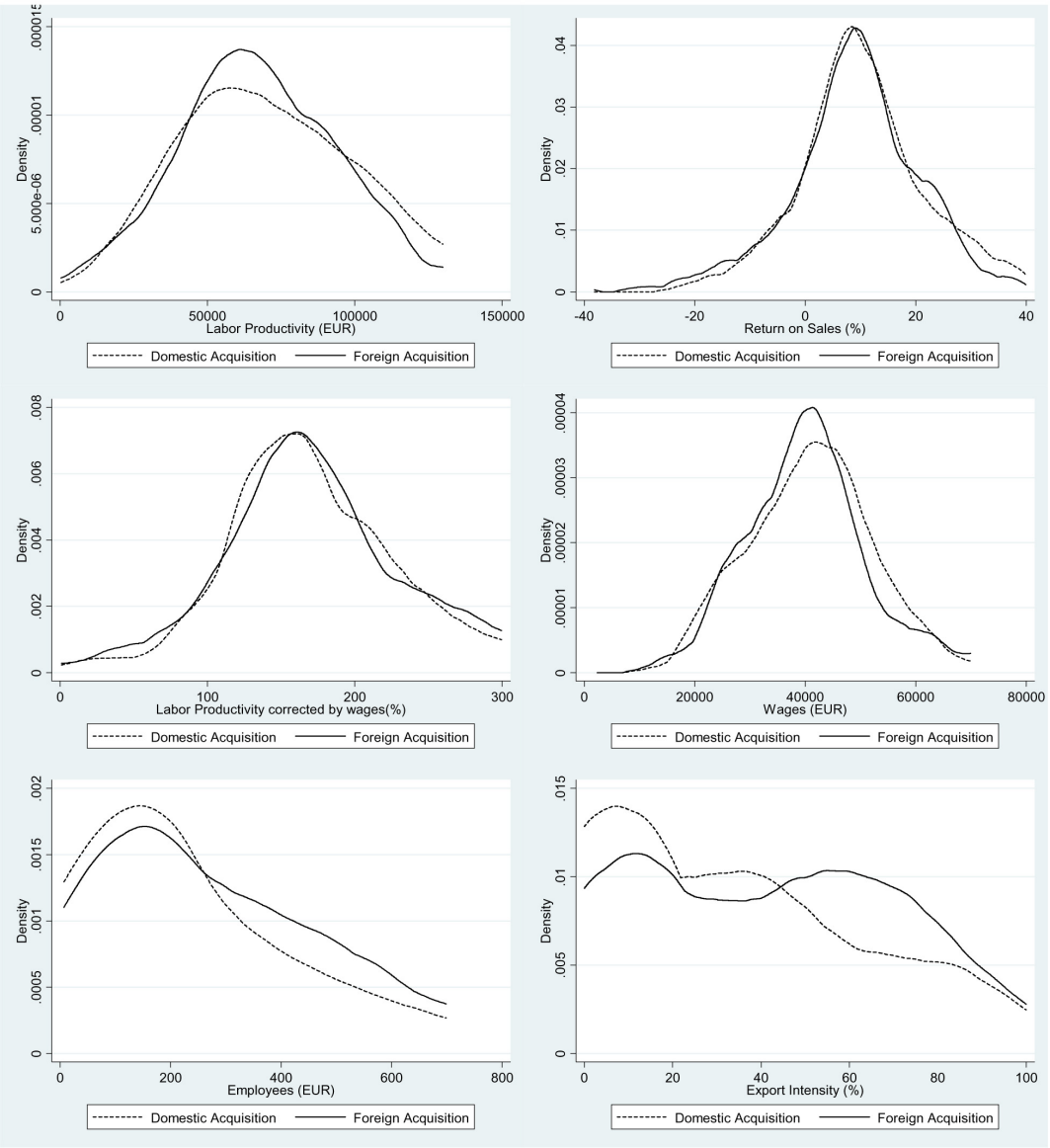
Notes: Reported are mean values with standard deviation in brackets; Significance levels for t-tests of statistical differences versus means of the domestically owned control group at the 10% (*), 5% (**), and 1% (***) level; Identification from the cost structure survey in manufacturing (KSE) and the structural survey on the service sector (SiD); Ownership changes which may be due to a new identification within the enterprise group database are excluded (see Section 3 for details).

Figure 1: Kernel density for foreign targets and control group in manufacturing



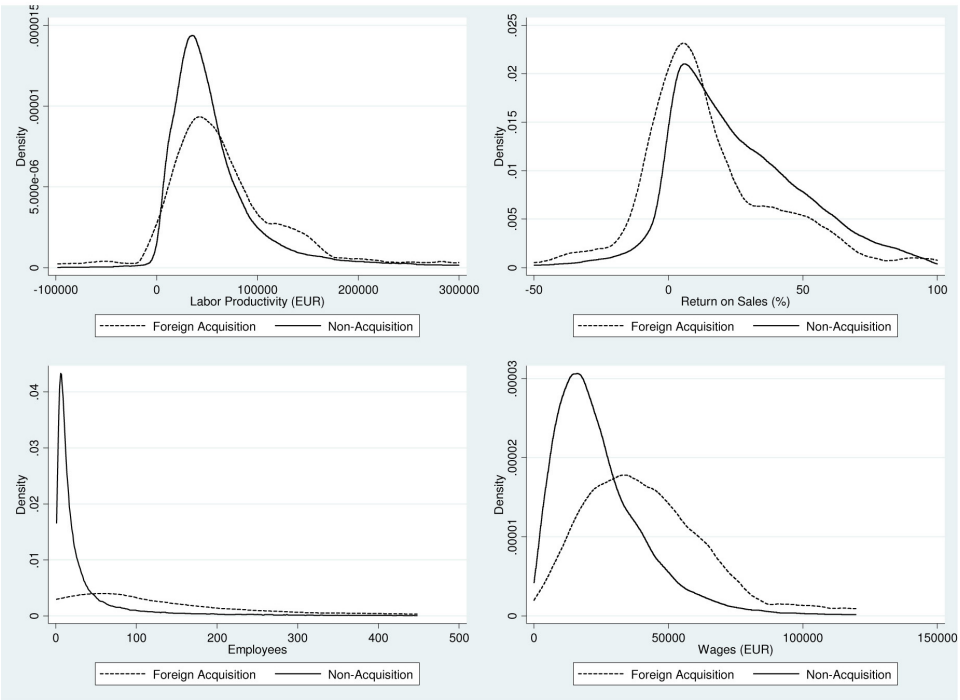
Notes: Density estimates for R&D intensity are not reported due to a cumulation around zero which makes the graphs not very meaningful; Kernel density estimation according to Epanechnikov function.

Figure 2: Kernel density for foreign and domestic targets in manufacturing



Notes: Density estimates for R&D intensity are not reported due to a cumulation around zero which makes the graphs not very meaningful; Kernel density estimation according to Epanechnikov function.

Figure 3: Kernel density for foreign targets and control group in services



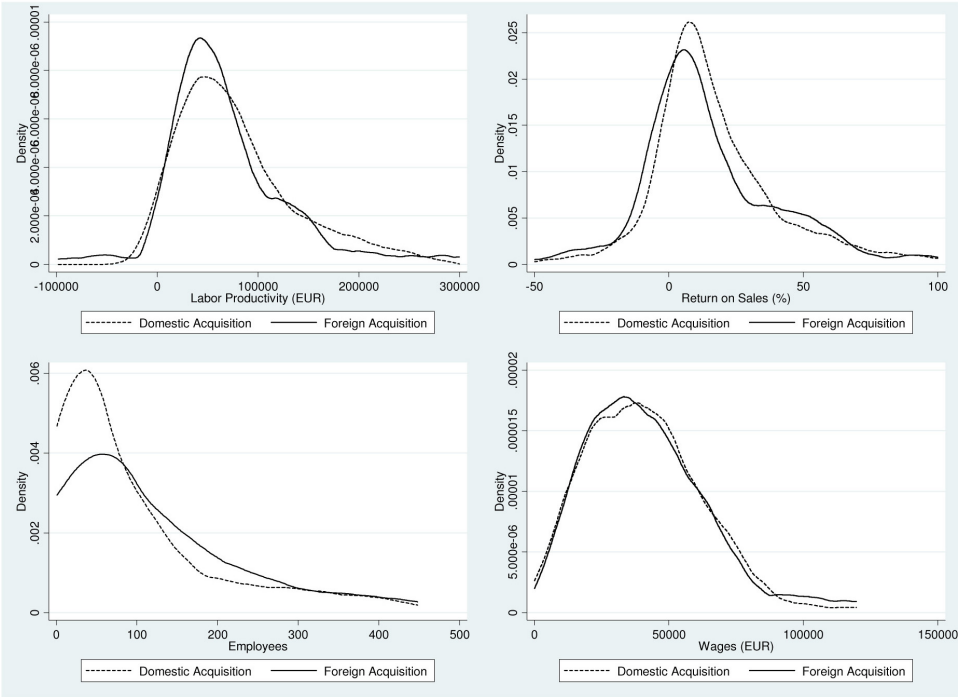
Notes: Density estimates for export intensity are not reported due to a cumulation around zero which makes the graphs not very meaningful; Kernel density estimation according to Epanechnikov function.

percent) as those with low productivity and a low rentability (0.25 percent). Interestingly, the combination of low rentability with high productivity gains has by far the greatest likelihood of foreign acquisition (0.86 percent). This is in line with the hypotheses regarding seeking management inefficiencies and 'lemon-grabbing' due to information asymmetries. However, it must be stressed here that two supposedly contradicting hypotheses - namely 'cherry-picking' and 'lemon-grabbing' - find support as simultaneously working mechanisms, which are dependent on the particular performance measure accounted for.

Regarding other covariates, firm size reveals a hump-shaped influence on foreign takeover probability, but as the squared term is close to zero, the extremum lies far outside the range of observed firm size. Hence, larger firms are more likely to become takeover targets. The influence of wages is also statistically significant, whereas market power does not seem to play a role. Export activities increase the probability of a foreign takeover, which gives support to considerations of awareness, as discussed in Section 2.

In the manufacturing sector, the diametrically opposed influences of productivity and profitability can also be observed, although they are less pronounced. When wages are intro-

Figure 4: Kernel density for foreign and domestic targets in services



Notes: Density estimates for export intensity are not reported due to a cumulation around zero which makes the graphs not very meaningful; Kernel density estimation according to Epanechnikov function.

duced into the estimates in model 4, most productivity and rentability coefficients become insignificant, even though wages are likewise not significant on any conventional level. This is not necessarily surprising, since already in the unconditional mean comparison, productivity differences are not significant when corrected by wages (Table 1). The relevance of average wages may indicate heterogeneous qualification levels between target and non-target firms, which in turn may suggest a significant impact of R&D intensities. However, the coefficient of R&D intensity is far from being significant and therefore, the innovation seeking foreign companies in German manufacturing find no support. Otherwise, it could be other specific knowledge not captured by R&D activities driving takeover decisions. On the contrary, engaging in export activities seems to be even more important than in services.

Regarding the selection of foreign acquirers would ignore the parallel effect of ownership change in general (see e.g. Bellak et al. 2006). The evidence so far demonstrates that there is 'cherry-picking' and 'lemon-grabbing' of foreign investors, but it needs to be asked if this can be attributed solely to foreigners. Instead, it can be assumed for takeovers in general as we take a look at the estimation results of domestic takeover probabilities,

presented in Table 3. It turns out that domestic acquirers prefer firms with above average productivity and relatively low rentability levels, just like their foreign counterparts. This applies to the service as well as the manufacturing sector.[11] Again, the connection between performance and takeovers seems more pronounced in the service sector in terms of levels of significance, differences between coefficients (Table 4), and magnitude (Table 5). Domestic acquirers in manufacturing target 'cherries' in terms of productivity but profitability appears to play a minor role here. This suggest that profitability measures for foreigners play a particularly important role due to specific information disadvantages. Additionally, though export activity has a positive influence on domestic takeovers in services, in manufacturing it is negative. The market power variable becomes significant and positive for the domestic takeovers of manufacturing firms, in contrast to foreign investments, and R&D intensity remains insignificant.

The question which remains is what exactly can be attributed exclusively to foreign acquirers? Since comparisons between estimates for foreign and domestic targets *versus* non-targets is limited, foreign and domestic targets can be compared directly in separate estimations of all models. Consequently, positive coefficients report a positive influence on foreign takeover probability, while negative coefficients reflect a positive link with domestic takeovers. The results from Table 6 show that there are only very few significant coefficients left. One should keep in mind that the observations dropped from more than 55,000 and 11,000 for services and manufacturing to 542 and 281, in terms of what may have a severe impact on levels of significance. However, most z-statistics were far from reaching any reliable level. Nevertheless, it turns out that having relatively low rentability is more important for foreign than for domestic investors in services, particular if wages are not considered. At least if wages are not considered additionally. In manufacturing, straightforward evidence is solely achieved with regard to establishing a positive link between exporting and the probability of a foreign takeover.

[11] The increased probability of low-profit firms to become subject of a change in corporate control is also observed by Köke (2001) for listed firms. However, he does not look at any other performance measure and the analysis is only on domestic ownership changes of large firms in Germany.

Table 2: Foreign takeover probability estimates (Probit)

	Manufacturing						Services				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(1)*	*(2)*	*(3)*	*(4)*	*(7)*
Productivity_q1	-0.27**	-0.21*	-0.21*	-0.12	-0.13	-0.07	-0.12	-0.16*	-0.15*	-0.14	-0.13
	(2.24)	(1.79)	(1.77)	(0.87)	(0.9)	(0.49)	(1.38)	(1.75)	(1.66)	(1.55)	(1.43)
Productivity_q2	-0.27**	-0.23*	-0.23*	-0.18	-0.19	-0.17	-0.12	-0.13	-0.12	-0.12	-0.12
	(2.22)	(1.88)	(1.86)	(1.46)	(1.48)	(1.32)	(1.38)	(1.41)	(1.36)	(1.31)	(1.26)
Productivity_q4	0.12	0.09	0.09	0.05	0.05	0.05	0.18**	0.16**	0.16**	0.16**	0.15**
	(1.17)	(0.91)	(0.91)	(0.49)	(0.5)	(0.46)	(2.21)	(1.99)	(1.99)	(1.92)	(1.84)
Productivity_q5	0.32***	0.26***	0.25**	0.16	0.16	0.15	0.34***	0.33***	0.32***	0.3***	0.29***
	(2.95)	(2.31)	(2.23)	(1.17)	(1.2)	(1.12)	(4.19)	(4.01)	(3.92)	(3.64)	(3.52)
Rentability_q1	0.21**	0.18*	0.18*	0.11	0.11	0.1	0.43***	0.39***	0.39***	0.38***	0.37***
	(2.05)	(1.72)	(1.67)	(1.04)	(1.06)	(0.91)	(5.65)	(5.05)	(5.0)	(4.84)	(4.78)
Rentability_q2	-0.02	-0.03	-0.04	-0.06	-0.06	-0.06	0.12	0.06	0.06	0.05	0.05
	(0.2)	(0.33)	(0.36)	(0.55)	(0.53)	(0.59)	(1.3)	(0.71)	(0.68)	(0.63)	(0.59)
Rentability_q4	-0.23**	-0.22*	-0.22*	-0.2*	-0.2*	-0.2*	-0.02	-0.01	-0.01	-0.004	0.004
	(2.07)	(1.94)	(1.94)	(1.79)	(1.79)	(1.73)	(0.26)	(0.07)	(0.08)	(0.04)	(0.04)
Rentability_q5	-0.24*	-0.17	-0.17	-0.13	-0.13	-0.13	-0.16*	-0.14	-0.13	-0.12	-0.11
	(1.77)	(1.53)	(1.51)	(1.13)	(1.16)	(1.08)	(1.66)	(1.42)	(1.39)	(1.25)	(1.11)
Size		0.0003***	0.0003***	0.0003***	0.0003***	0.0003***		0.001***	0.001***	0.001***	0.001***
		(3.58)	(3.01)	(2.95)	(2.97)	(2.86)		(6.14)	(6.49)	(6.5)	(6.51)
$Size^2$		-2.7e-08*	-2.7e-08*	-2.8e-08*	-2.8e-08*	-2.6e-08*		-1.5e-07***	-1.5e-07***	-1.5e-07***	-1.5e-07***
		(1.9)	(1.91)	(1.95)	(1.96)	(1.89)		(2.83)	(2.93)	(2.94)	(2.95)
Market power			0.06	0.05	0.04	0.04			0.04	0.04	0.04
			(1.18)	(0.97)	(0.73)	(0.73)			(1.64)	(1.62)	(1.57)
Wages				6.1e-06	5.7e-06	5e-06				5.3e-07**	5.4e-07**
				(1.42)	(1.26)	(1.11)				(2.24)	(2.29)
R&D intensity					1.2e-06	1e-06					
					(0.54)	(0.45)					
Export dummy						0.35***					0.11**
						(2.9)					(2.02)
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	11388	11388	11388	11388	11388	11388	55308	55308	55308	55308	55308
McFadden's R^2	0.05	0.06	0.06	0.06	0.06	0.07	0.08	0.11	0.11	0.11	0.12

Notes: Reported are coefficients with |z-values| in brackets; Statistical significance at the 10% (*), 5% (**), and 1% (***) level.

Table 3: Domestic takeover probability estimates (Probit)

	Manufacturing						Services				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(1)*	*(2)*	*(3)*	*(4)*	*(7)*
Productivity_q1	-0.12	-0.05	-0.05	0.09	0.09	0.05	-0.07	-0.1	-0.11	-0.1	-0.08
	(1.04)	(0.41)	(0.42)	(0.65)	(0.65)	(0.39)	(0.97)	(1.42)	(1.46)	(1.33)	(1.13)
Productivity_q2	-0.14	-0.09	-0.09	-0.02	-0.02	-0.04	-0.08	-0.08	-0.08	-0.08	-0.07
	(1.24)	(0.76)	(0.77)	(0.21)	(0.21)	(0.3)	(1.05)	(1.05)	(1.05)	(1.0)	(0.91)
Productivity_q4	0.21**	0.17	0.17	0.11	0.11	0.11	0.23***	0.21***	0.21***	0.21***	0.2***
	(2.0)	(1.6)	(1.57)	(0.97)	(0.97)	(1.0)	(3.39)	(3.15)	(3.16)	(3.08)	(2.97)
Productivity_q5	0.54***	0.47***	0.44***	0.3**	0.3**	0.31**	0.51***	0.49***	0.5***	0.48***	0.47***
	(5.09)	(4.26)	(4.07)	(2.37)	(2.37)	(2.42)	(7.7)	(7.38)	(7.44)	(7.12)	(6.95)
Rentability_q1	0.17	0.13	0.13	0.03	0.03	0.04	0.27***	0.25***	0.26***	0.25***	0.24***
	(1.46)	(1.12)	(1.1)	(0.22)	(0.22)	(0.34)	(4.27)	(4.06)	(4.08)	(3.91)	(3.79)
Rentability_q2	0.11	0.09	0.09	0.06	0.06	0.07	0.14**	0.12**	0.12**	0.12**	0.12*
	(1.07)	(0.9)	(0.89)	(0.56)	(0.56)	(0.64)	(2.29)	(2.04)	(2.06)	(2.0)	(1.91)
Rentability_q4	-0.09	-0.07	-0.07	-0.04	-0.04	-0.04	-0.16**	-0.15**	-0.15**	-0.15**	-0.14**
	(0.88)	(0.7)	(0.63)	(0.39)	(0.39)	(0.38)	(2.28)	(2.2)	(2.21)	(2.15)	(2.04)
Rentability_q5	-0.22**	-0.18*	-0.17	-0.11	-0.11	-0.11	-0.35***	-0.34***	-0.34***	-0.33***	-0.31***
	(2.16)	(1.77)	(1.64)	(1.01)	(1.01)	(1.02)	(4.84)	(4.62)	(4.63)	(4.46)	(4.22)
Size		0.0005***	0.0005***	0.0005***	0.0005***	0.0005***	0.0004***	0.0004***	0.0004***	0.0004***	
		(4.85)	(4.28)	(4.14)	(4.14)	(4.13)		(6.99)	(7.1)	(7.1)	(7.04)
$Size^2$		-9e-08***	-8.6e-08***	-8.6e-08***	8.6e-08***	-8.7e-08***		-2.4e-08***	-2.5e-08***	-2.5e-08***	2.5e-08***
		(2.83)	(2.8)	(2.72)	(2.72)	(2.7)		(3.1)	(3.16)	(3.16)	(3.14)
Market power			0.08**	0.09***	0.09***	0.09***			-0.02	-0.02	-0.02
			(2.52)	(2.7)	(2.7)	(2.73)			(0.78)	(0.8)	(0.87)
Wages				9.6e-06**	9.6e-06**	9.6e-06**				4.8e-07**	5e-07**
				(2.29)	(2.29)	(2.34)				(2.23)	(2.3)
R&D intensity					-4.3e-06	-4.1e-06					
					(1.31)	(1.24)					
Export dummy						-0.16*					0.13***
						(1.87)					(2.92)
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	11519	11519	11519	11519	11519	11519	55338	55338	55338	55338	55338
McFadden's R^2	0.07	0.08	0.08	0.09	0.09	0.09	0.07	0.08	0.08	0.08	0.08

Notes: Reported are coefficients with |z-values| in brackets; Statistical significance at the 10% (*), 5% (**), and 1% (***) level.

Table 4: P-values of tests on equality of coefficients

	Foreign takeovers				Domestic takeovers			
	Q1 vs. Q2	*Q4 vs. Q5*	*Q1 vs. Q2*	*Q4 vs. Q5*	*Q1 vs. Q2*	*Q4 vs. Q5*	*Q1 vs. Q2*	*Q4 vs. Q5*
Manufacturing	0.4225	0.3508	0.1542	0.5738	0.6341	0.0530	0.8029	0.6213
Services	0.8793	0.0563	0.0000	0.2471	0.8318	0.0000	0.0310	0.0228

Notes: Coefficients from models with all covariates (model 6 for manufacturing and model 7 for services) against the domestic control group; Tests based on Chi^2-statistics; Null hypothesis states that coefficients are equal.

Table 5: Simulated takeover probability of hypothetical enterprises with 100 employees (%)

	Foreign takeovers				Domestic takeovers			
	Rentability_q1	*Rentability_q2*	*Rentability_q4*	*Rentability_q5*	*Rentability_q1*	*Rentability_q2*	*Rentability_q4*	*Rentability_q5*
Manufacturing								
Productivity_q1	0.0040	0.0027	0.0018	0.0022	0.0067	0.0071	0.0050	0.0044
Productivity_q2	0.0031	0.0020	0.0014	0.0016	0.0057	0.0061	0.0043	0.0038
Productivity_q4	0.0056	0.0037	0.0025	0.0031	0.0090	0.0096	0.0068	0.0060
Productivity_q5	0.0073	0.0049	0.0033	0.0039	0.0144	0.0153	0.0109	0.0096
Services								
Productivity_q1	0.0025	0.0009	0.0008	0.0005	0.0025	0.0017	0.0007	0.0004
Productivity_q2	0.0026	0.0009	0.0008	0.0005	0.0026	0.0018	0.0008	0.0004
Productivity_q4	0.0058	0.0022	0.0019	0.0013	0.0058	0.0041	0.0018	0.0011
Productivity_q5	0.0086	0.0034	0.0034	0.0021	0.0124	0.0087	0.0042	0.0025

Notes: Simulations of models including all exogenous variables (model 6 for manufacturing and model 7 for services) against the domestic control group and other covariates at their means.

Table 6: Probability estimates of foreign vs. domestic takeovers (Probit)

	Manufacturing						Services				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(1)*	*(2)*	*(3)*	*(4)*	*(7)*
Productivity_q1	-0.41	-0.44	-0.44	-0.62*	-0.62*	-0.4	-0.02	-0.03	-0.01	0.01	0.01
	(1.28)	(1.36)	(1.39)	(1.75)	(1.74)	(1.09)	(0.1)	(0.14)	(0.03)	(0.03)	(0.04)
Productivity_q2	-0.18	-0.19	-0.18	-0.27	-0.27	-0.21	-0.08	-0.07	-0.06	-0.05	-0.05
	(0.59)	(0.62)	(0.58)	(0.83)	(0.84)	(0.63)	(0.33)	(0.33)	(0.25)	(0.22)	(0.22)
Productivity_q4	-0.18	-0.17	-0.15	-0.05	-0.05	-0.11	0.02	0.002	0.003	-0.04	-0.04
	(0.72)	(0.68)	(0.58)	(0.17)	(0.2)	(0.38)	(0.1)	(0.01)	(0.01)	(0.19)	(0.18)
Productivity_q5	-0.33	-0.35	-0.31	-0.11	-0.09	-0.16	-0.03	-0.04	-0.06	-0.16	-0.15
	(1.27)	(1.36)	(1.12)	(0.31)	(0.28)	(0.48)	(0.15)	(0.2)	(0.29)	(0.67)	(0.64)
Rentability_q1	0.18	0.21	0.22	0.43	0.43	0.25	0.4**	0.36*	0.33*	0.28	0.29
	(0.65)	(0.7)	(0.77)	(1.27)	(1.27)	(0.72)	(2.21)	(1.93)	(1.8)	(1.48)	(1.5)
Rentability_q2	-0.18	-0.18	-0.15	-0.11	-0.09	-0.22	0.06	0.01	-0.002	-0.02	-0.02
	(0.73)	(0.73)	(0.59)	(0.36)	(0.34)	(0.79)	(0.31)	(0.04)	(0.01)	(0.11)	(0.1)
Rentability_q4	-0.26	-0.25	-0.25	-0.28	-0.28	-0.33	0.28	0.26	0.27	0.28	0.28
	(0.98)	(0.93)	(0.95)	(1.05)	(1.07)	(1.22)	(1.33)	(1.22)	(1.24)	(1.32)	(1.32)
Rentability_q5	-0.02	0.01	-0.01	-0.11	-0.12	-0.17	0.33	0.33	0.34	0.39	0.39
	(0.09)	(0.02)	(0.04)	(0.38)	(0.41)	(0.57)	(1.41)	(1.45)	(1.46)	(1.64)	(1.62)
Size		-0.0002	-0.0001	-0.0001	-0.0001	-0.0001		0.0004*	0.0003	0.0003	0.0003
		(1.07)	(0.65)	(0.57)	(0.66)	(0.38)		(1.79)	(1.33)	(1.39)	(1.4)
$Size^2$		3.6e-08*	4.3e-08**	4.6e-08**	4.5e-08**	4.4e-08**		-3.8e-08	-3.2e-08	-3.3e-08	-3.3e-08
		(1.76)	(2.13)	(2.23)	(2.05)	(1.98)		(1.55)	(1.29)	(1.34)	(1.34)
Market power			-0.23	-0.21	-0.21	-0.23			0.15	0.14	0.15
			(1.21)	(1.08)	(1.08)	(1.0)			(0.88)	(0.83)	(0.85)
Wages				-0.00001	-0.00001	-0.00002				2.7e-06	2.7e-06
				(1.19)	(1.28)	(1.45)				(1.02)	(1.01)
R&D intensity					5.4e-06	4.5e-06					
					(0.56)	(0.45)					
Export dummy						1.11***					-0.05
						(4.02)					(0.36)
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	281	281	281	281	281	281	542	542	542	542	542
McFadden's R^2	0.05	0.05	0.06	0.06	0.06	0.1	0.06	0.06	0.06	0.06	0.06

Notes: Reported are coefficients with |z-values| in brackets; Statistical significance at the 10% (*), 5% (**), and 1% (***) level.

6 Summary and Conclusions

This study has focused comprehensively on the *ex ante* performance of foreign and domestic takeover targets in Germany, using a new database created from official statistics. Following a simple unconditional mean comparison, the determinants of a takeover probability were estimated within the framework of a binary response probit model for the manufacturing and service sector considered separately.

It turns out that acquisition targets in general already outperform their non-acquired competitors in the pre-takeover period in terms of size, wages and export intensity in services and manufacturing. With regard to the latter, this also applies to labor productivity and R&D intensity (**H1a**). However, foreign acquisition targets reveal their sole superiority at the extensive margin of exporting, and only in manufacturing (**H1b**). At the same time, the probability of a takeover rises if a firm reports a relatively low profitability (**H2a**). This finding is even more true for foreign acquisition targets (**H2b**). Hence, a diametrically opposed impact of productivity and profitability on takeover probability was observed which offers a conciliation of two supposedly opponent hypotheses, namely 'cherry-picking' and 'lemon-grabbing' (**H4**). These results make sense, as they support the assumption of acquirers who generally seek for management inefficiencies. Moreover, the findings may advocate hypotheses on information asymmetries in favor of domestic investors and the asset-exploiting strategies of foreigners, because after comparing foreign versus domestic targets directly, the only differences that are relevant are those regarding profitability and exporting. This may point to better cross-border visibility through exporting on the one hand and risk prevention as well as exploiting management skills through the takeover of low-profit companies, and therefore presumably cheaper targets on the other hand ('double market for lemons').

The implications for the foreign ownership performance premium literature are that foreign investors indeed target firms which enjoy advantageous performance measures on average, but in doing so, they do not differ from German investors. Hence, if foreign-controlled firms in Germany are compared with the entire population of domestically owned firms - including independent enterprises - the results are affected by the endogeneity of the takeover decision in terms of a higher premium for foreign-controlled firms. If, alternatively, the domestic comparison group is restricted to only dependent firms, no such positive bias can be

expected. Instead, foreign-controlled enterprises may suffer a disadvantageous profitability in services.

Surprisingly, the R&D intensity of German firms does not determine the probability of a takeover. Hence, the hypothesis of technology or innovation-seeking motives of foreign investors cannot be supported (**H3**). However, asset-seeking strategies may aim at other specific knowledge or workforce qualifications not captured by R&D expenses, but even wages make a foreign takeover more likely only in the service sector.

A major limitation of the study is the availability of only one pre-acquisition period. This may lead to an anticipation of the takeover event already in t_{-1} and therefore an endogeneity problem. Also the evaluation of performance dynamics in the ex ante period could offer more information. For example Blonigen, Fontagne, Sly, and Toubal (2012) find that negative productivity shocks determine M&A in France.

Overall, this study provides first comprehensive evidence on the pre-takeover performance of foreign and domestic acquisitions for the German manufacturing and service sector, based on new data. Therefore it contributes not only to the M&A and foreign ownership premium literature, but can also offer insights into ownership specific policies; a topic of increasing importance in the German context.

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Appendix

Table 7: Kolmogorov-Smirnov test statistics (p-values)

		Manufacturing			**Services**		
	H_0	*foacq vs. nonacq*	*doacq vs. nonacq*	*foacq vs. doacq*	*foacq vs. nonacq*	*doacq vs. nonacq*	*foacq vs. doacq*
Labor productivity	equal	0.000	0.000	0.520	0.001	0.000	0.060
	first group <	0.000	0.000	0.830	0.000	0.000	0.988
	first group >	0.925	0.990	0.265	0.548	0.984	0.030
Adj. labor productivity	equal	0.126	0.015	0.458	-	-	-
	first group <	0.063	0.007	0.232	-	-	-
	first group >	0.188	0.407	0.258	-	-	-
Return on sales	equal	0.323	0.839	0.800	0.000	0.000	0.030
	first group <	0.740	0.466	0.895	0.993	0.996	0.787
	first group >	0.162	0.482	0.435	0.000	0.000	0.015
Employees	equal	0.000	0.000	0.653	0.000	0.000	0.029
	first group <	0.000	0.000	0.340	0.000	0.000	0.014
	first group >	1.000	0.997	0.621	1.000	1.000	0.992
Wage per capita	equal	0.000	0.000	0.573	0.000	0.000	0.997
	first group <	0.000	0.000	0.685	0.000	0.000	0.732
	first group >	1.000	0.999	0.294	1.000	0.995	0.719
Export intensity	equal	0.000	0.000	0.032	0.001	0.000	0.997
	first group <	0.000	0.000	0.016	0.001	0.000	0.823
	first group >	1.000	1.000	0.982	0.988	0.996	0.729
R&D investment	equal	0.000	0.000	0.077	-	-	-
	first group <	0.000	0.000	0.038	-	-	-
	first group >	1.000	0.999	0.922	-	-	-

Notes: Abbreviation *foacq* stands for foreign acquisition target, *nonacq* for non-acquisition target, and *doacq* for domestic acquisition target.

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