

# The Wage Premium of Foreign Ownership: Evidence from European Mergers and Acquisitions

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**Abstract** The authors provide evidence on the impact of foreign ownership on labor market outcomes analyzing pay differences between foreign-acquired and domestically owned firms. For this purpose, they use firm-level data from 16 European countries over the time period 1999–2006. Combining propensity score matching techniques with difference-in-differences (DID) estimators the authors estimate positive wage premia of cross-border merger and acquisitions (M&As), suggesting that foreign-acquired firms exhibit higher short-run (post-acquisition) wage growth than their domestic counterparts. The observed wage disparities are most pronounced for low paying firms (with average wages below the median) which are typically located in Eastern European transition economies.

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## 1 Introduction

Since two or three decades there is a lively debate among social scientists on how the still ongoing process of globalization has changed the social and economic environment not only in developing countries but also in the developed world. One commonly held belief in this regard is that (relatively immobile) labor is harmed by the increased internationalization of production processes (see, e.g., Feenstra 2003). Similarly, policy makers often stress the detrimental impact of globalization-induced immigration on domestic unemployment (see, e.g., Heid and Larch 2012). In light of this 'dark side' of globalization, it is often stipulated in the political arena to strengthen the role of the welfare state via specific employment or social programs.

The early economic research on globalization, including contributions by Alesina and Wacziarg (1998), Rodrik (1998), Harrison (2002), Mayda and Rodrik (2005), Epifani and Gancia (2009) or Ram (2009), among others, analyzed its impact on the extent and the scope of the welfare state. Most of these studies observe a larger public sector in more open economies, which is often explained by an increased demand for the welfare state reducing individual risks associated with globalization (e.g., income losses due to sectoral downturns).

The increased availability of firm-level data has allowed researchers to also consider the effects of exports or FDI, and other aspects of globalization, on various firm-level outcomes. One particularly active literature strand has focused on the wage effects of foreign takeovers. Here, two lines of research can be distinguished between. The first and earlier line of research simply compares employment and wage figures of foreign and domestically owned firms (see, e.g., Aitken et al. 1996, Lipsey and Sjöholm 2004, Görg et al. 2007). Recent studies, however, have argued that such differences do not necessarily indicate any causal effects of foreign takeovers (see, e.g., Almeida 2007). But rather, they propose to analyze pay differences in firms with ownership changes, especially for cross boarder mergers and acquisitions (M&As). Accordingly, comparing post-acquisition wages of targeted firms with wages of purely domestically owned (non-acquired) firms allows the identification of the causal effect of MNEs on labor market outcomes. Relying mainly on firm-level data from single countries

and allowing for non-random selection of acquisition targets, these studies find insignificant or even positive wage premia of cross-border M&As.<sup>1</sup>

This paper contributes to the literature on wage effects of cross-border M&As. It complements the previous country-specific research by applying firm-level data from a cross-section of 16 European countries between 1999 and 2006. Our cross-country database allows us to analyze the differential impact of M&As on wages over countries or country groups. In our case, we are especially interested in wage premia differences across Western and Eastern European countries. Empirically, we focus on the growth of a firm's average wages one year after the acquisition has taken place (which might be viewed as a short-run effect). Further, we follow previous research such as Girma and Görg (2007) and apply propensity score matching techniques to account for a systematic selection of M&A targets and combine this approach with a difference-in-differences (DID) estimator. This allows us to control for unobserved time-invariant heterogeneity across M&A targets and non-acquired firms.

Our findings suggest that M&As, and especially cross-border acquisitions, induce a positive short-run impact on wages. We observe highest wage premia for firms at the lower end of the pay distribution (i.e., firms paying average wages below the median). Further, we find differences in wage premia between Western and Eastern European countries, suggesting that M&As expose a systematically different impact on wage policies of firms in both country groups. Accordingly, the positive wage effects of cross-border M&As seem to be most pronounced for firms located in (low wage) Eastern European countries. From a policy point of view, the latter result implies that cross-border M&As might be one potential driving force behind a (potential) catching-up process in Eastern European countries.

The remainder is organized as follows. Section 2 describes the data and provides some descriptive statistics. Section 3 elaborates the estimation strategy, summarizes our empirical results and investigates some potential sources for the positive wage effects of M&As. Section 4 concludes.

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<sup>1</sup> Significantly positive wage effects of cross-border M&As are found in Conyon et al. (2002) for the UK, Almeida (2007) for Portugal and Huttunen (2007) for Finland; insignificant wage differentials are observed by Martins (2004) for Portugal, Girma and Görg (2007) for the UK, as well as Heyman et al. (2007, 2011) and Bandick (2011) for Sweden.

## 2 Data

### 2.1 Data description

We exploit two firm-level data sets to analyze the wage effects of M&As. First, we use the AMADEUS database (provided by Bureau van Dijk), including balance sheet information from more than 8 million firms located in 41 European countries (specifically, we rely on update no. 170 of the database, published in November 2008). Second, information on firm transactions including M&As is obtained from the ZEPHYR database (also available from Bureau van Dijk). This database covers large shareholder transactions, but also a large number of smaller ones with relatively low deal values, which, in our view, represents a major strength of this database (see also Stiebale and Trax 2011). In both data sets, each firm is assigned to one unique identification number, allowing to merge the firm-specific information from AMADEUS with M&A data from ZEPHYR.

Our interest lies in a comparison of wages in acquired firms with the ones in non-acquired firms. In our case, we calculate an *average wage rate* ( $w$ ) for each firm in the sample and each year, given by a firm's ratio of total labor compensation to its total number of employees (for simplicity, we use *wage rate* and *wage* synonymously below). To obtain real wages, we deflate the sum of labor compensations in the numerator using (purchasing power corrected) country/year-specific producer price indices taken from the World Development Indicators 2010 (World Bank 2011). For M&A targets wage growth is solely calculated for the first year after the respective transaction took place.<sup>2</sup>

To identify merger cases, we only focus on transactions either classified as mergers or as acquisitions in the ZEPHYR database. In addition, we define an M&A as a transaction where the fraction of shares controlled by the acquiring firm amounts to less/more than 50 percent before/after the acquisition has taken place (see also Gugler and Yurtoglu 2004, Oberhofer 2012). Further, we classify a change in ownership as *cross-border* M&A if the acquiring and the acquired firms are located in different countries.

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<sup>2</sup> In the empirical exercise below we trace M&A targets for only one year after the respective transaction. Alternatively, we focus on a two year time frame in the robustness analysis. In both cases, this implies that M&A targets are treated as non-acquired firms in all other observed years.

To provide a sensitivity check regarding the definition of M&As, we apply two alternative ownership limits. First, we take 25 percent after-transaction ownership as a threshold for M&As (henceforth, we refer to this case as M&A–25 as opposed to the above mentioned M&A–50 ownership limit). The choice of this value is motivated by the fact that acquiring firms typically obtain significant legal rights virtually in all European countries if their ownership fraction exceeds 25 percent of all outstanding shares. In this case, firms might be interested in only acquiring just more than 25 percent of all shares and, thus, gain a strategic position in the target firm. Second, we only consider M&As where an acquiring firm immediately takes over 100 percent ownership with one single transaction (M&A–100). In this case, it is most likely that the new owner is able to impose strategic changes, including modifications in wage policies.

In the empirical analysis below, we focus on manufacturing firms (NACE rev. 2 industries 10–33) that are active within the time period 1999–2006. Since we are interested in wage effects of international acquisitions at the level of subsidiaries, we only include unconsolidated accounts in our data set. It is worth noting that for corporate networks consisting of more than one single firm, the AMADEUS database separately provides consolidated and unconsolidated accounting data. Thereby, unconsolidated accounts are compiled at the establishment level and this information allows us to trace changes in average wages in M&A targets. We also exclude firms from countries where ZEPHYR does not report any M&A activities. Overall, our sample includes 317,946 observations corresponding to 87,652 firms (of which 432 are M&As and 230 are cross-border M&As) located in 16 European countries.<sup>3</sup> The relatively small number of M&A cases can be explained by various reasons. First, our empirical framework (discussed below) is extremely data demanding and especially utilizes the longitudinal dimension of the data at hand. The AMADEUS database, unfortunately, is unbalanced over time and thus we have to exclude some M&As from our analysis. Second, the quality of the AMADEUS database varies substantially over countries which renders an analysis

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<sup>3</sup> Our country coverage includes Belgium, Bosnia and Herzegovina, Bulgaria, the Czech Republic, France, Germany, Hungary, Italy, Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden and the Ukraine.

of all 40 countries impossible.<sup>4</sup> Finally, especially during the last decade their had been a massive shift of (cross-border) M&A activities into service industries accompanied by decreasing relevance of M&As in manufacturing industries (see e.g., Mody 2004).

## 2.2 Descriptive statistics

Figure 1 displays the average growth rate of real wages for acquired and non-acquired firms using our baseline definition of M&As (i.e., M&A–50). Panel (a) includes the full country coverage of our sample (i.e., 16 countries), panel (b) focuses on Western European countries (i.e., Belgium, France, Germany, Italy, Norway, Portugal, Spain and Sweden), and panel (c) relies on Eastern Europe (i.e., Bosnia and Herzegovina, Bulgaria, the Czech Republic, Hungary, Poland, Russia, Slovakia and the Ukraine).

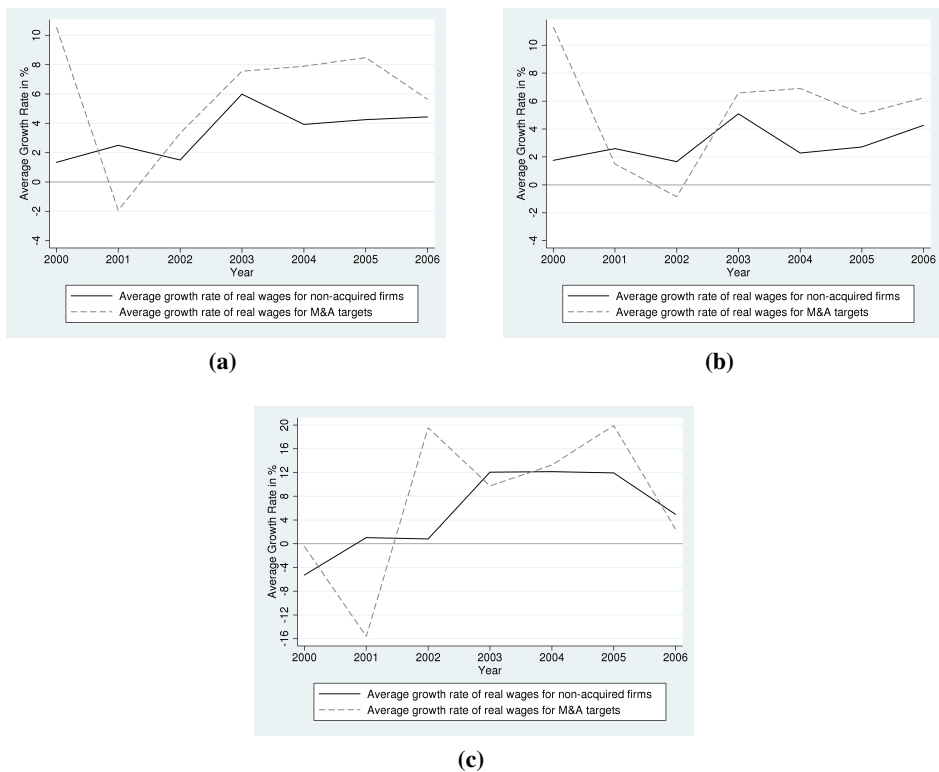
Three important conclusions can be drawn from the figure. First, as can be seen from panel (a), for most of the years after 1999 wage growth seems to be higher for acquired than for non-acquired firms (the only exception is 2001, where we find a negative difference in wage growth between these two firm types). In particular, wage growth is around 4–5 percent in years after 2003 for non-acquired firms, and about 7–8 percent for acquired ones.

Second, this general trend seems to mainly be driven by higher wage growth rates for M&A targets located in Western European countries (panel (b) of the graph). In Western Europe, in 5 out of 7 years average wage growth in this group of firms exceeds the corresponding wage changes in non-acquired firms. On the contrary, M&A targets located in Eastern European countries, on average, only significantly outperform the growth performance of their non-acquired counterparts in 2000, 2002 and 2005 (panel (c) of the graph).

Third, wage growth in Eastern European economies was generally negative before 2002, and increased substantially since then. For example, wage growth in 2005 was around 12 (20) percent for non-acquired (acquired) firms in those

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<sup>4</sup> To give an example, we have to exclude about 180 M&As from the UK due to missing information on material costs for all firms located in the UK. In this case, we are not able to calculate a firm's value added and, consequently, cannot estimate total factor productivity for these firms.



**Figure 1:** Average growth rate of real wages for acquired and non-acquired firms in (a) all 16 European countries of the sample, (b) Western European countries, and (c) Eastern European countries. For M&A targets real wage growth is only calculated for one year (i.e.,  $t + 1$ ) after the respective transaction.

countries, which is much higher as the corresponding figures in Western European countries.

Table 1 provides additional statistics for acquired and non-acquired firms. For M&As, wage growth refers to the first year after the acquisition has taken place (i.e.,  $t + 1$ ); all other variables reported in the table are measured one year before the takeover (i.e.,  $t - 1$ ) in order to facilitate a suitable comparison of both firm types in the pre-M&A situation.

In line with Figure 1, we can see that the average wage growth differential between acquired and non-acquired firms is about 4 percentage points (7.5 vs. 3.7 percent). Apart from that, we observe additional systematic differences between both firm types. For instance, in terms of the number of employees an average M&A target is approximately four times larger than its non-acquired counterpart and average wages in M&A targets exceed the ones in non-acquired firms by approximately 3 thousand euros per year. M&A targets are also more productive and tend to produce with more capital (in terms of total assets per employee).<sup>5</sup> Further, non-acquired firms tend to be slightly more profitable in terms of return on assets. Finally, with regard to a firm's leverage (i.e., short- and long-term liabilities to total assets) and its market shares (measured by a firm's turnover to the total country-industry-specific revenues as calculated from the AMADEUS database) our descriptive statistics indicate that M&A targets control larger shares of their respective markets and tend to be less leveraged. Here, it's worth noting that all differences in the means reported in Table 1 are (at least at the 5 percent level) statistically significant as indicated by simple t-tests.

Overall, a broad inspection of our data suggests that workers employed in M&A targets, on average, receive higher wages in the first year after a takeover has taken place, although these wage differentials are changing much over time (being more pronounced in recent years). However, our descriptive evidence also suggests that M&A targets and their non-acquired counterparts crucially

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<sup>5</sup> In Table 1, we provide an estimate for total factor productivity taking account for the vast literature on the estimation of production functions at the firm level (see, e.g., Del Gatto et al. 2011, for a recent survey). In particular, to deal with simultaneity of input and output choices we follow Levinsohn and Petrin (2003), who propose a semi-parametric estimation approach that utilizes a firm's demand for intermediate inputs (such as materials or electricity) in order to proxy for unobservable productivity shocks.



**Table 1:** Summary statistics

Variable	Firms <sup>a</sup>	Mean	Std.Dev.	Min.	Max.
<b>Non-acquired firms</b>					
Real wage growth ( $t + 1$ ), in %	87,652	3.725	22.509	−100	200
Number of employees ( $t - 1$ )	87,652	80.548	268.429	2	10,000
Average wages ( $t - 1$ ), in thd $e$	87,652	22.695	12.629	0.003	99.784
Total factor productivity ( $t - 1$ )	87,652	15.342	8.868	1.553	56.745
Profitability ( $t - 1$ )	87,652	0.069	0.112	−1	0.840
Leverage ( $t - 1$ )	87,652	0.656	0.239	0	2
Market shares ( $t - 1$ )	87,652	0.000	0.002	0	0.184
Capital intensity ( $t - 1$ )	87,652	126.331	256.014	0.09	50,195.500
<b>Acquired firms</b>					
Real wage growth ( $t + 1$ ), in %	432	7.493	28.780	−97	184
Number of employees ( $t - 1$ )	432	318.854	801.387	3	8,271
Average wages ( $t - 1$ ), in thd $e$	432	26.547	15.572	0.179	84.740
Total factor productivity ( $t - 1$ )	432	21.769	11.278	2.334	56.628
Profitability ( $t - 1$ )	432	0.051	0.126	−0.637	0.461
Leverage ( $t - 1$ )	432	0.632	0.266	0	1.619
Market shares ( $t - 1$ )	432	0.001	0.006	0	0.065
Capital intensity ( $t - 1$ )	432	197.402	350.792	1.826	4,311.635

Notes: <sup>a</sup>The 87,652 non-acquired firms in the sample are typically observed repeatedly, leaving us with 317,514 observations for the empirical exercise below.

differ in firm characteristics, which *simultaneously* might affect a firm's takeover probability and an individual worker's wage premium. Hence, simply regressing firm year-specific real wages on a dummy indicating whether a firm has been acquired or not along with other controls, would raise a severe endogeneity issue implying seriously flawed estimation results with regard to the impact of M&A activities on (post-acquisition) wages. This endogeneity issue would be especially pronounced if unobserved factors also simultaneously influence a firm's M&A target probability and its (average) wage growth rate. Similarly, the application of a simple regression framework does not allow us to explicitly account for the unobservable counterfactual outcome problem. In the next section, we propose an econometric framework that enables us to address these issues adequately.

### 3 Empirical analysis

#### 3.1 Specification and estimation

A study on the impact of M&As on wages has to tackle two central empirical issues (see, e.g., Egger and Hahn 2010). First, once a firm is acquired it is impossible to observe its wage growth for the counterfactual situation where it has not been acquired, and vice versa. Second, it is unlikely that a firm is acquired randomly, but rather, (un-)observed characteristics might explain why it is an attractive M&A target. In Table 1, we report systematic differences between acquired and non-acquired firms, which, in turn, might explain the observed pay differences between both firm types. The related empirical literature cited above addressed these issues mainly via propensity score matching, which explicitly accounts for observable characteristics affecting a firm's takeover probability and, therefore, also its wage growth. We follow this lead here and apply a very similar estimation strategy. Moreover, since we are interested in changes in average wages over time our approach combines propensity score matching with a difference-in-differences (DID) estimator, where the latter additionally eliminates unobserved time-invariant differences between M&A targets and their non-acquired counterparts.

We firstly specify a binary choice model predicting a firm's probability of being acquired as a function of observed firm characteristics (see, e.g., Heckman et al. 1997)

$$A_{it}^* = \Phi(\mathbf{x}'_{i,t-1}\beta), \quad (1)$$

$$A_{it} = \begin{cases} 1 & \text{if } A_{it}^* > 0 \\ 0 & \text{otherwise,} \end{cases}$$

where  $i$  indicates the  $i^{\text{th}}$  firm, and  $t$  is a time index. The variable  $A_{it}^*$  represents a latent variable capturing a firm's M&A target probability. Observed outcome,  $A$ , takes entry 1 if the latent variable exceeds the zero threshold, and zero otherwise.  $\mathbf{x}$  is a vector of explanatory variables (discussed below), measured in period  $t - 1$ , and  $\beta$  is the corresponding parameter vector. The term  $\Phi$  denotes the cdf of a normal distribution (i.e., we estimate a probit model).

We are interested in comparing the post-acquisition wage growth of an acquired firm,  $\tilde{w}_{i,t+1}^T$ , with the corresponding wage growth if it were not acquired,

$\tilde{w}_{i,t+1}^C$ , which defines the *average treatment effect on the treated* ( $\tau_{ATT}$ ) (see, e.g., Wooldridge 2010)

$$\tau_{ATT} = E(\tilde{w}_{i,t+1}^T - \tilde{w}_{i,t+1}^C | A_{it} = 1). \quad (2)$$

As described above, we are not able to observe  $\tilde{w}_{i,t+1}^C$ , but the non-acquired firms in our sample might deliver an appropriate control group for this counterfactual. For this, we estimate Eq. (1) and calculate each firm's probability of being acquired in  $t$  (i.e., the propensity score). To proxy  $\tilde{w}_{i,t+1}^C$ , we use the wage growth of non-acquired firms with a propensity score as close as possible to a firm in the treatment group. In our case, we rely on nearest neighbor matching, where we use the (weighted) average of the *five nearest neighbors* as the appropriate comparison firm.<sup>6</sup>

Following Heckman et al. (1997) and Girma and Görg (2007), the resulting DID propensity score estimator can be written as

$$\tau_{ATT} = \sum_{i \in T} \left( \tilde{w}_{i,t+1}^T - \sum_{j \in C} g(p_i, p_j) \tilde{w}_{i,t+1}^C \right) \quad (3)$$

where  $p_i$  and  $p_j$  denote propensity scores for acquired firm  $i$  and control group firm  $j$ , and  $g(\cdot)$  assigns the weights to be placed on the control group firms. For our baseline estimates, this weight amounts to 1/5 for each control which is matched to an acquired firm.

Following previous research and also theoretical work on M&A activity, vector  $\mathbf{x}$  contains a firm's number of employees and its square, average wages, total factor productivity, level of profitability and debt ratio as well as its market share and capital intensity. The inclusion of number of employees is mainly motivated by the managerial discretion hypothesis (see, e.g., Williamson 1963). Accordingly, if a manager's utility is positively affected by the size of the controlled firm, she would be interested in acquiring larger targets. Further, acquiring larger competitors also increases market concentration and gives more leeway in pricing decisions. On

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<sup>6</sup> Alternatively, we also applied one-to-one and ten nearest neighbor matching, leaving our estimation results nearly unchanged. Same applies to local linear and radius matching (with caliper 0.02).

the contrary, the very largest firms are expected to face lower acquisition hazards motivating the additional inclusion of the squared number of employees. Further, we include a firm's average wage level to ensure that acquisition targets and their matched controls are similar with regard to their wage structure.

Regarding productivity, two opposing predictions can be inferred from the theoretical literature. First, the market for corporate control theory argues that managers, assessing the relative performance of competing firms, tend to acquire currently underperforming firms within their markets (see Manne 1965). The neoclassical theory of the firm, in contrast, states that only the most productive firms are attractive acquisition targets, which also applies to profitability.

Further, according to Dewey (1961) the least successful firms either leave the market or will be acquired by their competitors. In the latter case, M&As might be viewed as a 'civilized' alternative to market exit. Hence, a firm's probability of being acquired increases with the risk of going bankrupt. Empirically, we measure a firm's market exit hazard using a firm's leverage. We would predict that both, market exit and the probability of being an M&A target, are positively associated with a firm's debt ratio.

In line with the literature on the impact of firm size on a firm's acquisition probability, market concentration might be crucial for the decision to engage in M&As. Typically, only those firms already controlling a substantial fraction of the market might substantially gain through additional market concentration. Therefore, it might be reasonable that firms with larger market shares are more likely to be the acquiring firms and, consequently, face lower M&A target probabilities.

Firms also might use M&As in order to improve their production technologies and, thus, are interested in acquiring firms possessing such technologies. Empirically, we measure this motive for M&As by capital intensity. Finally, we control for unobserved heterogeneity across countries, industries and time including the corresponding fixed effects.

### **3.2 Results**

Table 2 summarizes the estimation results of our selection Eq. (1). The coefficients reported are parameter estimates for the baseline definition of M&As, where the acquirer possesses more than 50 percent of outstanding shares after the transaction

has taken place (M&A–50).<sup>7</sup> Column (1) of the table refers to the full sample (domestic and cross-border M&As), column (2) to cross-border M&As (230 firms), and column (3) to domestic transactions only (202 M&As).

**Table 2:** Selection equation (probability of being an M&A target; baseline definition M&A–50)

Variable	Full sample M&As	Cross-border M&As	Domestic M&As
Number of employees ( $t - 1$ )	0.465*** (0.063)	0.530*** (0.089)	0.406*** (0.088)
Number of employees <sup>2</sup> ( $t - 1$ )	–0.025*** (0.007)	–0.029*** (0.009)	–0.023** (0.010)
Average wages ( $t - 1$ )	0.293*** (0.065)	0.240*** (0.082)	0.266*** (0.095)
Total factor productivity ( $t - 1$ )	–0.038 (0.048)	–0.017 (0.062)	–0.049 (0.071)
Profitability ( $t - 1$ )	–0.190 (0.173)	–0.135 (0.234)	–0.214 (0.234)
Leverage ( $t - 1$ )	0.104 (0.076)	0.100 (0.100)	0.093 (0.104)
Market shares ( $t - 1$ )	–0.176 (0.496)	0.213 (0.492)	–4.450* (2.337)
Capital intensity ( $t - 1$ )	0.093*** (0.025)	0.088*** (0.033)	0.093*** (0.034)
<i>Fixed effects</i>			
Country	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
McFadden's $R^2$	0.140	0.167	0.110
Number of M&As	432	230	202
Observations	317,946	317,744	317,716

*Notes:* Parameter estimates reported. \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively.

Our estimation results are mainly in accordance with our expectations and the previous literature (see, e.g., Huttunen 2007, Egger and Hahn 2010, Oberhofer 2012). At face value, the number of employees exerts a non-monotonic impact

<sup>7</sup> For the sake of brevity, we do not report the results of alternative definitions M&A–25 and M&A–100 here, but it turns out that they are very similar to the ones of our baseline definition M&A–50.

on a firm's acquisition probability lending support to the managerial discretion hypothesis. The negative sign for the squared term indicates that the very largest firms are less likely to be an M&A target. In line with the descriptive statistics from above, high (average) wage firms are more likely to be acquired. Further, we observe a positive estimate for capital intensity, suggesting that capital abundant firms seem to be especially interesting as M&A targets. A firm's market share seems to be only a significant driving force behind domestic M&A activities, which would be in line with our discussion from above. With regard to the other three variables included in  $\mathbf{x}$  we are not able to estimate statistically significant effects. In line with the contradictory predictions from the theory discussed above, these results are not surprising for productivity and profitability. Only for the debt ratio the insignificant coefficients seem to contradict Dewey (1961). Generally, we do not find systematic differences with regard to domestic and cross-border M&As, which indicates that the motives behind acquisition policies are not very different between those types of transactions. Here, the only exception is the reversed sign for the impact of market concentration on cross-border M&As, which is statistically insignificant, however.

After all, we may conclude that the probit model from Table 2 works well to explain the probability of being acquired. Of course, this is not sufficient for matching being a suitable framework to estimate the impact of (foreign) M&A on post-acquisition wages. Rather, it is important that the observable characteristics explaining M&A probabilities are similar enough between the acquired and non-acquired control firms (i.e., balancing property) and that the propensity scores for both groups of firms fulfill the common support criteria. Table A.1 in the appendix reports balancing property tests for the baseline M&A definition and for all three samples. Accordingly, our matching approach leads to considerable bias reduction, indicating that the difference between both firm types reduced substantially after matching. This result is also confirmed by non-significant  $t$ -tests for differences in our variables across matched acquired and non-acquired firms. Moreover, the estimated propensity scores for all M&A targets fulfill the common support criteria allowing to include all of them in our analysis.

Next, we turn to the wage effects of M&As. Regarding this, Table 3 shows our results from the DID propensity score matching procedure with five nearest neighbors. Again, column (1) of the table represents the full sample, column (2) only

presents the results for cross-border M&As, and column (3) the ones of domestic acquisitions. Further, the upper block of the table refers to our baseline definition of acquisitions (i.e., M&A–50), the middle and lower blocks indicate the results of our alternative measures, M&A–25 and M&A–100, respectively. Finally, we estimate the wage premia for Western and Eastern European countries separately, and examine the wage growth effects for firms with (pre-acquisition) average wages above and below our sample median. The latter gives some indication on whether (foreign) M&As are associated with additional wage ‘dumping’ in target firms.

Let us start with our baseline definition M&A–50. There, we find a significantly positive wage effect of M&As in the full sample, which supports the empirical findings of Conyon et al. (2002) and Huttunen (2007). In particular, in the first year after acquisition, wages in M&A targets are increased by 4.3 percentage points more than in the counterfactual situation where these firms would not have been acquired. As can be seen from the table, this result holds true for both, M&A targets located in Western and Eastern European countries with the quantitative effect being larger for the latter group of countries. Further, we observe the largest positive wage growth effects for firms with average (pre-acquisition) pay below median wages. Our baseline estimate for this group of firms suggests that their (average) wage growth is approximately 9.71 percentage points higher as in a situation without being an M&A target. These findings from the full sample of both domestic and cross-border acquisitions somehow contradicts the single-country evidence provided by Almeida (2007), for example, who finds negligible M&A induced changes in average wages.

In line with the literature on the wage effects of foreign ownership, we next investigate whether the above discussed wage effects are heterogeneous across domestic and cross-border acquisitions. Columns (2) and (3) of Table 3 indeed reveal that positive wage effects are mainly driven by cross-border M&As. Accordingly, cross-border M&As induce even larger positive average wage growth effects with a maximum of 11.95 additional percentage points of wage growth for the group of below median wage firms. This column again indicates that the wage gains are larger for M&A targets located in Eastern European countries. Regarding domestic acquisitions (column (3) of Table 3), we observe insignificant results throughout, indicating that this type of firm transactions exerts a negligible impact on post-acquisition wage growth. Thereby, domestic M&A targets located

**Table 3:** Wage growth effects of M&As (matching estimates)

Sample	All M&As		Cross-border M&As		Domestic M&As	
	ATT	#M&As	ATT	#M&As	ATT	#M&As
<b>Baseline merger definition M&amp;A–50</b>						
Full Sample	4.30*** (2.98)	432	5.87*** (2.88)	230	3.12 (1.54)	202
Western European countries	3.52** (2.19)	341	4.07* (1.68)	163	3.62* (1.69)	178
Eastern European countries	7.02** (2.21)	91	9.94*** (2.67)	67	–0.87 (–0.14)	24
Average wages above median	0.17 (0.12)	258	1.49 (0.71)	135	–0.40 (–0.22)	123
Average wages below median	9.71*** (3.50)	174	11.95*** (3.25)	95	7.37* (1.74)	79
<b>Merger definition M&amp;A–25</b>						
Full Sample	3.20** (2.42)	524	3.39* (1.88)	292	3.21* (1.67)	232
Western European countries	2.81* (1.92)	425	2.29 (1.10)	219	3.60* (1.76)	206
Eastern European countries	4.59 (1.49)	99	6.24* (1.76)	73	0.15 (0.03)	26
Average wages above median	–0.67 (–0.52)	319	–0.05 (–0.32)	179	1.01 (0.54)	140
Average wages below median	8.42*** (3.23)	205	9.01** (2.60)	113	5.58 (1.44)	92
<b>Merger definition M&amp;A–100</b>						
Full Sample	3.90** (2.42)	380	3.19 (1.40)	206	4.89** (2.14)	174
Western European countries	4.54*** (2.65)	345	3.57 (1.47)	181	4.88** (2.02)	164
Eastern European countries	–2.20 (–0.48)	35	0.16 (0.03)	25	4.94 (1.15)	10
Average wages above median	0.47 (0.32)	265	–0.29 (–0.15)	150	1.96 (0.94)	115
Average wages below median	10.85*** (2.77)	115	11.61** (1.97)	56	9.61* (1.83)	59

Average treatment effect on the treated (ATT) for  $t + 1$  reported in percentage points.  $t$ -values based on robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively.



in Western European economies constitute the only exception for which we are able to estimate moderately significant positive wage effects.

In qualitative terms, our findings from the baseline definition M&A–50 seem to be confirmed by the results of the alternative measures of acquisitions (middle and lower blocks of Table 3), with one notable exception. Applying the M&A–100 definition, we are able to estimate significantly positive wage premia for domestic acquisitions, which are mainly driven by transactions in Western European countries. On the contrary, applying this more severe definition of M&As, cross-border transactions lead to significant additional wage growth only for the group of below median wage firms. For the latter group, however, this positive effect is again most pronounced with 11.61 percentage points of additional wage growth.

On balance, our estimation results from Table 3 let us conclude that M&As in general, and particularly ones where the acquirer is a foreign firm, tend to induce positive short-run wage effects for workers in the acquired firms. These results are well in line with some single-country studies. Moreover, we are able to show that these effects are most pronounced in low wage M&A targets and tend to be solely induced by cross-border M&As. Accordingly, the positive wage effects of cross-border M&As seem to be most pronounced for firms located in (low wage) Eastern European countries. This result augments the evidence provided by Girma and Görg (2007), who identify some positive wage effects for unskilled workers in the UK.

In order to investigate the robustness of our baseline results, Table 4 reports additional ATT estimates for the M&A–50 definition. The upper two blocks of the table provide results based on two alternative estimators, (i) simple OLS, and (ii) nearest neighbor matching. Both alternative estimators include all variables from the above discussed probit model either as additional controls or matching variables. For the matching procedure we apply the approach proposed by Abadie et al. (2004) and Abadie and Imbens (2006), adjust our estimates for the bias rooted in non-exact matching and apply exact-matching within industry-country-year cells. The results obtained from these alternative estimates clearly point to the robustness of our baseline results. More precisely, the simple OLS estimator and the nearest neighbor matching procedure again indicate that M&As induce positive

**Table 4:** Robustness analysis (baseline definition M&A–50)

	All M&As		Cross-border M&As		Domestic M&As	
	ATT	#M&As	ATT	#M&As	ATT	#M&As
<b>OLS estimation</b>						
Full Sample	4.23*** (3.10)	432	5.72*** (3.00)	230	2.53 (1.30)	202
Western European countries	3.77** (2.43)	341	4.51* (1.94)	163	3.11 (1.50)	178
Eastern European countries	5.35* (1.88)	91	8.25** (2.54)	67	–2.75 (–0.50)	24
Average wages above median	0.33 (0.25)	258	1.08 (0.54)	135	–0.49 (–0.30)	123
Average wages below median	9.10*** (3.52)	174	11.86*** (3.53)	95	5.78 (1.45)	79
<b>Nearest neighbor matching<sup>a)</sup></b>						
Full Sample	4.12*** (3.31)	432	5.55*** (3.03)	230	1.43 (0.74)	202
Western European countries	3.61*** (2.63)	341	4.84** (2.38)	163	2.59 (1.40)	178
Eastern European countries	6.31** (2.13)	91	9.94*** (3.04)	67	–0.46 (–0.07)	24
Average wages above median	–0.08 (–0.07)	258	1.02 (0.55)	135	–1.33 (–0.78)	123
Average wages below median	10.62*** (4.58)	174	12.94*** (4.21)	95	8.01** (2.33)	79
<b>Wage effects in the second year</b>						
Full Sample	3.38 (1.60)	155	2.41 (1.02)	75	3.51 (1.00)	79 <sup>c)</sup>
Western European countries	3.10 (1.23)	116	3.46 (1.23)	48	3.24 (0.85)	68
Eastern European countries	3.82 (1.04)	39	0.87 (0.22)	27	5.09 (0.58)	11 <sup>c)</sup>
Average wages above median	0.03 (0.01)	82	1.47 (0.74)	38	–1.96 (–0.72)	44
Average wages below median	6.53* (1.68)	73	3.06 (0.74)	37	9.52 (1.38)	35
<b>Extensive versus intensive margin wage effects</b>						
Full Sample	2.98*** (1.99)	428 <sup>b)</sup>	3.58 (1.63)	230	1.13 (0.55)	202
Western European countries	3.10* (1.89)	341	3.43 (1.40)	163	1.50 (0.68)	178
Eastern European countries	2.43 (0.69)	87 <sup>b)</sup>	3.71 (0.82)	67	–1.81 (–0.29)	24
Average wages above median	0.18 (0.12)	258	0.85 (0.40)	135	–1.59 (–0.86)	123
Average wages below median	6.48** (2.17)	170 <sup>a)</sup>	7.26* (1.75)	95	4.39 (1.01)	79

Average treatment effect on the treated (ATT) reported in percentage points. *t*-values based on robust standard errors in parentheses. <sup>a)</sup> *z*-values based on bias-adjusted standard errors in parentheses. \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively. <sup>b)</sup> 4 M&A observations are out of common support for the full sample extensive versus intensive margin estimates. <sup>c)</sup> 1 M&A observation is out of common support for the sub-sample of (Eastern-European) domestic M&As.

wage growth effects which are mainly driven by cross-border transactions of low wage firms.

In the third block of Table 4 we investigate the impact of M&As on wage growth for the second year after the transaction using propensity score matching combined with the DID estimator. This approach allows us to investigate whether the positive short-run wage effects are possible offset by lower wage growth later on.<sup>8</sup> In qualitative terms and in line with the Finnish evidence reported by Huttunen (2007), our results indicate that M&As also induce positive wage effects in the second year after the respective transaction. This result is again most pronounced for low wage firms. However, the relatively small number of observations leads to imprecise estimates and increases its standard errors.

Finally, we are interested in the impact of M&As for wage growth in other subsidiaries of multinational and domestic corporate groups. According to Muendler and Becker (2010), extensive margin changes in affiliate presence (such as through M&As) will also affect intensive margin labor demand in already owned affiliates.<sup>9</sup> Consequently, the latter affiliates might experience a decrease in average wages induced by a corporate group's M&A activities. In order to investigate this issue, we construct an alternative control group which only contains subsidiaries of multinational enterprises which are not M&A targets during our observational period. Again, we apply the DID propensity score matching approach described above. The corresponding ATT estimates are reported at the bottom of Table 4. For the full sample of all firms we estimate significantly positive wage effects for M&A targets implying that non-acquired subsidiaries of multinational enterprises would have experienced larger wage growth rates in case of being an acquisition target. In line with our earlier evidence, this effect is most pronounced for the group of low wage firms. In qualitative terms, these effects carry-over to the sub-samples of cross-border and domestic M&As, where the small number of observations results in imprecisely estimated ATTs.

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<sup>8</sup> The small number of M&As and the poor longitudinal quality of the data in the AMADEUS database unfortunately restricts this robustness analysis to only two years after the transaction.

<sup>9</sup> In a similar vein, Oberhofer and Pfaffermayr (2012) apply (generalized) empirical firm growth models to estimate interdependence of employment growth in multinational corporate groups.

### 3.3 Potential sources for the wage premium of foreign ownership

So far, our analysis provides evidence for positive wage effects of M&As, which are most pronounced for cross-border transactions in low wage firms and in Eastern European economies. These findings seem to confirm previous results suggesting positive wage premia of foreign ownership. In this section, we investigate tentatively potential sources of the observed wage premia estimating the impact of M&As on alternative outcome variables: employment, capital intensity, productivity, sales and profits. We apply the same empirical framework as before (i.e., propensity score matching combined with a DID estimator) and calculate growth rates for each of these outcome variables.

Table 5 reports the estimates of the ATT regarding the impact of M&As on a firm's post-acquisition (i) number of employees, (ii) capital intensity, (iii) total factor productivity, (iv) sales, and (v) profits. For most of these variables, we obtain insignificant parameter estimates, which is not surprising as the sample size is generally reduced now.<sup>10</sup> Hence, the results of Table 5 should be interpreted very cautiously. Nevertheless, we would like to draw the following conclusions regarding the sources of the observed wage premia of M&As.

First, our estimates regarding the change in employment suggests that M&A targets in Eastern European countries tend to downsize employment immediately after the transaction took place. This, together with a positive effect on capital intensity, might explain the positive wage effects for this group of firms. Second, M&As seem to have a substantial impact on profits of domestically acquired firms with low wages and/or located in Eastern European economies (notice that we have extremely low observations in both cases). Even more interestingly, in qualitative terms, cross-border M&As seem to be accompanied by a decrease in short-run profits, which might be explained by the wage increases estimated above. Further, we observe increased sales for cross-border M&As, especially at the lower end of the wage distribution, indicating that these firms increased their market shares and employee remuneration simultaneously. Finally, the impact of domestic M&As on productivity, in contrast, is insignificant throughout.

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<sup>10</sup> This reduction in the sample size is due to missing post-acquisition information for our alternative outcome variables.

**Table 5:** Potential sources of wage differences (baseline definition M&A–50)

	All M&As		Cross-border M&As		Domestic M&As	
	ATT	#M&As	ATT	#M&As	ATT	#M&As
<b>Employment</b>						
Full Sample	–0.27 (–0.24)	424	–1.09 (–0.66)	227	0.57 (0.38)	197
Western European countries	1.57 (1.32)	335	1.34 (0.76)	161	1.26 (0.80)	174
Eastern European countries	–7.24** (–2.54)	89	–6.95* (1.91)	66	–4.72 (–1.01)	23
Average wages above median	0.70 (0.57)	257	0.06 (0.03)	133	0.22 (0.13)	124
Average wages below median	–1.62 (–0.76)	167	–2.65 (–0.83)	94	1.59 (0.58)	73
<b>Capital intensity</b>						
Full Sample	0.74 (0.48)	425	2.69 (1.27)	225	–2.56 (–1.15)	200
Western European countries	–0.75 (–0.45)	337	1.61 (0.69)	161	–3.46 (–1.47)	176
Eastern European countries	6.33* (1.69)	88	5.02 (1.11)	64	4.35 (0.69)	24
Average wages above median	0.25 (0.13)	255	2.98 (1.10)	131	–2.55 (–0.97)	124
Average wages below median	1.48 (0.56)	170	2.14 (0.63)	94	–2.46 (–0.61)	76
<b>Total factor productivity</b>						
Full Sample	1.18 (0.61)	269	2.61 (1.05)	151	–0.20 (–0.07)	118
Western European countries	1.71 (0.84)	206	2.66 (0.99)	103	1.09 (0.35)	103
Eastern European countries	–0.47 (–0.10)	63	2.26 (0.42)	48	–8.64 (–0.92)	15
Average wages above median	0.14 (0.07)	165	2.15 (0.85)	85	–2.20 (–0.67)	80
Average wages below median	2.52 (0.68)	104	2.74 (0.59)	66	3.91 (0.65)	38
<b>Sales</b>						
Full Sample	2.87* (1.78)	423	3.95* (1.75)	226	1.41 (0.62)	197
Western European countries	2.07 (1.16)	334	3.03 (1.14)	159	1.61 (0.68)	175
Eastern European countries	5.59 (1.52)	89	5.88 (1.41)	67	–0.59 (–0.08)	22
Average wages above median	–1.32 (–0.75)	266	–0.52 (–0.21)	133	–0.94 (–0.37)	133
Average wages below median	9.69*** (3.18)	157	10.12** (2.50)	93	5.84 (1.30)	64
<b>Profits</b>						
Full Sample	3.69 (0.83)	186	–4.76 (–0.72)	92	7.69 (1.28)	94
Western European countries	4.16 (0.86)	156	–0.54 (–0.07)	69	4.40 (0.72)	87
Eastern European countries	0.38 (0.03)	30	–18.22 (–1.48)	23	48.43** (2.16)	7
Average wages above median	0.54 (0.11)	122	–5.92 (–0.78)	61	–3.51 (–0.52)	61
Average wages below median	9.17 (1.05)	64	–2.49 (–0.20)	31	29.86** (2.62)	33

Average treatment effect on the treated (ATT) reported in percentage points. *t*-values based on robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively.

Overall, the evidence from Table 5 remains ambiguous and it lends support to the view that the observed wage premium of M&As is not necessarily caused by one specific aspect of firm behavior. It might be rather explained by manifold reasons, some of them are probably not captured in our sample of European firms (e.g., skill levels or firm differences in technologies). One alternative explanation might be that our variables of interest are adjusted very differently after an acquisition. For instance, while it might be easy to change wages immediately, it typically takes more time to increase productivity or sales. In any case, more detailed information at the firm level would be needed to provide a clear answer to the sources of the observed wage premia of M&As.

## 4 Conclusions

This paper provides evidence on whether cross-border acquisitions of firms exerts a systematic impact on labor compensation. We focus on a cross-section of countries using firm-level data from 16 European economies between 1999 and 2006. To account for a possible selection bias we use propensity score matching techniques, also applied in previous related contributions and combine this approach with a difference-in-differences (DID) estimator. Accordingly, we compare wages in acquired firms with ones in non-acquired firms, focusing on wage growth one year after the transaction has taken place.

Our findings might be summarized as follows. First, we are not able to provide evidence that foreign mergers and acquisitions (M&As) are associated with a downward pressure on wages, but rather, we broadly observe positive wage premia of such ownership changes. Second, pay differences between acquired and non-acquired firms are largest for ones with average labor compensation below the median. From this, one might conclude that foreign acquisitions do not induce a downward pressure on wages at the lower end of the wage distribution. Third, we find systematic differences in wage premia between Western and Eastern European countries, suggesting that wage policies of acquiring firms are distinctive in these groups of countries. Accordingly, the positive wage effects of cross-border M&As seem to be most pronounced for firms located in (low wage) Eastern European countries. From a political point of view, this latter result implies that cross-border

M&As might be one potential driving force for a (potential) catching-up process in Eastern European countries.

In contrast to the existing literature, providing comprehensive single-country evidence on wage premia, our results rely on firm-level information from more than one economy. Unfortunately, matched employer–employee data for a larger country coverage are not available so far and, therefore, we are unable to analyze within-firm wage distributions. Previous papers exploiting such information for single countries suggest that foreign M&As, on average, are paying higher wages, being in line with the evidence presented in our paper. However, they also observe negative pay differentials for workers at lower end of the wage distribution (see, e.g., Heyman et al. 2011). Our results indicate that this is not necessarily driven by low wage industries and firms, but it might be rather rooted in a general increase of within-firm wage inequalities. This result seems also to be confirmed by the related literature on the wage effects of offshoring (see, e.g., Geishecker and Görg 2012). From this, one might conclude that there are still losers of globalization. Hopefully, matched employer–employee data from more than one country is available soon to address this issue further.

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## Appendix

**Table A.1: Balancing property (baseline definition M&A–50)**

		Full sample M&As					
Variable	Sample	Mean		% bias	% reduct.  bias	t-test	
		Treated	Control			t	p>  t
Number of employees	Unmatched	4.736	3.208	111.1		23.08	0.000
	Matched	4.736	4.734	0.1	99.9	0.02	0.985
Number of employees <sup>2</sup>	Unmatched	24.314	12.180	100.5		24.63	0.000
	Matched	24.314	24.208	0.9	99.1	0.12	0.907
Average wages	Unmatched	2.861	2.777	6.8		1.52	0.128
	Matched	2.861	2.905	–3.6	47.5	–0.51	0.613
Total factor productivity	Unmatched	2.944	2.542	62.9		13.12	0.000
	Matched	2.944	2.968	–3.7	94.2	–0.54	0.589
Profitability	Unmatched	0.052	0.069	–15.2		–3.36	0.001
	Matched	0.052	0.056	–3.7	75.7	–0.56	0.574
Leverage	Unmatched	0.632	0.656	–9.6		–2.10	0.036
	Matched	0.632	0.634	–0.7	92.2	–0.11	0.912
Market shares	Unmatched	0.014	0.003	24.4		11.74	0.000
	Matched	0.014	0.011	5.1	79.2	0.66	0.509
Capital intensity	Unmatched	4.687	4.267	40.8		8.45	0.000
	Matched	4.687	4.697	–1.0	97.4	–0.15	0.880
		Cross-border M&As					
Variable	Sample	Mean		% bias	% reduct.  bias	t-test	
		Treated	Control			t	p>  t
Number of employees	Unmatched	5.041	3.208	133.7		20.21	0.000
	Matched	5.041	5.069	–2.0	98.5	–0.22	0.826
Number of employees <sup>2</sup>	Unmatched	27.272	12.180	120.8		22.36	0.000
	Matched	27.272	27.532	–2.1	98.3	–0.19	0.846
Average wages	Unmatched	2.625	2.776	–11.2		–1.98	0.047
	Matched	2.625	2.707	–6.0	46.1	–0.58	0.559
Total factor productivity	Unmatched	2.939	2.542	60.9		9.46	0.000
	Matched	2.939	2.954	–2.2	96.4	–0.22	0.822
Profitability	Unmatched	0.052	0.069	–14.4		–2.30	0.021
	Matched	0.052	0.049	3.2	78.1	0.35	0.730
Leverage	Unmatched	0.615	0.656	–15.3		–2.57	0.010
	Matched	0.615	0.628	–4.7	69	–0.51	0.613
Market shares	Unmatched	0.021	0.003	31.8		14.65	0.000
	Matched	0.021	0.021	–0.3	99.2	–0.02	0.983
Capital intensity	Unmatched	4.589	4.267	30.6		4.73	0.000
	Matched	4.589	4.619	–2.9	90.6	–0.29	0.772
		Domestic M&As					
Variable	Sample	Mean		% bias	% reduct.  bias	t-test	
		Treated	Control			t	p>  t
Number of employees	Unmatched	4.388	3.208	88.1		12.20	0.000
	Matched	4.388	4.388	0.0	100.0	0.00	0.997
Number of employees <sup>2</sup>	Unmatched	20.945	12.180	78.9		12.18	0.000
	Matched	20.945	20.920	0.2	99.7	0.02	0.983
Average wages	Unmatched	3.129	2.776	33.5		4.34	0.000
	Matched	3.129	3.129	0.1	99.8	0.01	0.995
Total factor productivity	Unmatched	2.950	2.542	65.2		9.10	0.000
	Matched	2.950	2.954	–0.6	99.1	–0.06	0.955
Profitability	Unmatched	0.050	0.069	–16.1		–2.46	0.014
	Matched	0.050	0.055	–4.5	72.3	–0.47	0.638
Leverage	Unmatched	0.651	0.656	–2.3		–0.32	0.746
	Matched	0.651	0.648	1.1	53.2	0.11	0.913
Market shares	Unmatched	0.005	0.003	12.1		1.55	0.120
	Matched	0.005	0.005	–0.8	93.3	–0.09	0.927
Capital intensity	Unmatched	4.798	4.267	53.3		7.32	0.000
	Matched	4.798	4.808	–0.9	98.2	–0.10	0.923



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