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Domestic and foreign acquisitions, plant survival and employment effects

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ABSTRACT

We estimate causal treatment effects of domestic and foreign acquisitions on plant survival, employment (growth) and the skill composition within acquired plants. To do so, we look at takeovers of private firms in Danish manufacturing and service sectors during the period 2002–2015. We use plant-, firm-, and industry-level information to control for the non-random selection of the acquisition targets, differentiated for domestic and foreign acquirers, by combining a difference-in-differences approach with a propensity score weighting estimator. Our results reveal positive effects on plant survival, employment (growth) and the skill intensity for domestic targets, while foreign targets reduce their skill intensity following an acquisition.

KEYWORDS

Acquisition; plant survival; employment growth; did matching estimator

JEL CLASSIFICATION

F23; L23

I. Introduction

The substantial increase of domestic and cross-border merger and acquisitions (M&As) has led to mixed feeling among policymakers. M&As may lead to synergy gains that ultimately may strengthen the overall competitiveness and survival prospects of the acquired target. Yet, M&As may take place to gain market power and access, followed by reducing substantially the scale of operations (intensive margin) and survival probabilities (extensive margin) in acquired targets. Nowadays, there exists a comprehensive literature that provides predictions and facts about the causes and consequences associated with M&As, derived out of theoretical and, in particular, empirical studies. The findings in this literature are, however, quite mixed and micro-level evidence on the causal effects of M&As on employment (growth) and plant survival is still scarce.

Most importantly, only few studies systematically distinguish between domestic and foreign M&As and, due to difficulties to control for the non-random choice of acquisition targets, it is unclear if the causal effects differ between domestic and foreign takeovers. Domestic and foreign acquirers might differ in their motives for an acquisition, e.g. efficiency gains vs. market access and, thus, acquirer might target different targets depending on their incentives. Such

differences are crucial and need to be considered, to provide a thorough analysis on the causal effects of domestic and foreign M&As. Lehto and Böckerman (2008) and Balsvik and Haller (2010, 2020) who focus on the intensive margin of adjustments, find positive selection of foreign owners. Looking at the treatment effects of M&As, Lehto and Böckerman (2008) document negative employment effects after domestic and foreign takeovers, Balsvik and Haller (2010) show positive employment effects following a foreign acquisition but no significant adjustments after a domestic takeover, and Balsvik and Haller (2020) find no substantial changes in skill shares around the time of takeovers. While these studies compare domestic to foreign takeover, their analysis is limited to specific outcomes in the treatment analysis. This paper tries to fill this important gap, by providing a systematic and precise differentiation before and after ownership changes.

To be more specific, this paper provides an in-depth analysis on the treatment effects of domestic and foreign takeovers. We focus on the extensive margin (i.e. plant survival) and intensive margin (i.e. employment and skill adjustments within plants) and use different recent approaches to control for the non-random selection of targets by domestic and foreign acquirers. To do so, we use a detailed and unique dataset that combines plant-, firm-, and industry-

level information across Danish manufacturing and service sectors during the period 2002–2015. To reveal causal treatment effects of domestic and foreign M&As, we control for the non-random selection of the acquisition target by combining a difference-in-differences approach with a propensity score weighting estimator. We combine firm and plant controls (including lagged values of the dependent variables) in the estimation of propensity scores, which we estimate separately for domestic and foreign takeovers. Thus, we take into account crucial differences between firms and their plants that are involved in a domestic or foreign takeover across different dimensions.¹ Furthermore, we also follow the recent approach of Fons-Rosen et al. (2021) and match foreign-acquired firms to similar domestic-acquired firms in another set of propensity score matching (PSM) estimates.

Our results reveal positive effects on plant survival, employment (growth) and the skill intensity for domestic targets, while foreign targets reduce their skill intensity following an acquisition. These results are robust to different PSM methods and different sub-samples. By detecting crucial differences in the treatment effects of domestic and foreign takeovers, our study provides novel results to the literature. The paper proceeds as follows; section 2 briefly presents the data and the methods used in our empirical study, section 3 presents our results and section 4 concludes.

II. Data and methodology

The data consists of register-based information at the firm-plant level assembled annually over the period 2002–2015 by Statistics Denmark and covers private firms in the manufacturing and service sectors. To identify foreign takeovers we use information on the ultimate owner of the firm. For domestic acquisitions, we follow the same method as in Bandick and Görg (2010) by using the unique identification code that connect plants to their associated firm. If the firm

identifier attached to each of these plants changes from 1 year to the next and the ‘new’ firm is not foreign, we can then conclude that another domestic firm acquires the plants. We focus attention to those cases where all plants are taken over (90% of acquisitions) and limit the sample to those firms and plants that change ownership only once during the sample period. Our sample covers almost 90.000 plants, out of which we identify 6745 plants (which corresponds to 6448 firms) involved in a domestic takeover and 2442 plants (1102 firms) involved in a foreign takeover.²

We use our sample to estimate the impact of a domestic or foreign takeover on plant employment, its growth, the skill intensity, and plant survival. For the first set of outcome variables, we estimate the following equation, separately for domestic and foreign takeovers:

$$y_{it} = \beta I_{it-1} + \gamma_i + \mu_{st} + \varepsilon_{it} \quad (1)$$

where y_{it} refers to the plant-level outcome (e.g. employment) in year t , I is an indicator variable for domestic or foreign takeovers that is one following the acquisition, γ_i is a plant-fixed effect, μ_{st} denotes industry-year fixed effects for 43 industries at the 2-digit level, and ε_{it} is an error term. We focus attention to the estimate of the parameter β , which captures the effect of a change in ownership and is identified from within-plant variation. To reveal the causal effects of a domestic and foreign takeover, we combine this difference-in-differences approach with a propensity score weighting estimator. The PSM allows us to construct, on a yearly basis, a sample of domestic or foreign acquired and non-acquired plants with similar characteristics. Conditional on these characteristics, we estimate the plants’ probability (or propensity score) to be involved in a foreign or domestic takeover. We then select the nearest control plants as a match for the acquired plant and use this matched sample to estimate equation (1).³

¹In the appendix, we present estimation results on the selection of domestic and foreign targets following the strategy in Guadalupe, Kuzmina, and Thomas (2012) and reveal crucial differences between domestic and foreign targets along many dimensions.

²In the appendix, we provide summary statistics and detailed definitions on the variables we use in the subsequent empirical analysis.

³More specifically, we use a probit model to estimate the firms’ probability (or propensity score) to be acquired either by foreign or by other domestic firms. Once the propensity scores are calculated, the nearest control firms in which the propensity score falls within a pre-specified radius can be selected as a match for the acquired firm. This is done using the ‘caliper’ matching method, where we follow previous literature, i.e. Becker and Ichino (2002) and Heinrich, Maffioli, and Vazquez (2010), by setting the radius to 0.001 in the PSMATCH2 routine in Stata version 15 as described by Leuven and Sianesi (2003). Moreover, the balancing condition, i.e. each independent variable does not differ significantly between acquired and non-acquired firms (see Tables C-H in the Appendix), and the so-called common support condition, i.e. firms with the same values for independent variables have a positive probability of being both acquired and non-acquired firms, need to be verified. The constructed matched sample is then used to estimate variants of equation (1), similar to Greenaway and Kneller (2007) or Bandick and Karpaty (2011).

As to avoid having foreign and domestic targets matched together, we need to construct separate matched samples. As shown in the appendix, domestic and foreign targets differ along many dimensions, e.g. in terms of size, exporting, importing, capital intensity and labour costs, both at the level of the firm and the plant. We thus estimate the propensity scores separately for domestic or foreign targets, while excluding the other from the estimation and use two set of variables. The first one includes lagged firm controls (sales, labour productivity, number of plants, indicator for exporting and importing, capital per worker and wages per worker), the second one in addition includes lagged plant controls (age and wages per worker) and the first and second lag of our dependent variables (employment, employment growth, skill intensity). Notably, we include the lagged values of the dependent plant outcomes 'in order to hedge again the regressions spuriously

picking up pre-existing trends with the foreign acquisition variables' (Fons-Rosen et al. 2021, 7). In addition, we run PSM for these two sets of control variables, on a sample that only consists of acquired firms, thereby matching foreign-acquired plants to similar domestic-acquired plants, as proposed by Fons-Rosen et al. (2021). Finally, we follow Bandick and Görg (2010) to estimate the impact of a takeover on plant survival by using a discrete logistic (proportional odds) model in combination with the estimated propensity scores, where the dependent variable in equation (1) is an indicator variable equal to one, if the plant exits.

III. Results

Table 1 present results on the causal treatment effects of domestic or foreign acquisitions on plant employment (Panel A), employment

Table 1. Treatment effects of domestic and foreign acquisitions.

Employment						
Panel A	(1)	(2)	(3)	(4)	(5)	(6)
Lag domestic	0.119*** (0.0074)		0.083*** (0.0089)			
Lag foreign		0.022 (0.0248)		0.065*** (0.0197)	0.021 (0.0485)	-0.003 (0.0457)
Observations	457,386	413,191	314,230	282,150	69,806	52,932
R-squared	0.038	0.038	0.062	0.061	0.048	0.060
Employment growth						
Panel B	(1)	(2)	(3)	(4)	(5)	(6)
Lag domestic	0.049*** (0.0066)		0.099*** (0.0082)			
Lag foreign		-0.005 (-0.0172)		-0.01 (0.0116)	0.002 (-0.0558)	-0.004 (0.0260)
Observations	457,386	413,191	314,230	282,150	69,806	52,932
R-squared	0.021	0.019	0.025	0.025	0.041	0.025
Share of skilled workers						
Panel C	(1)	(2)	(3)	(4)	(5)	(6)
Lag domestic	0.193*** (0.0180)		0.153*** (0.0218)			
Lag foreign		-0.618*** (0.0516)		-0.532*** (0.0491)	-0.459*** (-0.0893)	-0.448*** (0.115)
Observations	457,386	413,191	314,230	282,150	69,806	52,932
R-squared	0.442	0.461	0.490	0.512	0.451	0.508
Plant closure						
Panel D	(1)	(2)	(3)	(4)	(5)	(6)
Lag domestic	0.716*** (10.49)		0.895*** (2.99)			
Lag foreign		0.934 (0.70)		0.982 (0.17)	2.524*** (3.94)	1.072 (0.19)
Observations	457,386	413,191	314,230	282,150	69,757	52,901

The dependent variable in Panel A is the log number full-time equivalents (FTEs) at the establishment, Panel B is the growth rate (FTE's), Panel C is the inverse hyperbolic sine of the share of upper and middle level of skill workers, Panel D is an indicator variable equal to 1 if the plant closes. Domestic (foreign) is a dummy variable, equal to one if the plant changes ownership to another domestic (foreign) firm. Coefficients in Panel A, B and C report the percentage point change in the dependent variable one year after the acquisition, while coefficients in Panel D report the hazard ratios (exponentiated coefficients), where a coefficient less (greater) than one implies increasing (decreasing) survival probability. The reference group in column (1)-(4) are non-acquired firms, in column (5) and (6) domestic acquired firms. Columns (1), (2) and (5) include firm controls in the PSM, column (3), (4) and (6) also add plant controls and the first and second lag of our dependent variables. See the text for further details on the PSM. All regressions include industry-year and plant fixed effects. Robust standard errors (in parentheses) are clustered at the plant level. *, **, *** denote significance at the 10%, 5%, 1% levels, respectively.

growth (Panel B), skill intensity (Panel C) and plant survival (Panel D). Column (1) and (2) refer to PSM that includes firm controls; column (3) and (4) include also plant controls in the estimation of the propensity scores. Finally, column (5) and (6) present the results for foreign acquisitions from PSM that selects matched plants in the control group out of the sample of domestic acquired plants. Looking at column (1) and (3) in Panel A, B and C, our results reveal positive effects on employment, its growth and the skill intensity within plants following a domestic acquisition. Looking at the respective columns in Panel D, the estimates reveal a higher survival probability.⁴ Looking at the outcomes for plants involved in a foreign takeover (columns (2), (4)-(6)) reveals no robust evidence of any significant change in employment (growth) or the survival probability, but shows a statistically significant negative impact on the skill intensity (Panel C) across all PSM methods.⁵ The results presented in column (5) and (6) are in line with these findings. While the interpretation of the coefficients do not differ to those from other columns, it is important to keep in mind that the reference group are domestic acquired firms, thereby 'isolating the 'foreign' component of acquisitions from the acquisition itself (Fons-Rosen et al. 2021, 2).

IV. Conclusion

This paper reveals differences in the causal treatment effects of domestic and foreign takeovers on plant survival, employment (growth) and skill intensity. We find that plants following a domestic acquisition expand in terms of (skilled) workers and are less likely to close, we do not find evidence for plant closure or overall employment losses following a foreign acquisition but reveal negative effects for skilled workers in foreign acquired plants.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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⁴Panel D report the hazard ratios (exponentiated coefficients) which means that a coefficient less (greater) than one implies increasing (decreasing) survival probability.

⁵In a set of robustness estimates, we rerun estimations akin to those presented in Table 1 for small plants (less than 10 employees), and survived plants (not Panel D). We also include controls for failed others plants and rerun the estimations only for the manufacturing sector. Results presented in Table 1 are robust to these sample adjustments.