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Impact of Acquistions by Foreign Companies on Innovation Activities

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Abstract

This study examines the impact of foreign acquisitions on innovation activities in Finnish target firms using comprehensive linked employer-employee data from 2010–2021. Unlike previous research that found negative effects on R&D expenditures and patenting, we measure innovation through the share of R&D personnel in total employment. Our main finding is that foreign acquisitions have a statistically insignificant and economically small impact on the share of R&D employees in target firms. Three years post-acquisition, the point estimate shows a 0.9 percentage point increase in R&D employee share, and we can rule out increases over 2 percentage points and decreases below 0.09 percentage points. This null effect persists across different firm sizes and industries. Our results suggest that con-cerns about foreign acquisitions substantially reducing domestic R&D activity may be overstated, at least when measured by R&D employment.

Tiivistelmä

Miten ulkomaiset yrityskaupat vaikuttavat yritysten innovaatiotoimintaan?

Tässä tutkimuksessa tarkastellaan ulkomaisten yritysostojen vaikutusta innovaatiotoimintaan suomalaisissa kohdeyrityksissä käyttäen yhdistettyä työnantaja-työntekijäaineistoa vuosilta 2010–2021. Toisin kuin aiemmissa tutkimuksissa, joissa ulkomaisten yritysostojen on havaittu vähentävän t&k-menoja ja patentointia, mittaamme innovaatiota t&k-henkilöstön osuudella kokonaistyöllisyydestä. Päähavaintomme on, että ulkomaisilla yritysostoilla on tilastollisesti merkityksetön ja taloudellisesti pieni vaikutus kohdeyritysten t&k-henkilöstön osuuteen. Piste-estimaatti t&k-henkilöstön osuuden muutokselle on +0,9 prosenttiyksikköä kolme vuotta yritysoston jälkeen. Voimme myös sulkea pois yli 2 prosenttiyksikön kasvun ja alle 0,09 prosenttiyksikön laskun. Tämä nollavaikutus nähdään myös erikokoisissa yrityksissä ja toimialoilla. Tuloksemme viittaavat siihen, että huoli siitä, että ulkomaiset yritysostot vähentäisivät merkittävästi kotimaista t&k-toimintaa, voi olla liioiteltua.

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Keywords: Acquisition, M&A, Research, Development, R&D, Innovation, Impact

Asiasanat: Yrityskauppa, Tutkimus, Kehittäminen, Innovaatio, T&k, Vaikutus

JEL: O3, L6, L64

1 Introduction

Technology development is one of the key issues affecting economic growth, and research and development (R&D) activities are key intentional investments for discovering new knowledge affecting technological change. Market failures, such as capital market imperfections and knowledge spillovers, provide an economic justification for government intervention to incentivize and subsidize the R&D activities of private companies.

However, due to mergers and acquisitions, the ownership of firms that invested earlier in R&D might change. The new owner potentially reorganizes the target and integrates it into its existing units, which can lead to changes in innovation activity. However, it is not obvious how the innovation activity of the target firm changes. Innovation activity and R&D are types of investments that face market imperfections. Because of the intangible nature of R&D, problems of asymmetric information between lenders and borrowers lead to increased costs of external financing or difficulty in obtaining financing (Hubbard, 1997; see also Fazzari et al., 1988). Using the terminology by Akerlof (1970), Bronwyn Hall and Josh Lerner (2009) describe the financing market for the development of innovative ideas as "lemons" market because investors have difficulties to distinguish good R&D projects from bad R&D projects. Thus, in the pre-merger period, the target has potentially suffered financing constraints, which has prevented it from investing in all R&D projects with positive net present value. If the new owner has more financial resources, it may remove financial constraints by transferring finance to the firm it acquired, which, in turn, leads to an increase in the target's R&D activity.

There are also arguments that lead to different conclusions. Knowledge spillovers, information sharing, and matching of resources create agglomeration benefits that are also important for R&D (Carlino and Kerr, 2014). Due to these benefits, in the post-merger period, the acquirer potentially reorganizes the group's structure and concentrates R&D activities to certain locations. This is particularly true for cross-border acquisitions, as R&D is typically conducted close to headquarters or main production sites (UNCTAD, 2005, p.158). As a result, the target firm's R&D activities might be transferred to other locations. Another motivation for relocation is cost savings if R&D is transferred to low-cost countries. Based on a three-player oligopoly market, the theoretical model by Haucap et al. (2019) suggests that a merger diminishes merged entity's innovation effort particularly in high research intensity industries. Furthermore, the model predicts that M&As also have a negative effect on the innovation activity of non-merger competitors because the merger diminishes competition.

In sum, there are good arguments for acquisitions leading to an increase in R&D and acquisitions leading to a decrease in R&D. Thus, it is an open empirical question as to which one of these prevails. Previous studies have found negative effects on R&D expenditures and patenting activity in acquired firms (e.g. Szücs, 2014; Stiebale and Reize, 2011 and Haucap et al., 2019). A key challenge in examining this topic is the availability of data. Most companies do not report their R&D expenditure because it is not mandatory. The same challenge applies to the register-based data of national statistical authorities. They also do not contain data on the R&D expenditure of all enterprises. Some previous studies on foreign acquisitions have determined innovation activity through patent applications. The advantage of patent data is that they are comprehensively available. However, its weakness is that far from all companies patent, and in many cases, their innovations are not patentable.

We study the impact of foreign acquisitions on innovation activities in Finnish target firms, using comprehensive linked employer-employee data from 2010-2021. We measure innovation activities by the share of R&D employees in a firm's total employment. Since we use register-based data, we can calculate this share for the entire company population. This is a big advantage compared to using R&D expenditure or R&D intensity as a measure because R&D expenditure is not available for all companies. Our main finding is that foreign acquisitions have a statistically insignificant and economically small impact on the share of R&D employees in target firms. Three years after acquisition, we estimate a 0.9 percentage point increase in the R&D employee share, but can rule out increases over 2 percentage points and decreases below 0.09 percentage points. The null effect persists across different firm sizes and industries.

The remainder of this paper is organized as follows. The next section discusses prior literature, after which we turn to data-related issues, including variable construction and summary statistics in Section

3. Our methodology and empirical strategy are described in Section 4, and Section 5 presents the results of the empirical analyses and robustness tests. Finally, Section 6 concludes the study.

2 Prior literature

Existing empirical literature concerning the impacts of cross-border M&As on a target's innovation activity is relatively scarce. Stiebale (2016) analyzed the impact of cross-border M&As on innovations in European firms. He used patent applications as an indicator of innovation activity. According to the results, the patent applications of the acquiring companies increased by more than 30% after acquisition. In contrast, patent applications of the target companies decreased by more than 60 percent. Asymmetric effects of M&As on the innovation activities of acquirers and targets was also found in another study that analyzed M&As in the U.S. and Europe during 1990-2009 (Szücs, 2014). The findings suggest that the effects on acquirers are small, but the effect on targets' R&D growth is significantly negative.

The result that the acquirer's innovation activity increases after cross-border M&A was echoed in another study (Hsu et al., 2021). This study included more than 85,000 M&A deals between 1990 and 2010 from various countries. According to the results, firms from less innovative countries increase their R&D efforts and generate more patents after acquiring companies from more innovative countries.

According to a study focusing on M&A deals in the pharmaceutical industry in 1991-2007, patent applications of merged entities decrease after M&A (Haucap et al., 2019). In addition to the parties involved in the M&A, the deals also reduced the innovation activity of competitors. The significance of the results is increased by the fact that the pharmaceutical industry is one of the sectors investing the most in R&D.

The paper most closely related to ours is Stiebale and Reize (2011), which focused on the impacts of foreign acquisitions on target firms. The analysis was based on a representative survey of German firms, which was combined with financial and ownership data (AMADEUS database). The period covered the period between 2002-2007. The results suggest that foreign acquisitions have a high negative impact on targets' R&D intensity.

Our results differ from the existing literature in that we do not find statistically significant negative impacts of foreign acquisitions on the R&D intensity of the target firms.

3 Data and Descriptive Statistics

Our analysis is based on administrative linked employer-employee datasets from Finland. The population-wide dataset covers practically all employees in all firms over the period 2010-2021. The data enables us to link each employee with his or her employer every year. We employ the Finnish Linked Employer-Employee Data (FOLK), which Statistics Finland (a government agency that produces official statistics in Finland) has specially constructed at the micro-level for research purposes. This dataset was constructed by merging the comprehensive administrative records of all employees and all employers. For enterprises, the data includes annual information on ownership (domestic or foreign), the industry, and financial statements.

For us, the key employee-level information concerns the occupation of each employee because we identify R&D employees based on their occupation. We utilize the ISCO classification to track R&D employees. Table A1 in the Appendix includes the list of ISCO occupations that we define as R&D occupations.

Companies with more than 50% foreign ownership are defined as foreign-owned. Otherwise, firm is classified as a domestic firm. We define foreign acquisitions as the transition from domestic ownership to foreign ownership between years *t-1* and *t*. Firms can change ownership several times during our study period, although most commonly ownership changes occur only once. This means that we also have domestic firms that acquire foreign firms. We identify 3937 acquisitions with foreign acquirers.

Table 1 presents the summary statistics of the targets and firms belonging to the control group. The target companies have a larger share of R&D personnel and more establishments and employees but are less profitable. The shares of foreign trade companies in the target and control groups are very close to each other, as are the variables depicting the financing of the company.

Table A2 in the Appendix shows that the most common industries of the target firms are manufacturing (32.9%); wholesale and retail trade (17.2%); information and communication (12.1%); and professional, scientific, and technical activities (12.8%). Thus, the targets are not only in the manufacturing sector, but also in the service sector. Table A3 in the Appendix shows that the target firms are mostly those with fewer than 250 employees. Firms employing more than this comprises only 17,7% of all target firms. The acquisitions take place quite uniformly over our observation period, as can be seen in Table A4 in the Appendix.

In the next section, we describe the methods we use to estimate the impact of foreign acquisition on the share of R&D personnel in the target firms, but it is worth mentioning here that the method relies on parallel trends and non-anticipation assumptions and not on the similarity of the firms as such. We will show later the tests assessing the key assumptions of the model. Thus, the fact that the firms are e.g. of different sizes does not matter as such for the methods if the control and target groups have parallel trends.

Table 1 Descriptive statistics

Variable	Control group	Targets
R&D personnel, %	9.44	13.37
No. of establishments	5.21	10.80
Exporter, %	45.08	45.29
Importer, %	59.66	61.62
Turnover, millions of Euros	68.85	55.50
Personnel	177.99	204.69
Revised operating margin	3.72	2.88
Net profit	1.90	0.98
Equity ratio, %	38.17	34.16
Debt-equity ratio, %	56.13	54.75
Relative indebtedness , %	42.70	43.53
N	32 171	3 937

Note: Mean values of variables for cross-border acquisition targets and firms in the control group.

The origins of the foreign acquirers in these deals are presented in Table 2. It is seen from the table that Sweden is by far the most common origin of foreign investors, followed by the United Kingdom and the United States. Overall, European countries dominate this list. The number of observations is smaller in this table than in Table 1, since the data on the origin of foreign investors contain many missing values, especially in the earlier years.

Table 2 Distribution of the origin of foreign investors

Country	% of targets
Sweden	25.2 %
United Kingdom	11.0 %
United States	8.6 %
Netherlands	6.8 %
Germany	6.4 %
Denmark	5.1 %
Norway	5.1 %
Switzerland	4.8 %
Japan	4.3 %
Luxembourg	3.7 %
France	3.4 %
Other countries	15.5 %

Note: N=2047

4 Empirical strategy

To estimate how foreign acquisitions affect the share of R&D personnel up to five years after acquisition, we use the methods developed by De Chaisemartin and d'Haultfoeuille (2024). Their estimator can be used in settings where the treatment is non-absorbing (that is, units can revert to a non-treated state, possibly several times), treatment effects are heterogeneous, and lagged treatments may affect the outcomes. The estimator relies on no-anticipation and parallel trends assumptions, which can be assessed by placebo estimators developed in the same article. We calculate the non-normalized event-study effects DID_l, where l denotes periods after the treatment and takes the values 1-3.

Estimator DID_1 compares the average evolution of the share of R&D personnel of acquired firms one year before and after the acquisition to that of firms that were not acquired at that point in time (they might be acquired later, or they might never be acquired). More generally, the estimator DID_l compares the average evolution of the share of R&D personnel of acquired firms from one year before acquisition to l years after acquisition to that of firms that were not acquired in the same time window. Standard errors are clustered at the firm level.

The placebo estimators are calculated analogously. For example, the placebo estimator DID^{pl}_1 uses the same treatment and control groups as DID_1, *but* compares the outcome evolutions from two years before the acquisition to one year before the acquisition. We also calculate the placebo estimators for the five years before the acquisition.

This method is preferable to the often-used alternative of combining matching with difference-in-differences analysis. This is because of the following factors: First, this method provides unbiased estimates when treatment takes place over time, and the treatment effects are heterogeneous. Second, combining matching with difference-in-differences may lead to increased bias in the estimates owing to the regression to the mean (Ham and Miratrix 2024). Third, matching is typically used in cases where the pre-trends are not similar in the treatment and control groups, but in our case, they align well.

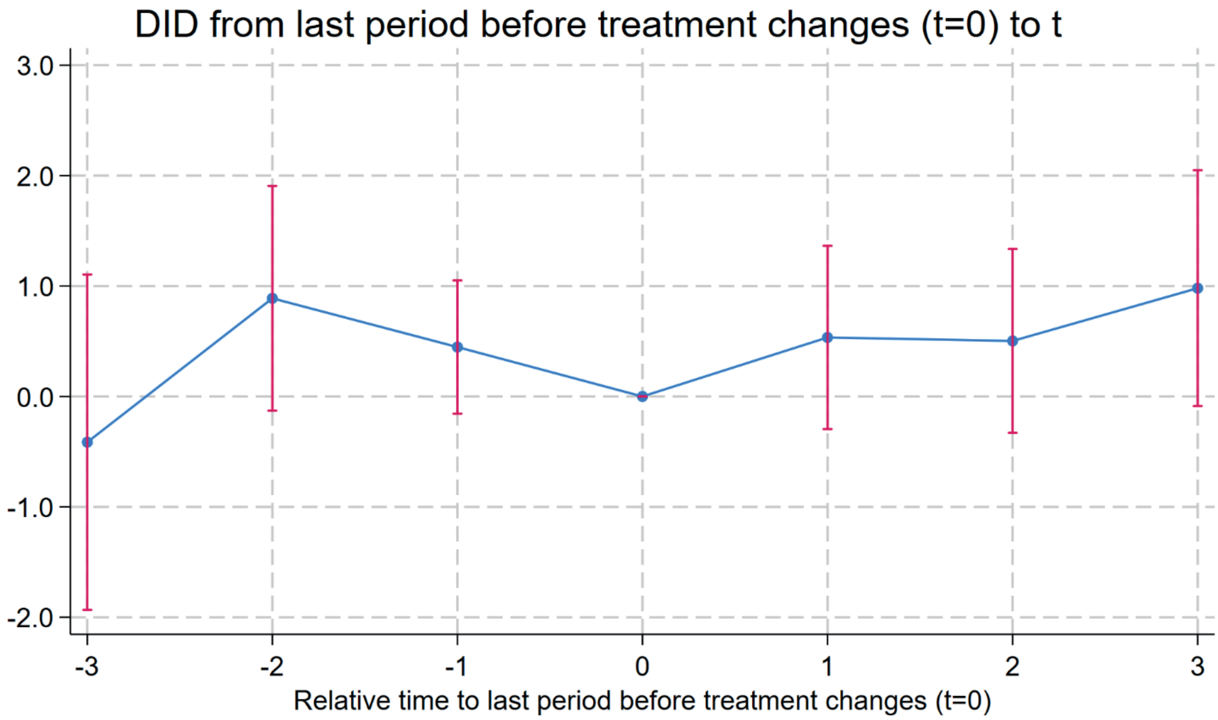
5 Results

5.1 Main results

The main results are shown in Figure 1. The coefficient estimates, confidence intervals, and number of observations for each event study estimate are shown in Table A5 in the Appendix. On the horizontal axis, 0 denotes the last period before acquisition. Negative values refer to the period before the acquisition and show placebo estimates. These are individually and jointly (p=0.18) statistically insignificant, which increases the credibility of the key assumptions. However, as is well known (Roth 2022), placebo estimators may be underpowered to detect violations of the parallel trends assumption.

After the acquisition, the share of R&D employees increases by about 0.5 percentage points in the first two years and in the third year the estimated increase is 0.9 percentage points. All point estimates are statistically insignificant. The results are estimated fairly precisely. In the first two years, we can rule out decreases below -0.3 percentage points and increases above 1.3 percentage points. The mean of the dependent variable in the acquired firms is about 13 percent (see Table 2), which means that in percentage terms, our coefficient estimate shows about a 7 percent increase (0.9/13) in the share of R&D personnel three years after the acquisition. These results are different from what has been found previously for R&D expenditures and patents: foreign acquisitions decrease R&D activity in the target firm (Stiebale and Reize 2011, Szücs 2014, Stiebale 2016). For example, Szücs (2014) finds that the R&D expenditure of an acquired firm is reduced by 7-10% in the following four years. In our case, the estimated increase in the share of R&D personnel is of a similar magnitude, but the sign is different.

Figure 1. Full Sample Estimates



Note: Estimates and 95% confidence intervals.

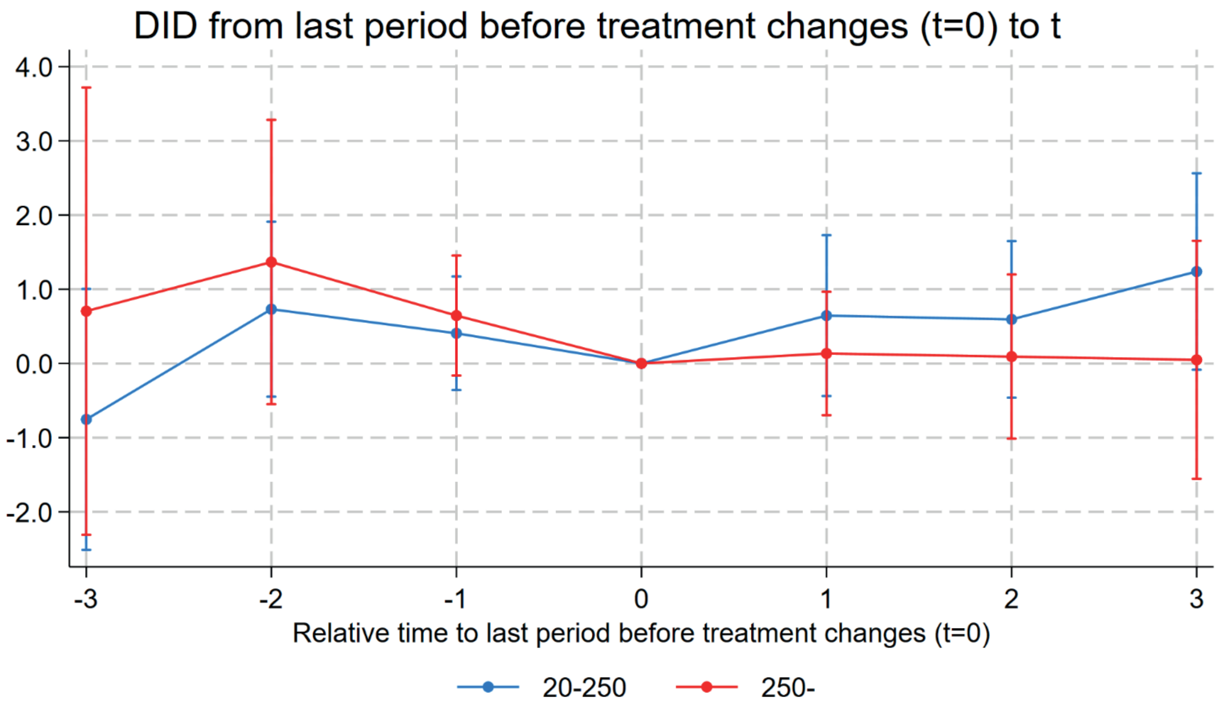
5.2 Extensions and robustness checks

We consider the heterogeneity of the results by estimating the models in the subsamples defined by firm size and industry. In the analysis concerning firm size, we classify firms into two groups: firms employing 20-250 employees and firms employing more than 250 employees. The estimates by firm size are motivated by the suggestive evidence in the earlier literature that acquiring firms may neglect the innovative activities of smaller target firms, thus potentially leading to larger reductions in innovative activities in smaller target firms (Szücs 2014).

The industry subsamples we consider are Manufacturing (NACE Rev. 2 10-33), ICT (NACE Rev. 2 582, 61, 62, 631), and Other. Industry-specific analyses are motivated by the fact that the nature of R&D might differ, for example, between Manufacturing and the ICT. R&D in Manufacturing may be more closely linked to production facilities, making it relatively more costly to relocate compared to R&D in the ICT industry, which is less bound by geographical location.

The results for different firm sizes are shown in Figure 2 and can also be found in tabular form in Table A6 in the Appendix. The figure shows that the time profile of the effects is similar for both size classes; however, the estimates are not statistically significant for either group. Thus, there are no differences between different-sized firms in terms of their impacts.

Figure 2. Estimates by firm size

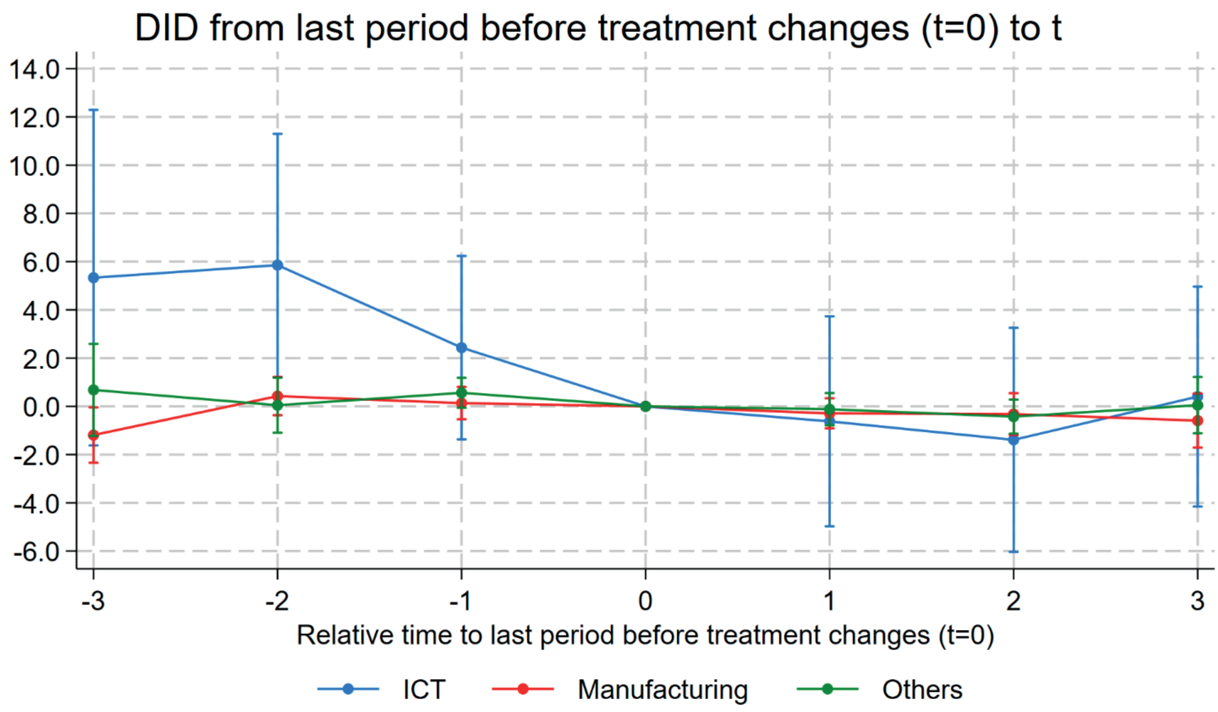


Note: Estimates and 95% confidence intervals.

The results for different industries are shown in Figure 3 and can also be found in tabular form in Table A7 in the Appendix. In all the considered industry groups, the placebo estimates are individually and jointly statistically insignificant.

In all industries considered, the estimated effects are close to zero and statistically insignificant. The ICT sector has relatively few observations, leading to large standard errors.

Figure 3. Estimates by industry



Note: Estimates and 95% confidence intervals.

We consider two robustness checks. First, given the importance of the parallel trends assumption, we add separate trends for 2-digit NACE industries. This allows firms in different industries to have different trends in their share of R&D personnel. Figure A1 in the Appendix shows that the results are similar to those in Figure 1 in that the point estimates are not statistically significantly different from zero. However, the pre-trends are not as clean, although they are not jointly statistically significantly different from zero (p = 0.11).

The second robustness check shows that the estimated effects are similar when the estimation sample is restricted to switchers, for which all effects can be estimated. Like all event-study estimators, each of the estimators DID_1 to DID_3 uses a different set of switchers, since, for example, DID_3 cannot be calculated for firms that are acquired in the last two years of the sample. We re-estimate Figure 1 by restricting the analysis to firms for which all effects and placebos can be estimated. The results in Figure A 2 show that the results of this analysis are similar to those in Figure 1.

6 Conclusions and Discussion

The impact of foreign acquisitions on innovation activities in target firms remains an important empirical question, with conflicting theoretical predictions. This study examined how cross-border acquisitions affect the share of R&D personnel in acquired Finnish companies using comprehensive linked employer-employee data. In contrast to previous studies, our measure of innovation activities is based on the share of R&D employees in a firm's total employment. Since we use register-based data, we can calculate this share for the entire company population. This is a big advantage compared to using R&D expenditure or R&D intensity as a measure because R&D expenditure is not available for all companies.

Our main finding is that foreign acquisitions have a statistically insignificant and economically small impact on the share of R&D employees in target firms. Three years post-acquisition, the point estimate shows a 0.9 percentage point increase in R&D employee share, and we can rule out increases over 2 percentage points and decreases below 0.09 percentage points. This result differs from previous studies that found negative effects on R&D expenditures and patenting activity in acquired firms (for example, Szücs (2014), Stiebale and Reize (2011), and Haucap et al. (2019)).

The null effect persists across different firm sizes and industries. We do not find evidence that smaller acquired firms experience larger reductions in R&D personnel, contrary to suggestions in earlier literature. The impacts also appear similar across manufacturing, ICT, and other sectors, despite the potential differences in the nature of R&D across industries. Our findings suggest that concerns about foreign acquisitions leading to substantial reductions in domestic R&D activity may be overstated, at least when measured by R&D employment. Foreign acquirers appear to largely maintain the existing R&D workforce of target firms. However, we cannot rule out changes in the quality or focus of R&D that are not captured by personnel numbers alone. This study contributes to the literature by using comprehensive administrative data on R&D employment, overcoming the limitations of patent or R&D expenditure measures. Future research could examine longer-term effects beyond three years post-acquisition and explore the impacts on R&D outputs and productivity. Overall, our results provide new evidence on an important policy question regarding the innovation consequences of cross-border M&A activity.

7 References

Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*, 84, 488–500.

Carlino, G and Kerr, W. (2015). Agglomeration and Innovation. In Duranton, G., Henderson, V. and Strange, W.: *Handbook of Regional and Urban Economics*, Elsevier, Holland.

De Chaisemartin, Clément and Xavier d'Haultfoeuille. 2024. Difference-in-Differences Estimators of Intertemporal Treatment Effects. *Review of Economics and Statistics,* 1-45.

Cloodt, Hadoon, J. and Van Kranenburg, H. (2006). Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries. *Research Policy*, 35, 642-654, https://core.ac.uk/reader/6787170

Fazzari, S.M., Hubbard R.G., and Peterson, B.C. (1988). Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity,* 1, 141–95.

Ham, D. W. ja Miratrix, L. (2024). Benefits and costs of matching prior to a difference in differences analysis when parallel trends does not hold. *The Annals of Applied Statistics, 18*(3), 2096-2122, 2027.

Haucap, J., Rasch, A. and Stiebale, J. (2019). How mergers affect innovation: Theory and evidence. *International Journal of Industrial Organization*, 63, 283-325.

Hsu, P-H., Huang, P., Humphery-Jenner, M. and Powell, R. (2021). Cross-border mergers and acquisitions for innovation. *Journal of International Money and Finance*, 112, 1-26.

Hubbard, R. (1998). Capital market imperfections and investment. *Journal of Economic Literature*, 36, 193-225.

Roth, J. (2022). Pretest with Caution: Event-Study Estimates after Testing for Parallel Trends. *American Economic Review: Insights*. 4(3):305-22.

Szücs, F. (2014). M&A and R&D: asymmetric effects on acquirers and targets? *Research Policy,* 43, 1264–1273. .

Stiebale, J. (2016). Cross-border M&As and innovative activity of acquiring and target firms. *Journal of International Economics*, 99, 1-15.

Stiebale, J. and Reize, F. (2011). The impact of FDI through mergers and acquisitions on innovation in target firms. *International Journal of Industrial Organization*, 29, 155-167.

UNCTAD (2005). *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D.* United Nations, Geneve, Switzerland.

8 Appendix

Table A1. R&D employees

R&D occupations in the period 2010-2021:

ISCO-08	Occupation
2111	Physicists and astronomers
2112	Meteorologists
2113	Chemists
2114	Geologists and geophysicists
2120	Mathematicians, actuaries and statisticians
2131	Biologists, botanists, zoologists and related professionals
2132	Farming, forestry and fisheries advisers
2133	Environmental protection professionals
2141	Industrial and production engineers
2142	Civil engineers
2143	Environmental engineers
2144	Mechanical engineers
2145	Chemical engineers
2146	Mining engineers, metallurgists and related professionals
2149	Engineering professionals not elsewhere classified
2151	Electrical engineers
2152	Electronics engineers
2153	Telecommunications engineers
2161	Building architects
2162	Landscape architects
2163	Product and garment designers
2164	Town and traffic planners
2165	Cartographers and surveyors
2166	Graphic and multimedia designers
2421	Management and organization analysts
2422	Policy administration professionals
2423	Personnel and careers professionals
2424	Training and staff development professionals
2511	Systems analysts
2512	Software developers
2513	Web and multimedia developers
2519	Software and applications developers and analysts not elsewhere classified
2521	Database designers and administrators
2529	Database and network professionals not elsewhere classified

2631	Economists
2632	Sociologists, anthropologists and related professionals

Table A2. Distribution of cross-border acquisition targets across industries (NACE 1-digit level)

Industry		share
B	Mining and quarrying	0.1 %
C	Manufacturing	32.9 %
D	Electricity, gas, steam and air conditioning supply	0.1 %
E	Water supply; sewerage, waste management and remediation activities	0.5 %
F	Construction	4.3 %
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	17.2 %
H	Transportation and storage	5.1 %
I	Accommodation and food service activities	1.8 %
J	Information and communication	12.1 %
L	Real estate activities	1.9 %
M	Professional, scientific and technical activities	12.8 %
N	Administrative and support service activities	5.8 %
Q	Human health and social work activities	4.7 %
R	Arts, entertainment and recreation	0.3 %
S	Other service activities	0.4 %

Table A3. Size distribution of cross-border acquisition targets.

No. of employees	% of targets
20-49	27.2 %
50-99	27.7 %
100-249	27.5 %
250-499	10.4 %
500-	7.3 %

Table A4. Annual number of acquisitions by foreign companies

Year	Number of acquisitions by foreign companies	Share, %
2010	288	7.3 %
2011	301	7.6 %
2012	317	8.1 %
2013	323	8.2 %
2014	339	8.6 %
2015	345	8.8 %
2016	352	8.9 %
2017	351	8.9 %
2018	345	8.8 %
2019	336	8.5 %
2020	328	8.3 %
2021	312	7.9 %
TOTAL	**3937**	

Table A5. Estimation results for the full sample (Figure 1)

Estimation of treatment effects: Event-study effects

	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	0.534	0.423	-0.295	1.364	30 475	392
Effect t+2	0.503	0.425	-0.329	1.335	26 780	330
Effect t+3	0.981	0.545	-0.087	2.049	23 318	287

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	0.447	0.308	-0.156	1.051	26 779	339
Placebo t-2	0.889	0.519	-0.129	1.907	20 041	249
Placebo t-3	-0.414	0.775	-1.932	1.105	14 098	173

Test of joint nullity of the placebos: p-value = 0.184

Table A6. Estimation results by firm size (Figure 2)

Panel A. Firms employing ≤250 employees

Estimation of treatment effects: Event-study effects

	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	0.645	0.553	-0.439	1.728	23 912	291
Effect t+2	0.594	0.538	-0.461	1.649	20 936	246
Effect t+3	1.239	0.676	-0.085	2.563	18 162	214

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	0.407	0.391	-0.359	1.172	20 922	249
Placebo t-2	0.732	0.602	-0.448	1.911	15 526	179
Placebo t-3	-0.754	0.897	-2.512	1.004	11 141	128

Test of joint nullity of the placebos: p-value = 0.406

Panel b. Firms employing>250 employees

Estimation of treatment effects: Event-study effects

	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	0.134	0.424	-0.697	0.966	5 609	101
Effect t+2	0.092	0.565	-1.014	1.199	4 918	84
Effect t+3	0.049	0.818	-1.555	1.653	4 261	73

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	0.646	0.413	-0.163	1.454	5 108	90
Placebo t-2	1.367	0.978	-0.549	3.283	3 982	70
Placebo t-3	0.705	1.538	-2.309	3.719	2 624	45

Test of joint nullity of the placebos: p-value = 0.29

Table A7. Estimation results by Industry (Figure 3)

Panel A. Manufacturing

Estimation of treatment effects: Event-study effects for Manufacturing

	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	-0.290	0.319	-0.916	0.336	12 464	129
Effect t+2	-0.317	0.442	-1.184	0.549	10 792	110
Effect t+3	-0.589	0.572	-1.711	0.533	9 408	99

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	0.136	0.343	-0.536	0.807	10 998	117
Placebo t-2	0.425	0.404	-0.366	1.217	8 078	93
Placebo t-3	-1.189	0.586	-2.338	-0.040	5 637	64

Test of joint nullity of the placebos: p-value = .04493766

Panel B. Other Industries

Estimation of treatment effects: Event-study effects

	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	-0.118	0.342	-0.788	0.553	16 506	216
Effect t+2	-0.426	0.360	-1.133	0.280	14 474	179
Effect t+3	0.050	0.595	-1.117	1.216	12 272	155

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	0.563	0.317	-0.059	1.185	14 475	185
Placebo t-2	0.047	0.582	-1.094	1.188	10 786	133
Placebo t-3	0.682	0.974	-1.227	2.592	7 549	92

Test of joint nullity of the placebos: p-value = 0.217

Panel C. ICT Industries

Estimation of treatment effects: Event-study effects

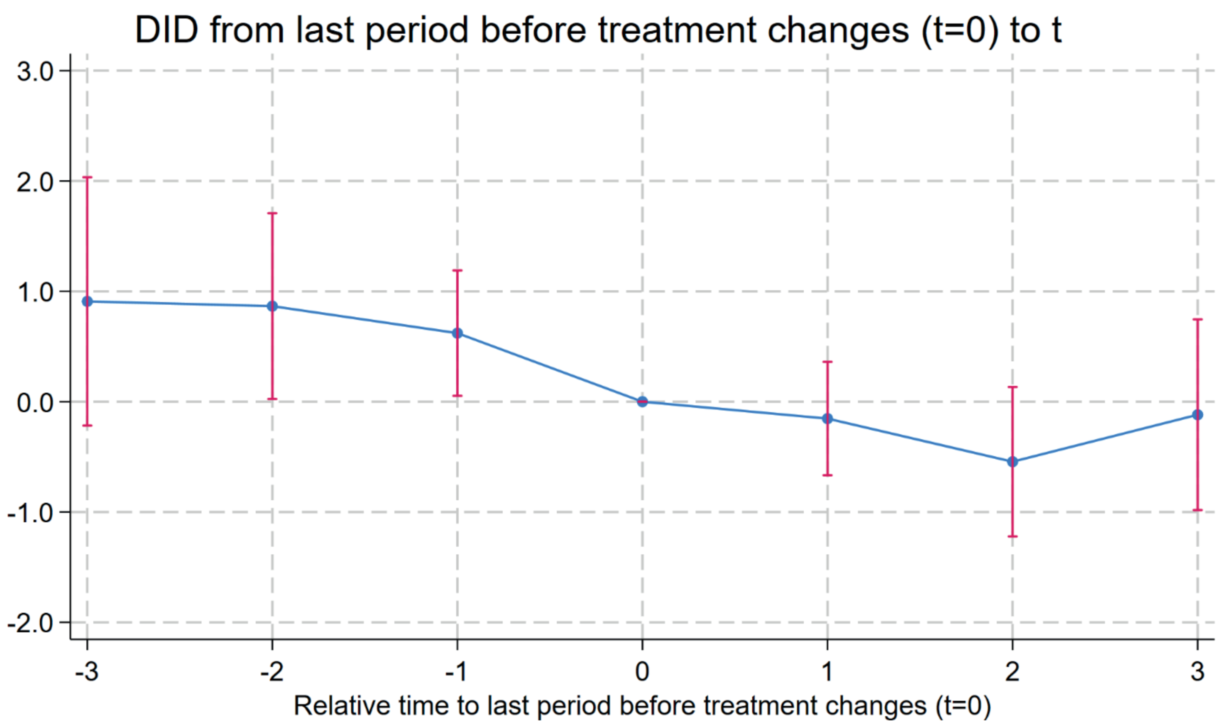
	Estimate	SE	LB CI	UB CI	N	Switchers
Effect t+1	-0.621	2.221	-4.975	3.732	943	47
Effect t+2	-1.387	2.369	-6.031	3.256	736	41
Effect t+3	0.403	2.326	-4.155	4.962	546	33

Testing the parallel trends and no anticipation assumptions

	Estimate	SE	LB CI	UB CI	N	Switchers
Placebo t-1	2.435	1.939	-1.366	6.237	717	37
Placebo t-2	5.857	2.776	0.415	11.299	372	23
Placebo t-3	5.334	3.550	-1.624	12.291	276	17

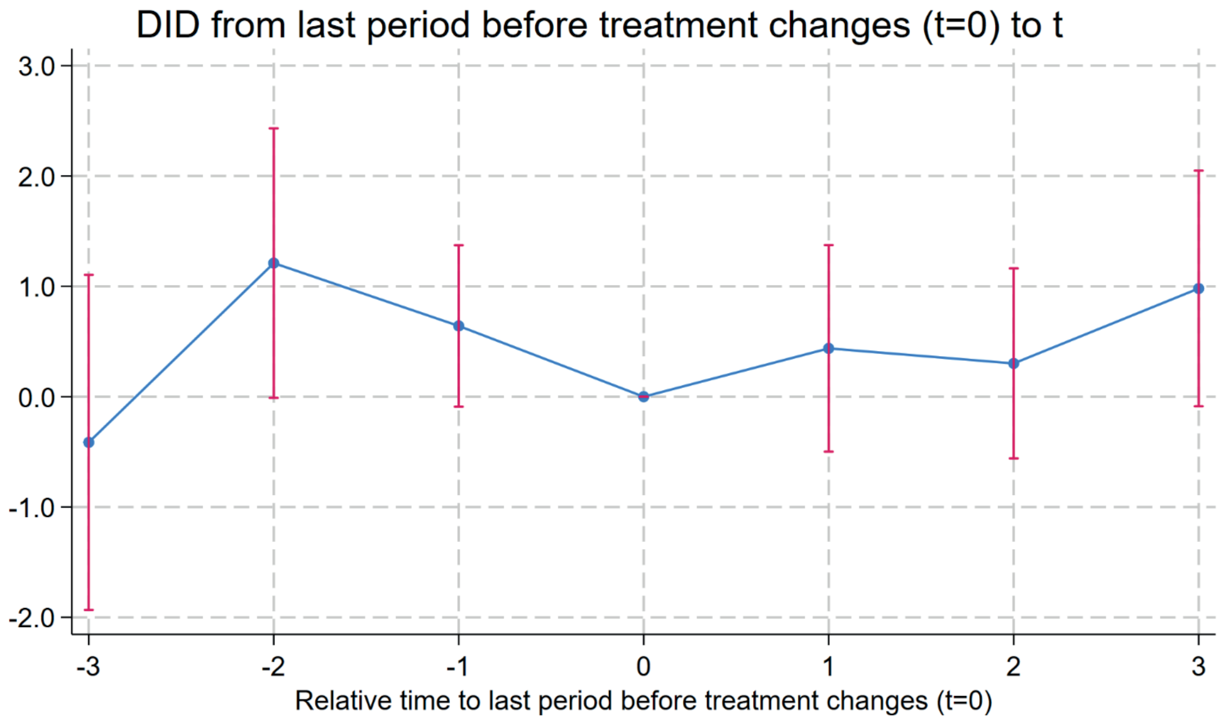
Test of joint nullity of the placebos: p-value = 0.156

Figure A1. Robustness check: heterogeneous trends at the 2-digit industry level



Note: Estimates and 95% confidence intervals.

Figure A2. Firms for which all effects and placebos can be estimated



Note: Estimates and 95% confidence intervals.

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