ESSAYS ON
THE EFFECT OF
CROSS BORDER MERGERS & ACQUISITIONS

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Preface

There are two possible ways for a firm to grow its business in the international market. One is greenfield investment, which consists in expanding the firm's production by setting a new plant abroad, hiring workers and increasing other factors of production. The other is cross-border mergers and acquisitions (M&A), which involves scaling up the production externally by acquiring a combination of already existing production factors. This second type of business strategy has quickened in the '90s (during the so called "fifth merger wave") following the increased globalization and deregulation of the markets, and further expanded in more recent times: the value of global net M&As has almost doubled over the last five years.

Acquiring or merging with an existing firm offers both advantages and disadvantages compared to greenfield investments. Cross-border M&As allows the acquiring firm to save substantial time, get knowledge of local market conditions, obtain technologies protected by patents, inherit relationships with local suppliers/buyers and gain market power by eliminating competitors. On the con side, mergers and acquisitions – compared to greenfield investment - are typically less scalable, require larger investments and involve higher risks. Plus, since the acquisition of the firms usually includes all their features and employees, in some cases they may exhibit excess capacity or run inefficient plants.

In Italy, this phenomenon has gained higher economic and political relevance, following the sharp increase of both number and volume of inward cross-border M&As within the last two decades: from the acquisition of Bnl by Bnp Paribas in 2006, and Gucci, taken over by Kering during the '00s, to the more recent acquisition of Bulgari by Lvmh Group in 2011 (the same year in which Lactalis takes control of Parmalat), until 2015, when ChemChina becomes the main shareholder of the Pirelli Group. However, across the years, cross-border M&As have not gone without criticism, mainly because of their consequences on domestic firms. In the popular debate, in fact, the negative effects of these operations – such as loss of national control or workforce rationalization - have been largely stressed. However, according to economic theory, foreign acquisitions should also generate high-skill jobs, better salaries and higher productivity in the target firms. The question, then, is whether a domestic firm benefits or not - in terms of its performance - from a foreign acquisition.

The issue has been the subject of research in the economic field for the last two decades. Inquiries about the effects of M&A on the target firms' performance were first discussed in the '90s, however the research effort intensified in the '00s following the increasing M&A activity worldwide and the improvement in econometric techniques. Studies have mainly focused their attention on two key measures of firms' performance – productivity and employment/wage – but often reaching contrasting results, due to different observation units (firm or plant), type of industries considered (manufacturing or service) and empirical methods employed (regression or matching).

The present dissertation builds on the economic research about cross border M&A and their effects on the acquired firm's performance. In particular, this thesis aims to shed some light on the causal effects of cross-

border M&As on domestic firms' performances - productivity and employment - taking into account M&A specific features such as type of M&A, industry heterogeneity, type of buyer, capital share and distance. The thesis tries to answer two main questions: what are the short and long-term impacts of cross-border M&A on target firms' productivity and employment, and which variable affected this impact? The results will allow to draw some conclusions about the causal effect of M&A deals on target firms' performance, and its key factors.

The thesis consists of two chapters. Although each chapter can be read separately, as they are based on stand-alone papers with their own introduction and conclusion, the second chapter is a natural continuation of the first one. The structure and the storyline of the thesis are the following: the first chapter investigates the causal effect of cross-border M&A by using a Propensity Score matching approach; the second chapter focuses on the key factors which may be responsible for this effect by running the same matching methodology. Thus, the second chapter builds on the dataset and results deriving from the first chapter. The firm-level panel dataset includes all cross-border M&As targeting Italian firms and resulting with a control share (≥ 50%) between the years 2010 and 2013. The core dataset is a combined dataset which matches information on cross-border M&A deals (*Reprint* by Ice and Politecnico di Milano and *Zephyr* by Bureau van Dijk) with data on the balance sheets of Italian firms (*AIDA* by Bureau van Dijk). This allows, in the first chapter, to study the impact of M&As deals on Italian target firms. To further understand which M&A deals features may have affected the size and sign of the impact -which is the objective of the second chapter- the core dataset is enriched with an additional database, containing information on the balance sheets of International acquiring firms (*Orbis* by Bureau van Dijk). The number of observations differs between the two chapters: in the first chapter, the observations are 612 (out of 1155, due to the presence of missing data for relevant variables in Italian target firms' balance sheet, guaranteeing a coverage of 53%), while in the second chapter the sample is restricted to 504 observations, due to missing data for relevant variables in International acquiring firms' balance sheet.

Let's briefly review the main features, contributions and findings of the two chapters. The first chapter, "Effect of cross border M&As on target firms", begins with a short theoretical discussion followed by a more extensive empirical literature review on the effects of cross-border M&As on target firms' performance – i.e. productivity and employment. Then, the identification strategy is explained: by using a difference-in-differences propensity score matching – which involves the inclusion of a control group of non-target domestic firms - it will be possible to overcome the selection problem – i.e. target firms would perform better irrespective of ownership because foreign investors acquire only better performing firms. After describing the data and presenting the main limitations, the causal effect of cross-border M&As on target firms' performance is analyzed with the software STATA; what results show is a positive and significant long-term effect of ownership change on both productivity and employment of target Italian firms, peaking respectively in the third and fifth year after the acquisition.

The second chapter, "Key factors affecting the impact of cross border M&As on target firms", begins by offering a review of most relevant empirical papers on factors affecting the impact of cross border M&As,

such as investment motive, industry heterogeneity, capital share, distance, ecc. Then, the attention is focused on one of those, which has been entirely neglected by previous studies, namely the type of buyer. The next section explains the identification strategy that has been adopted – i.e. difference-in-differences propensity score matching, following the analysis done in the first chapter. Descriptive statistics on these key variables are provided and, afterwards, data are analyzed through propensity score matching in STATA. What emerges is the key role played by the type of buyer which, according to business economic theory, can be either strategic or financial; in particular, when target firms are acquired by financial buyers – i.e. investors who operate in the financial sector – they reduce their productivity. That can be explained by the fact that financial buyers are generally more interested in generating high return for investors than in transferring best practices and reaching positive synergies with the acquired firms.

For a better reading, figures and tables are integrated in the text, while annexes can be found at the end of each chapter.

FIRST CHAPTER:

1. Effect of cross border M&As on target firms

1.1 Introduction

Over the last decade there has been a significant increase in the number of M&A activities: according to UNCTAD (2019) in 2018 the value of global net M&As has almost doubled over the last five years[1] and expressed as a percentage of FDI inflows has reached its highest level - 62 per cent - since the height of the dotcom boom in 2000. Cross-border M&As have gained importance starting from the '90 due to the greater globalization and deregulation of the markets, which characterizes the "fifth merger wave", usually following tightly the trend of stock prices (S&P 500), as they are driven by a similar combination of factors[2]. The reason why a firm should prefer as entry mode to a new market the establishment a foreign subsidiary, instead of building a new plant from scratch (greenfield investment), is generally to acquired knowledge of local market conditions, inherit relationships with local suppliers or buyers and wipe out direct competitors.

A large number of studies have engaged in analyzing the impact of inward FDI on firm performance in the host country of the investment. Both direct effects on a subsidiary of a multinational enterprise and indirect effects, or spillovers, on domestic enterprises in the host economy have been extensively investigated in the economic literature. Still, many studies do not make any distinction between the different foreign market entry modes, i.e. greenfield and cross border M&A. In the popular debate concerning foreign acquisition of domestic firms (as opposed to greenfield investments) the negative aspects – which are loss of national control and outsourcing of the domestic production to other countries - have been often emphasized. However, in the economic literature foreign ownership is very often associated with greater productivity, high-skill jobs and better wages.

Existing studies on the impact of cross border M&A on host country have tended to focus their analyses on the direct effect of the process of internationalization on domestic companies, evaluated in terms of changes in R&D, productivity, employment or output. However, these studies present an ambiguous picture, as they often find opposite effects. The reasons why empirical results tend to differ are typically related to: different datasets employed - number of observations included, the covered time periods, countries, industries, etc. - different empirical methods – in particular, earlier studies did often not control for selection bias - different types of mergers considered – either horizontal, vertical or both – and also different observation unit – firm or plant level.

Within this context, the goal of this first chapter is to measure the effects of cross border M&A on target firms' performance, looking at the recent case of Italy (2010-2013). This is done by creating an integrated micro data set (*Reprint* and *Zephyr)* which covers all Italian firms subject to cross-border M&A deals over the period 2010-2013. Thereby, this piece of research contributes to shed more light on the role of foreign investment as

[1] From 428126 millions of dollars in 2014 to 815726 millions of dollars in 2018.

[2] Such as strong economic performance, cheap cost of borrowing, rising investor confidence and often a mix of technological and structural change.

a potential driver of efficiency and employment growth by addressing the following question: what is the short and long-term impact of cross-border M&A on target firms' productivity and employment?

Productivity is measured in terms of Total Factor Productivity (TFP) by following the approach of Levinsohn & Petrin which generates unbiased input elasticities by using intermediate inputs as a proxy for unobservable productivity shocks. To address the selection bias, resulting from the fact that foreign investors may acquire better performing firms, the causal effect of foreign acquisition on Italian firm performance is estimated controlling for observable characteristics through a difference-in-difference propensity score matching (Rosenbaum and Rubin 1983).

Results lead a positive long-term effect of cross-border M&A deals on Italian target firms' performance. In fact, domestic firms coming under foreign control between the years 2010-2013 show both an increase in productivity and in employment - from the third year after the deal on. The absence of positive and significant short-term effects can be either related to the reorganization and restructuration costs target firms may incur right after the acquisition or the delayed onset of foreign-ownership beneficial effects (such as increased efficiency or market power).

This paper is organized as follows: section 2 reviews relevant theoretical and empirical literature, section 3 describes the identification strategy implemented (*Difference-in-Difference Matching)*, section 4 provides the results of the work based upon the methodology, section 5 includes the most relevant robustness checks and, lastly, section 6 summarizes the main findings.

1.2 Theoretical background and empirical literature

According to theory, domestic firms can benefit from foreign ownership thanks to the direct flows of knowledge ("technology transfer") and good practices ("efficiency gains") from the foreign subsidiaries to the parent firms. The seminal contribution of Dunning (1977) already pointed out at ownership advantages – intended as endowments of intangible assets that compensate for the lack of local knowledge – typically possessed by multinational firms and potentially transferable to their subsidiaries. One possible way to capture this knowledge and efficiency flow is by looking at the variation in the level of Research and Development (R&D). What the evidence seems to suggest is that the R&D intensity of target firms, both in terms of input and output, can be either positively and negatively affected by foreign ownership (Branstetter 2006, Stiebale 2016). However, not all inventions and knowledge spillovers are codified – e.g. imitation or reverse engineering – thereby not all knowledge transfer can be captured by patent and patent citation flow data. Thus, many studies have engaged in measuring the impact of reverse knowledge transfer and its spillovers on the investing firms by using productivity indicators, such as Total Factor Productivity (TFP) or labour productivity.

The industrial organization (I-O) literature distinguishes between short-term and long-term effects on target firm productivity. In the short run target firms will very likely incur in some restructuration and reorganization costs, which are short-term expenses required to make the company profitable in the long run. Merging or

acquired companies may indeed need some investments – e.g. to close overlapping activities or resources by breaking contracts, to transfer best practices, to ship the material resources, to build new plants or offices, etc. - in order to extract the expected potential synergies. Then, while in the short run the impact of a take-over can be potentially negative – as the delayed onset of beneficial effects cannot compensate the costs of reorganization - in the long run the effects are more mixed. On one hand, the market concentration potentially resulting from an M&A may involve a decline in competition, and then of productivity, in the whole sector; at the same time not always synergies between acquiring and target firms are achieved in post-merger integration process, which is particularly true for cross border M&A, where a loose in management control or a lower coordination can even reduce target firm overall efficiency. On the other, a long-run increase in productivity is expected to result from the diffusion of technological and organizational firm-specific knowledge, a better reallocation of production across firms, the presence of scale and input purchase economies and, lastly, the reduction of managerial and workforce slack (Bellak et al 2006).

Multinational firms have indeed proven to own superior knowledge-based assets – both tangible and intangible – such as better product, more efficient production and marketing skills or an established brand name (Dunning 1977, 1993, Karpaty 2007). These competitive advantages allow multinational firms to compete in a new market and compensate for fixed costs of establishment, lack of local information, experience and business relationships (Bertrand and Zitouna, 2008, Conyon et al. 2002). This argument is supported by most recent theories on international trade (Helpman, Melitz, and Yeaple 2004), which show how in their model, among the group of the more productive firms which choose to serve the foreign markets, only the most productive will further choose to serve the overseas market via FDI. Thus, the transfer of multinationals' technological and managerial competences, along with a better access to foreign markets through sales affiliates and network economies, is likely to benefit local subsidiaries located in foreign countries. And, of course, the higher the ownership advantage that a multinational firm possesses, its transferability and the complementarity/relatedness with target firms' assets, the higher the productivity effect on the target firm is likely to be.

However, the occurrence of long-run efficiency gains is very likely to depend on the motives driving the investment decisions. If, for example, the investment arises out of managers' utility maximization or of managers' preference for free cash rather than return it to investors (free cash flow hypothesis), instead of profit maximizing motives, efficiency gains will hardly materialized. The same might happens if the motive behind the acquisition is technology sourcing, rather than technology exploiting.

According to I-O literature, both positive and negative long run effects on productivity are expected to be greater in the case of cross border M&A, compared to domestic one, as they are on average much larger (Grimpe and Hussinger 2008). This is explained by the fact that information asymmetries (both ex-ante and ex-post) and transaction costs - which are larger for foreign targets due to geo-cultural distance and institutional differences – are less severe for larger firms.

The effect of cross border M&A on firm performance has been investigated by many researchers using standard econometric techniques, typically by regressing productivity and other outcome variables on covariates such as the degree of internationalization of the firm (Caves 1989, Conyon et al. 2002, Piscitello and Rabbiosi 2005). However, this kind of studies is not exempt from criticism as they are potentially subject to selection bias: target firms, compared to non-target, have different pre-acquisition characteristics that, other than attracting the interest of foreign investors (cherry vs lemon picking argument), have a direct impact on post-acquisition performance; thus, being acquired by a foreign firm will be, in all likelihood, an endogenous process. To overcome this source of bias, a second stream of studies have adopted matching techniques, which seek to obtain unbiased estimates of the impact of cross border M&A on firms' performance by matching target and not target firms with ex-ante similar characteristics. The assumption for which the two types of firms are ex-ante different has also been supported by empirical works (Barba Navaretti and Venables 2004, Karpaty 2007) which show that the performance of foreign-owned and domestic firms can be ex-ante significantly different not only in level but also in growth rate, casting doubt on the validity of standard regression analyses.

The existing empirical evidence on the causal link between international M&A and firm's productivity is however inconclusive. While several studies have found a positive effect of foreign ownership on firm productivity (Arndt and Mattes 2010, for Germany; Bertand and Zitouna, 2008, for France; Conyon et al, 2002, for the UK; Lichtenberg and Siegel, 1987 and Maksimovic et al, 2011, for the US), other studies have shown that domestic firms are not always able to reap the gains of foreign ownership (Gioia and Thomsen 2002, for Denmark; Girma and Gorg, 2007; Harris and Robinson 2002, for UK). Unfortunately, results are not easily comparable as studies differ in terms of datasets - number of observations included, the covered time periods, countries, industries, etc. - type of merger – either horizontal, vertical or both – and observation unit – firm or plant.

Supposing the existence of efficiency gains, a crucial point for policy makers is the source of these improvements. Policy makers and trade unions often argue that productivity gains are the result of workforce rationalization, as M&A provide an opportunity to cancel contracts with trade unions or employees (Stiebale & Trax, 2011). The new management can indeed more easily renegotiate explicit and implicit labor contracts and conditions because it is generally less committed to employees. On the other hand, target firms can benefit from acquiring competitive advantages and sales network, resulting in an increase in sales and employment. If for example the new ownership brings new capital inflows and expertise, the effect on the employment is likely to be positive. Motivation may also play a role as mergers which are motivated by profit maximization are more likely to be followed by cost savings and workforce reductions compared to mergers that are differently motivated. Effects on the workforce may also differ according to the type of merger as horizontal mergers – where firms operate in the same or similar industry – are more likely to lead to higher employment losses – as some functions can turn out to be redundant – even more if considering in a context of increasing returns to scale. Therefore, predictions about effects of M&A on employment are difficult. Similarly, the evidence of cross border M&A on the level of employment of acquired firms is somewhat mixed. If some authors (Harris

et alt. 2005) report an increase of productivity after ownership changes partly due to a layoff of workers, other studies (Arndt and Mattes 2010, Gugler and Yortoglu 2004) observe no evidence of workforce reduction in acquired firms. However, what empirical works tend to suggest is a tendency towards decrease or no change in employment, in line with efficiency increase and cost rationalization motives driving cross border M&A.

1.3 Identification strategy

Difference-in-Difference Matching (DiDM): estimating the ATT

To overcome the selection bias problem, i.e. cross border M&A target firms are different from non-target firms, the study adopts a matching approach, by comparing only firms with ex-ante similar characteristics (purely domestic firms form the control group). This is to be done by using a Difference-in-Difference Matching (DiDM) Estimator, which allows to take into account both ex-ante differences in observed firm characteristics and temporally invariant differences in outcome levels, i.e. firm-level unobserved heterogeneity. Foreign target (treatment) and not target (control) firms are matched and compared on the basis of a propensity score (***PS***), which is defined as the probability of treatment (***T***) assignment conditional on observed baseline covariates ***X*** (Rosenbaum and Rubin,1983).

$$\boldsymbol{PS(X) = Pr[T = 1|X]}$$

Average outcomes are then compared to produce the treatment effect (ATT) – Eq 1:

$$\boldsymbol{ATT_{PSM-DID} = \frac{1}{N_T}\sum_{i\in T}\left\{\Delta Y_i - \sum_{j\in T} W_{ij}\Delta Y_j\right\}}$$

where:

$\boldsymbol{Y_i}$ = TFP , employment .

$\boldsymbol{W_{ij}}$ denotes the weight given to the j − th case in making the comparison with the i − th treated case (0 < Wji ≤1)

To match treated and untreated subjects with similar scores, several matching algorithms can be used[3]. In this work, matching will be realized according to the three most commonly used matching algorithms: 3-Nearest neighbour with replacement[4], 5-Nearest neighbour with replacement[5] and Radius[6].With the three underlying assumptions – conditional independence[7], common support and balancing – holding, the analysis will able to

[3] Exact matching, Nearest neighbour, Radius matching, Stratification matching, Kernel matching, Weighting function

[4] Every treated is matched with three untreated and untreated individuals can be used only once as a match.

[5] Every treated is matched with five untreated and untreated individuals can be used only once as a match.

[6] Every treated is matched with untreated individuals that lies within the caliper ('propensity range').

[7] A sensitivity test, following the Rosenbaum bounds approach, will allow to determine how strongly an unmeasured confounding variable affects selection into treatment and undermine the results from the matching analysis.

mimic a randomized assignment and, conditioning on the propensity score, unbiased estimates of the impact will be obtained.

As previously mentioned, firms are matched conditioned on a propensity score, which, in this study, correspond to the firm's probability of foreign acquisition; according to the existing literature (Arnold J. and Javorcik B. 2009, Bertrand and Zitouna 2008, Blonigen A. and Pierce R. 2016, Heyman et al. 2007, Schiffbauer et al 2009, Siedschlag I. e Ruane F. 2009, Stiebale & Trax, 2011), the main variables that affect this probability are found to be: firm's size (revenues, employees or market share), productivity (TFP or labour productivity), profitability (EBITDA or profit per employee), experience (age), skilled labour (labour cost per employee or wage), intangible capital (intangible fixed assets over total assets) and financial soundness (debts or interest expenses over total assets, cash flow over borrowing costs or solvency status)[8]. Also, external characteristics such as firm sector and its geographical location are likely to affect the probability to be acquired, as cross-border investors prefer to target firms located in certain areas and sectors.

Therefore, to obtain the propensity score, the treatment status dummy (being acquired by a foreign firm) is regressed on the selected baseline characteristics using a logit model. Estimated propensity scores represent predicted probabilities of treatment, on which basis similar subjects - belonging to the same 2-digit NACE sector - will be matched and their outcomes compared. The variables selected for the estimation of the propensity score equation are the following:

Table 1.1. Baseline variables for the estimation of the propensity score

Variable name	**Description**
Revenues 0_1	From 0 to 1 ml € of revenues
Revenues 1_2	From 1 to 2 ml € of revenues
Revenues 2_10	From 2 to 10 ml € of revenues
Revenues 10_50	From 10 to 50 ml € of revenues
Revenues 50	Over 50 ml € of revenues
Value added per employee	Value added per employee
Profit per employee	Profit per employee
Age	Years of business
Labour cost per employee	Labour cost per employee
Intangible Capital	Intangible fixed assets over total assets
Leverage	Debts over total assets
Area	North-Central Italy vs South-Islands Italy

The combination of matching and a difference-in-differences approach means looking for divergence in the paths of performance between the target and matched control firms with similar characteristics in the pre-acquisition year. For this reason, it becomes important to check any differences in pre-acquisition trends which may drive change in performance over the years following the acquisition; this is done by testing the so-called

[8] For the full set of variables affecting the probability to be acquired by a foreign investor please see annex 1.

Common Trend hypothesis, which guarantees that treatment and control groups had similar trajectories in the outcome variables before the acquisition.

1.4 Data description

To conduct the empirical analysis, an integrated dataset has been constructed by combining two different databases on foreign investments, *Reprint* by Ice and Politecnico di Milano – a Foreign Direct Investment (FDI) data bank which provides information on the identity of Italian multinational and foreign-owned firms and their foreign subsidiaries - and *Zephyr* by Bureau van Dijk – a financial information inventory which provides data on M&A deals and rumors across the world, with a third database *AIDA* (Analisi Informatizzata Delle Aziende) – a company accounts data system that contains classified balance sheets of more than 700.000 Italian firms - provided by Bureau van Dijk.

Data have been collected for all Italian firms who have been subject to cross-border M&A deals between the years 2010 to 2013 – using as source both *Reprint* and *Zephyr* in a complementary way to obtain a more complete list of cross border M&A targeting Italy. However, a firm in order to be included in this M&A target firms group must have been acquired by a foreign investor, that is the M&A deal would give a foreign investor a control share (≥ 50%). The resulting group would have summed up to 1155 firms acquired between 2010 and 2013 by a foreign investor, but unfortunately over half of these firms could not been included (table 2) in the study because they displayed non-positive or missing value on relevant variables such as - value of production, value added, revenues, employees and fixed capital - in the year prior and 1-year after the deal. That has turned unfeasible the calculation of the outcome variable (TFP) and some baseline variables – specifically the ones expressed in per capita terms, such as value added, profit and labour cost per employee. Thus, the study has been able to guarantee a coverage of 53% with respect with the original sample, totaling 612 firms, that represent the 'treatment' group.

Table 1.2. Number of firms subject to cross-border M&A between 2010 and 2013 with foreign control (≥ 50%)

	2013	***2012***	***2011***	***2010***	***2013-2010***
Treated firms	218	168	126	100	612
Cross-border M&A target firms	362	270	318	205	1155
treated/target firms	60%	62%	40%	49%	53%

Next, a group of domestic firms with similar ex-ante characteristics must be selected to form the comparison group. To serve the purpose a panel of firms has been randomly extracted from *AIDA,* totaling 75983 units for the four years (almost 20.000 a year), with the constraint of belonging to the same sector (4-digit Nace rev.2) of the acquired firms. Plus, in order to guarantee an extensive comparison group, for each firm in the treatment group must have corresponded at least 30 firms of the same sector from the control group.

Table 1.3. Number of domestic non-target firms, between 2010 and 2013

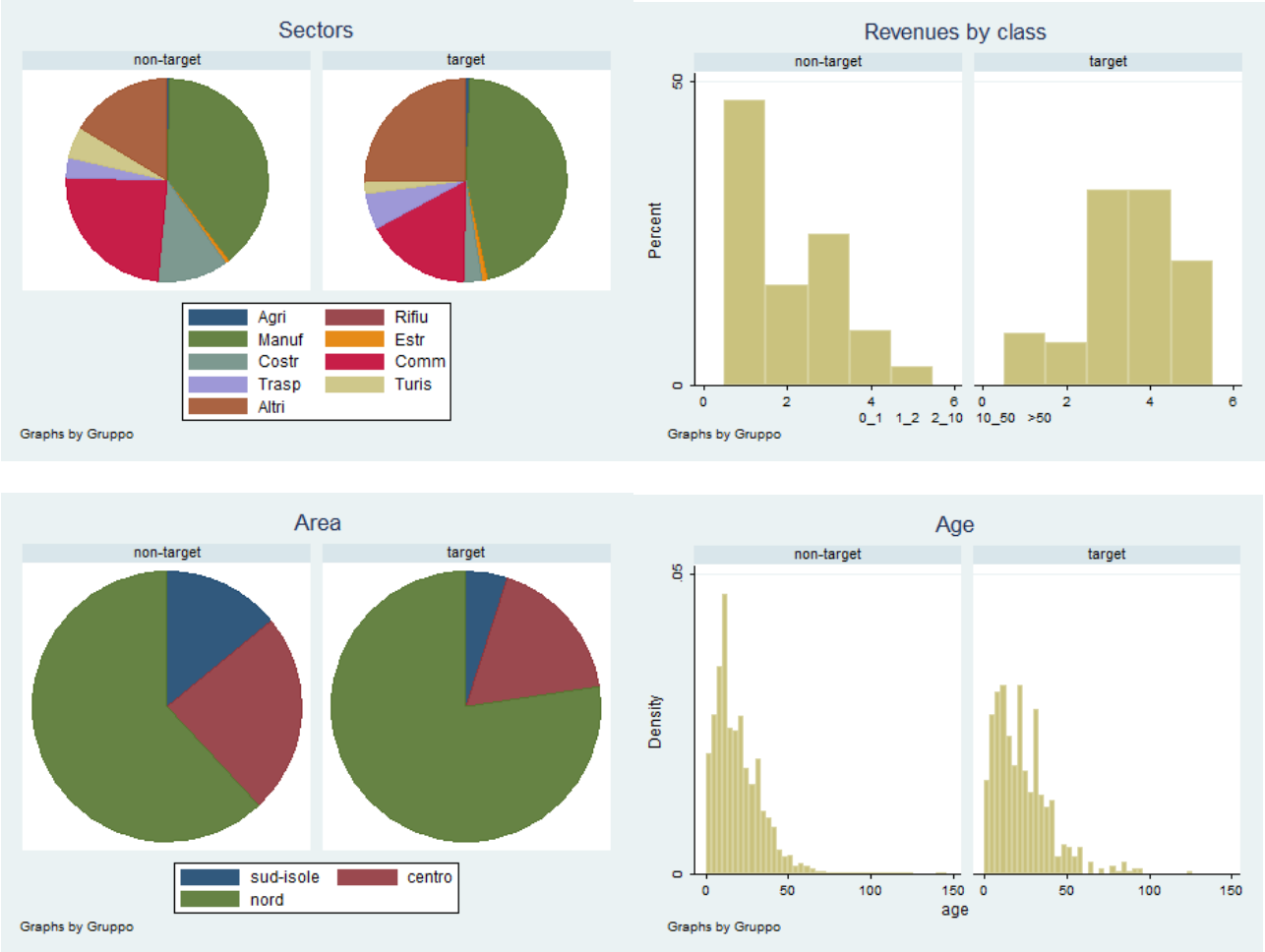
	2013	*2012*	*2011*	*2010*	*2013-2010*
Non-target firms	19810	19099	17189	19885	75983

A first visual comparison is provided by Graph 1.1, that plots the distribution by industry, class size, status and geographical area of the two pooled groups of firms (2010-2013), the first includes 29.843 non-target firms[9] while the second 612 target firms, for the year prior to the foreign acquisition ('baseline' year). Despite non-target firms have been selected according to the sector of origin of treated firms, the two groups show some differences in relation to the industry, as there are more firms belonging to construction and trade sectors in the control group compared to the treatment group, which is due to the random extraction of non-target firms. A notable difference between the groups is also in terms of revenues size: target firms tend to be bigger than purely domestic firms, according to theory this can be explained by the fact that cross-border deals tend to target larger firms due to high information asymmetries and transaction costs involved in the transaction. In relation to the geographical location of the registered office, target M&A firms tend to be located more in North of Italy compared to non-target ones. The last figure shows that target firms are older compared to non-target, this was expected since M&A usually involves more experienced domestic firms (although 22 target firms are considered *start-up* as they have less than 2 year when they were acquired).

Graphs 1.2a in the appendix show some additional differences in pre-acquisition characteristics. For instance, target firms display higher levels of labour cost per capita compared to non-target, signaling the presence of more skilled workers in acquired firms. Along with skilled labour, target firms seem to own more intangible capital (over total capital) as the distribution of the variable is more shifted rightward. Again, target firms show higher labour productivity levels compared to purely domestic ones, as distribution of the variable for treated units is moved eastward compared to control units. While the level of leverage is rather similar in both groups, the distribution of profit per capita show more kurtosis around lower values for not-target units, most likely due to the larger presence of micro and small firms. Last but not the least the legal status, more purely domestic firms are - to date 2019 - out of business or in liquidation, indicating a higher chance of survival of acquired firms, though the two groups are still not comparable.

[9] 46140 out of 75983 non-target firms record either missing or non-positive values (for the variable production, value added, revenues, employees and fixed capital), thereby Propensity Score could not be calculated for those firms.

Graph 1.1 – Distribution by industry, class size, status and geographical area of non-target and target groups – percentage – one year before the acquisition



To perform correct inference, it is of utmost importance to analyze the main characteristics of not included target firms (appendix - graphs 1.4a). Looking and comparing those graphs with graphs 1.1a, it is possible to notice very few differences between not included and included target firms. Not included firms are indeed very similar to included firms both in terms of geographic area (predominantly Center and North firms), industry (mostly from manufacturing, other and trade sectors) and status (over three quarters are in business). However, there is still a notable difference with respect to firms' age: 134 out of 534 not included firms (over 25%) are *start-up,* i.e. with less than 2 years old at the moment of the acquisition - contrary to 3,5% of included target firms, and that in part can explained the lack of information or presence non-positive values in this group of firms.

To end the section, it can be interesting to look at the main characteristics of Italian firms subject to cross border deals between 2010 and 2013 and compare them to their relative Western European and North American counterparts, as the database *Zephyr* allows worldwide comparisons among cross border M&A deals. With regard to industry, there are not notable differences as the main destination sectors are: Machinery and

equipment, Other services, Chemicals and non-metallic products, Metal products and Food & Beverage. The Utility sectors is maybe the only exception as it represents 9% of Italian deals, but less than 1% of Western European and North American deals. In general, the average deal value is higher for Italian firms - 211 thousand euros compared to 180 thousand euros – as well as their average productivity (revenues/employees) – 1244 euros compared to 719 euros. On the contrary, European and American firms are larger in size - 429 employees per firm against 230 employees per firm of Italian firms. Last but not the least, M&A target firms do not differ in terms of their stock exchange listing status, in fact only 1% of both Italian and Western European/North American firms were issuing shares the year prior to the acquisition.

1.5 Results

As a first step, the probability of being acquired by a foreign firm is estimated using a logit model. Table 1.4 presents the result of the logit model coming from equation 1.

Almost all binary dummies concerning revenues are significant at least at 0.05 significance level: the higher the revenues the higher the chance for a firm to be acquired by a foreign investor, which means that target firms are bigger in size. Area and intangible capital are also always significant at 0.05 level, suggesting that M&A target firms are usually located in North and Central Italy and have higher level of intangible capital. In three years out of four there is not significant difference in terms of age, only in 2011 acquired firms are younger compare to not acquired ones. Acquired firms are found to be less profitable only in year 2010, while they do not show significant difference in terms of productivity. Lastly, in some years (2010 and 2011) the probability of being acquired by a foreign investor increases if firms employ more skilled workers (have higher labour cost per employee).

What has been found confirm the cherry-picking hypothesis which states that investors target the most solid and structured companies (larger dimension, higher level of intangible capital and skilled labour), typically located in the more dynamic areas.

Table 1.4. Logit model: probability of being acquired in the years 2010 to 2013 using previous year baseline variables

	2013		***2012***		***2011***		***2010***	
Variable	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Revenues 1_2	0.8232	0.011**	0.8648	0.025**	0.5338	0.243	1.9123	0.002***
Revenues 2_10	1.9930	0.000***	2.1025	0.000***	1.5245	0.000***	2.8849	0.000***
Revenues 10_50	2.9009	0.000***	3.1474	0.000***	2.3637	0.000***	4.3020	0.000***
Revenues 50	3.6192	0.000***	3.6097	0.000***	3.2224	0.000***	4.6697	0.000***
Value added per employee	0.0002	0.616	0.0002	0.282	-0.0016	0.083*	0.0002	0.765
Profit per employee	0.0003	0.475	0.0001	0.793	-0.0001	0.395	-0.0012	0.000***
Labour cost per employee	0.0000	0.922	0.0014	0.324	0.00909	0.001***	0.0036	0.056*
Age	-0.0027	0.556	0.0057	0.297	-0.0181	0.008**	-0.0025	0.734

Intangible Capital	1.2031	0.000***	1.2949	0.000***	1.2751	0.000***	1.6115	0.000***
Leverage	-0.0006	0.576	-0.0020	0.163	-0.0001	0.888	-0.0035	0.007***
Area	1.2659	0.000***	1.2533	0.001***	0.7651	0.043**	1.1969	0.010**
cons	-6.9337	0.000***	-7.4216	0.000***	-5.9799	0.000***	-7.8637	0.000***

PSM provides a very effective and robust method for estimating the effect of foreign acquisition only if covariates are balanced in the two groups of firms, i.e. acquired and non-acquired ones. The balancing assumption means that the control group (non-acquired firms) has a distribution of covariates very similar to the treatment group (acquired firms). The significance level taken into consideration to prove similarity between the two groups is 0.05 (**). The table below shows which covariates are not properly balanced: only Revenues_50 and Revenues0_1 are found to be unbalanced – respectively in 2011 and 2010 - at 95% confidence level. Once data are pooled in a single dataset, which spans from 2010 to 2013, again the variable Revenues_50 is not properly balanced; a higher presence of larger firms in the treatment group can be clearly seen in Annex 3, which shows the distribution of baseline variables – by reporting also their mean values - for treatment and target groups. However, joint chi square distributions are always balanced, which allows to claim that the balance property is satisfied across the years. The common support assumption – which states that every subject has a nonzero probability to receive either treatment – is also guaranteed (see graphs in Annex 5).

Table 1.5. Comparison between treatment and control group (p values), 1-year before baseline covariates

	NN5				
Variable	***2013***	***2012***	***2011***	***2010***	***2010-2013***
Revenues 0_1	0.659	0.378	0.141	0.046**	0.069*
Revenues 1_2	0.94	0.75	0.656	0.337	0.936
Revenues 2_10	0.291	0.159	0.208	0.403	0.071*
Revenues 10_50	0.768	0.565	0.75	0.245	0.382
Revenues 50	0.151	0.097*	0.026**	0.178	0.013**
Value added per employee	0.531	0.642	0.385	0.495	0.258
Profit per employee	0.867	0.186	0.853	0.937	0.492
Labour cost per employee	0.111	0.139	0.845	0.152	0.143
Age	0.093**	0.117	0.712	0.656	0.826
Intangible Capital	0.577	0.697	0.188	0.251	0.453
Leverage	0.931	0.895	0.823	0.849	0.900
Area	0.92	0.615	0.776	0.895	0.655
Agriculture	1.000	.	1.000	.	1.000
Manufacturing	1.000	1.000	1.000	1.000	1.000
Waste	1.000	.	1.000	1.000	1.000

Construction	1.000	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	.	1.000	1.000
Other services	1.000	1.000	1.000	1.000	1.000
p>chi2	0.992	0.403	0.831	0.892	0.493

The second step of this analysis implies merging the four different datasets, one for each year, in a new single dataset (pooled sample), and carry out a weighted regression. The weights (pweights) for control group depend on the type of algorithm chosen. For this study a 5-Nearest neighbour algorithm has been selected, which involves that each acquired firm is matched with five not-acquired firms - from the same 2-digit NACE sector[10] - and not-acquired firms can be used only once as a match.

Then, the effect of a cross border M&A is estimated on TFP[11] and employment on the 5 years following the deal, because as suggested by theory effects of acquisition are likely to be different over time (eq 2).

$$\Delta \boldsymbol{Outcometyear_i} = \boldsymbol{\beta_1} + \boldsymbol{\beta_2}\, \boldsymbol{treat_i} + \boldsymbol{\varepsilon_i}\ [\boldsymbol{pweights}]$$

where:
$\boldsymbol{i}$ = firm
$\mathbf{t}$ = 0 to 5
$\Delta \boldsymbol{Outcometyear} = \log(\boldsymbol{outcome_t}) - \log(\boldsymbol{outcome_0})$

Before implementing a difference-in-differences estimate, as a robustness check, a one-year common trend (CT) assumption is tested using pre-treatment data, which helps to understand whether the two groups had different trajectories in the outcome variables before the acquisition. If so, any post acquisition effect on outcome could be attributed not only to the acquisition, but to the different pre-acquisition outcome paths. As it is shown in table 1.6, outcome variable growth is not different between the two groups (Δ*outcome0year_CT*[12]) leading to reject the role of difference in pre-acquisition outcome growth on post-acquisition firms' performance[13].

As demonstrated by theory, short- and long-term effect of foreign acquisition may differ and this study confirms this intuition. The table below shows different effects through time for both productivity (TFP) and employment both for Unmatched - *left hand side* - and PSM Matched – *right hand side* – samples. Not only in

[10] This is done by using the following matching algorithm: NEWps=NACERev2_2cif*10000+OLDps*1000

[11] Derived from a Cobb-Douglas value added production function estimation with Levinsohn-Petrin correction (see annex 6).

[12] Δ*outcome0year_CT= log(outcome0year)-log(outcome-1year)*

[13] This result however does not include year 2010, because information on outcomes in 2008 are not provided by AIDA

the unmatched case, but also in the matched one, positive and significant coefficients are found for TFP starting from the third year. Target firms are more efficient than purely domestic firms by 12,7% in the third year after the acquisition, 11,5% in the fourth and 11,9% in the fifth year, so with a significant impact in the third year which slightly declines over the following years[14]. What can be concluded is that, from 2010 to 2013, Italian target firms have benefitted from the change of ownership, which means that the efficiency gains stemming from cross-border M&A deals – such as technological transfer, better managerial and organizational practices, a more efficient reallocation of production across firms or the presence of scale economies – have offset their potential disadvantages – such as loose management, lower coordination or technology sourcing. An alternative explanation to the productivity delta between target and purely domestic firms takes into account market power, since the standard calculation of tfp (Olley and Pakes 1996, Levinsohn and Petrin 2003) does not allow to disentangle between efficiency and market power effects, as pointed out by Bloningen and Pierce (2016). However, an additional analysis to disentangle the two different effects is out of the scope of the present study, thus left for future research.

Across the sample, no significant effect of foreign acquisition on 1-year post acquisition performance is found. However, this is not an isolated case: a study realized by Schiffbauer et al. (2009), which examine UK target firms over the period 1999-2007, even finds a 1-year post-acquisition negative effect on their TFP. The absence of significant effect in the short-run can be either explained by the occurrence reorganization and restructuration costs target firms may bear right after the acquisition or by the presence of lead time in the reorganization of activities after the M&A. While the latter channel cannot be tested with the data at hands, the former effect should be somehow visible from the balance sheet when measuring the cost of goods sold across the years after the acquisition. Having a look at intermediate goods costs (raw material and other expenditures), which is just a part of the cost of goods sold, may provide some clues on the absence of productivity effect in the first year. However, table 1.7a (in annex 7) reports no significant difference in the cost of intermediate goods between the two groups.

Another explanation to the absence of short run effects fact can be found in Maksimovic et al, (2011), which by analyzing US plants, find that half of the plants, which resulted to be the least productive, were sold or closed within 3 year from the acquisition, while the retained ones turned out to be also the most productive ones. The same may have occurred in this study as sample size tends to decrease as time goes by, as shown in table 1.6 (right-hand column).

Table 1.6. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5)

	Unmatched				***Matched***				
	Coef.	Std.Err	t	P>t	Coef.	Std.Err	t	P>t	Samp Size
Δtfp0year CT	.0030129	.029024	0.10	0.917	-.006439	.0304371	-0.21	0.832	1869

[14] Sample size (right hand column) is reducing as some firms go out of business through the years

Δtfp1year	-.016912	.0257545	-0.66	0.511	.0107885	.0325086	0.33	0.740	2622
Δtfp2year	.0501132	.0286646	1.75	0.080*	.0637727	.0340643	1.87	0.061*	2471
Δtfp3year	.0730933	.0300771	2.43	0.015**	.1271913	.0357704	3.56	0.000***	2404
Δtfp4year	.0843078	.0308048	2.74	0.006***	.1150813	.0406269	2.83	0.005***	2293
Δtfp5year	.1188843	.0400286	2.97	0.003***	.1188843	.0400286	2.97	0.003***	2199
Δemployees0year_CT	.0297448	.0194025	1.53	0.125	.0094667	.0228601	0.41	0.679	1884
Δemployees1year	.0170746	.0167543	1.02	0.308	.004125	.0177508	0.23	0.816	2622
Δemployees2year	.0484286	.0218323	2.22	0.027**	.0315088	.0237012	1.33	0.184	2530
Δemployees3year	.085871	.0253311	3.39	0.001***	.0769344	.0310332	2.48	0.013**	2476
Δemployees4year	.096378	.0281995	3.42	0.001***	.0980961	.0345186	2.84	0.005***	2379
Δemployees5year	.1270011	.0301272	4.22	0.000***	.1230363	.0383065	3.21	0.001***	2289

M&A deals can provide to foreign investors the opportunity to cancel contracts with trade unions or dismiss redundant employees. That is the reason why these economic deals are constantly under public scrutiny. In this research however, there is no evidence of layoff of workers, but quite the contrary: acquired firms report a statistically significant increase in workforce - compared to non-acquired firms – in the three years after the acquisition, starting from the third and with an increasing pace. The delta between the two groups is found to be 7,7% in the third year, 9,8% in the third year and 12,3%[15] in the fifth year. Thus, the evidence suggests that acquired firms - in the case of Italy - benefit also from an increase in employment, potentially due to the competitive advantages and sales network expansion brought by the newly arrived foreign investors.

As a final step, a sensitivity test (Rosenbaum bounds) to investigate whether the causal effect estimated from the Propensity Score matching is vulnerable to the influence of unobserved covariates is run. As reported in table 1.8a in Annex 8, in the third year after the acquisition the estimated effect on TFP is insensitive to a bias that would increase the odds of treatment by 20% but sensitive to a bias that would increase them by 30%. It is possible to conclude that the analysis on the effect of cross-border M&A on firms' productivity is only partially sensitive to hidden bias. The impact on employment - estimated at its most in the fifth year - is even less sensitive to the influence of unobserved covariates, in fact a bias that increases the odds of treatment by 40% wouldn't affect the results, as shown by table 1.8b.

1.6 Robustness checks

As further check on the existence of a significant impact of cross-border M&A deals on acquired firms' productivity and employment, alternative matching algorithms, specifications, samples and outcome variables are tested within the same identification framework (Difference in Difference Matching).

[15] Which corresponds to a delta of 2566 units of workforce increase (in the fifth year after the acquisition).

To make sure results do not depend on the matching algorithm employed (NN5), two alternative matching algorithms are tested, namely Nearest Neighbor 3 (NN3) - which is a one-to-one matching - and radius - which is a radius matching that uses a standard caliper of 0.013828. As shown below, results are robust to the use of different matching algorithms, as both outcome variables are significant and positive in the long term. In both NN3 and radius, the effect on TFP is greatest in the third year, as for baseline results (NN3); the effect on employment is also in this case increasing through years, though a bit smaller when NN3 is applied. The balancing property is satisfied across the years (see Annex 9).

Table 1.7. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN3 & Radius)

	NN3				
	Coef.	Std.Err	t	P>t	Sample Size
Δtfp0year_CT	-.0086747	.0318534	-0.27	0.785	1362
Δtfp1year	.0071684	.0333686	0.21	0.830	1877
Δtfp2year	.0699492	.0353914	1.98	0.048**	1776
Δtfp3year	.1163052	.0365049	3.19	0.001***	1734
Δtfp4year	.109622	.0416069	2.63	0.008***	1654
Δtfp5year	.1052526	.0402352	2.62	0.009***	1557
Δemployees0year_CT	.0070376	.0224331	0.31	0.754	1375
Δemployees1year	.0008589	.018852	0.05	0.964	1877
Δemployees2year	.0280876	.0251969	1.11	0.265	1810
Δemployees3year	.071069	.0324395	2.19	0.029**	1774
Δemployees4year	.084649	.0349558	2.42	0.016**	1706
Δemployees5year	.1097496	.0392041	2.80	0.005***	1638

	RADIUS				
	Coef.	Std.Err	t	P>t	Sample Size
Δtfp0year_CT	-.0120354	.0331846	-0.36	0.717	9627
Δtfp1year	.0162261	.0354221	0.46	0.647	14457
Δtfp2year	.0599006	.037929	1.58	0.114	13293
Δtfp3year	.1002508	.0379626	2.64	0.008***	12598
Δtfp4year	.1069621	.0430561	2.48	0.013**	11892
Δtfp5year	.0777739	.0424062	1.83	0.067*	11265
Δemployees0year_CT	.0156444	.022013	0.71	0.477	9774
Δemployees1year	.0174553	.0196667	0.89	0.375	14457
Δemployees2year	.0599026	.0288158	2.08	0.038**	13745
Δemployees3year	.1017086	.0344413	2.95	0.003***	13128
Δemployees4year	.1006905	.0394188	2.55	0.011**	12423
Δemployees5year	.1536081	.0434789	3.53	0.000***	11777

The first alternative specification does not include the variable value added per employee among baseline variables – which explain the probability of being acquired by a foreign investor. This attempt is to avoid considering a variable - that approximates the outcome (TFP) - in the propensity score equation[16]. As shown below, results are robust to the exclusion of value added per capita, as both outcome variables are significant and positive starting from the third year, in line with main results. The balancing property is satisfied across the years (see Annex 9).

Table 1.8. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 without value added)

	Matched			
	Coef.	Std.Err	t	P>t
Δtfp0year_CT	-.0116188	.0310165	-0.37	0.708
Δtfp1year	.0046641	.0325984	0.14	0.886
Δtfp2year	.0492451	.0340776	1.45	0.149
Δtfp3year	.1077048	.0352292	3.06	0.002**
Δtfp4year	.1045571	.040685	2.57	0.010**
Δtfp5year	.1097058	.040094	2.74	0.006**
Δemployees0year_CT	.0190639	.0229497	0.83	0.406
Δemployees1year	.0017826	.017852	0.10	0.920
Δemployees2year	.0261115	.0236436	1.10	0.270
Δemployees3year	.0664377	.0311092	2.14	0.033**
Δemployees4year	.0824794	.0345901	2.38	0.017**
Δemployees5year	.1095647	.0385836	2.84	0.005***

In a similar way, it is possible to rule out the variable labour cost per employee among baseline variables; this again in order not to include a variable that could be ex-ante correlated with one of the outcome (in this case employees). As it can be seen in table 1.9c, the impact on the outcome variables is even anticipated, manifesting its effect from the second year on. The balancing property is satisfied across the years (see Annex 9).

Table 1.9. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 without labour cost per employee)

	Matched			
	Coef.	Std.Err	t	P>t
Δtfp0year_CT	.0089609	.0285581	0.31	0.754
Δtfp1year	-.0114142	.0253534	-0.45	0.653
Δtfp2year	.0509219	.0282585	1.80	0.072*
Δtfp3year	.0716665	.0294539	2.43	0.015**
Δtfp4year	.083261	.0303185	2.75	0.006**
Δtfp5year	.0914531	.0312411	2.93	0.003***

[16] This is also why TFP has not been used in the propensity score equation.

Δemployees0year_CT	.0260678	.018749	1.39	0.164
Δemployees1year	.0223513	.0166446	1.34	0.179
Δemployees2year	.0540298	.0215818	2.50	0.012**
Δemployees3year	.0831717	.0249176	3.34	0.001***
Δemployees4year	.0977446	.0278255	3.51	0.000***
Δemployees5year	.1293793	.0298895	4.33	0.000***

A third robustness check is done with the goal of obtaining a better balance between the two groups through the exclusion of less relevant industries. In the treatment group, indeed, only few firms operate in the following sectors: agriculture (4 units), tourism (8 units) e waste (7 units). Again, in this case results are robust and positive and significant effects are confirmed for both TFP and employment. The balancing property is satisfied across the years (see Annex 9).

Table 1.10. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 excluding less relevant industries)

	Matched			
	Coef.	Std.Err	t	P>t
Δtfp0year_CT	-.0107362	.0313867	-0.34	0.732
Δtfp1year	-.0044271	.0330106	-0.13	0.893
Δtfp2year	.0654491	.0346772	1.89	0.059*
Δtfp3year	.1428119	.0363137	3.93	0.000***
Δtfp4year	.1246173	.040507	3.08	0.002***
Δtfp5year	.1252971	.0410294	3.05	0.002***
Δemployees0year_CT	.0219892	.022699	0.97	0.333
Δemployees1year	-.0013844	.0172944	-0.08	0.936
Δemployees2year	.0263305	.0237279	1.11	0.267
Δemployees3year	.0626869	.0314964	1.99	0.047**
Δemployees4year	.0849234	.0353465	2.40	0.016**
Δemployees5year	.1024407	.0389383	2.63	0.009***

An additional sample specification involves dropping from the control group firms that have been subject to national M&A. In this way, only domestic firms not subject to any kind of M&A are included in the control group. Results are still positive and significant for both TFP and employment, although the effect on TFP is slightly less intense with respect to the original sample. The balancing property is satisfied across the years (see Annex 9).

Table 1.11. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 excluding national M&A)

	Matched			
	Coef.	Std.Err	t	P>t
Δtfp0year_CT	.0186907	.0324027	0.58	0.564

Δtfp1year	-.0236917	.0347318	-0.68	0.495
Δtfp2year	.0448943	.0360944	1.24	0.214
Δtfp3year	.1036349	.0370995	2.79	0.005***
Δtfp4year	.0966972	.0427252	2.26	0.024**
Δtfp5year	.08715	.0415887	2.10	0.036**
Δemployees0year_CT	.0062994	.0236648	0.27	0.790
Δemployees1year	.010772	.0190219	0.57	0.571
Δemployees2year	.0517631	.0253899	2.04	0.042**
Δemployees3year	.0932977	.0315106	2.96	0.003***
Δemployees4year	.0895282	.0366172	2.44	0.015**
Δemployees5year	.120296	.0409059	2.94	0.003***

When considering multiple-years effect on outcome – such as TFP – one can think that the impact on some particular year – for instance from the third year on, as in the present study – may be due to the different size of both treat and control groups, as some firms go out of business as time goes by. In particular, the graph on status in the appendix may suggest that there are more control firms going out of business compared to treated ones. Thereby in this alternative sample only firms running at least five years of business after the acquisition (with positive TFP for five consecutive years) are considered. Here as well results are positive and significant both for TFP and employment, although also in this case the effect on TFP is smaller compared to the baseline sample. Again, the balancing property is satisfied across the years (see Annex 9).

Table 1.12. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 only 5-years operating firms)

	Matched			
	Coef.	Std.Err	t	P>t
Δtfp0year_CT	-.0078012	.0299791	-0.26	0.795
Δtfp1year	-.015421	.0317005	-0.49	0.627
Δtfp2year	.0372811	.0328648	1.13	0.257
Δtfp3year	.0983844	.0365982	2.69	0.007***
Δtfp4year	.0986217	.0361024	2.73	0.006***
Δtfp5year	.0884278	.0400025	2.21	0.027**
Δemployees0year_CT	-.0098116	.0235292	-0.42	0.677
Δemployees1year	.0075155	.0161355	0.47	0.641
Δemployees2year	.0292425	.0227755	1.28	0.199
Δemployees3year	.072308	.0285027	2.54	0.011**
Δemployees4year	.1030502	.0302958	3.40	0.001***
Δemployees5year	.133181	.0350965	3.79	0.000***

Lastly, an alternative outcome variable to TFP is considered, labour productivity – value added per employee – which still measures firms' efficiency but in a different way, taking into consideration also variation in

employment level. Similar to TFP, the effect on labour productivity is statistically significant starting from the third year, even if smaller in terms of impact size. Not surprisingly, the effect on revenues is also positive and significant in the long term, that can explain the increase in TFP and employment in the medium term.

Table 1.13. Effect of cross-border M&A deals on target Italian firms' performance, from 2010 to 2013 (NN5 with labour productivity as outcome variable)

	PSM Matched			
	Coef.	Std.Err	t	P>t
Δvaperempl0year_CT	-.0093001	.0329952	-0.28	0.778
Δvaperempl1year	.0031056	.0341126	0.09	0.927
Δvaperempl2year	.05487	.0349127	1.57	0.116
Δvaperempl3year	.0986523	.0371082	2.66	0.008***
Δvaperempl4year	.0902031	.0419032	2.15	0.031**
Δvaperempl5year	.0883441	.0426098	2.07	0.038**
Δrevenues1year	.0206642	.028263	0.73	0.465
Δrevenues2year	.0746847	.0345979	2.16	0.031**
Δrevenues3year	.1437452	.0406283	3.54	0.000***
Δrevenues4year	.186091	.0491441	3.79	0.000***
Δrevenues5year	.2246176	.0550506	4.08	0.000***

1.7 Conclusions

The flow of inward Foreign Direct Investments (FDI) has increased starting from the 1990's all over the world bringing wide-ranging socio-economic implications. There are two different foreign market entry modes (greenfield or M&A) and this research has decided to focus on one of them - cross-border M&A deals - to understand their effect on host country target firms' performance.

Following the industrial organization literature, the study aims at disentangling between short-term and long-term effects of cross-border M&A on target firms' productivity (TFP) and employment, looking at the Italian case between the years 2010 and 2013. Target firms however cannot be directly compared to purely domestic firms because they have different pre-acquisition characteristics that, other than attracting the interest of foreign investors, have a direct impact on post-acquisition performance. To overcome this selection bias - which would have produced biased estimates, a *Difference-in-Difference Matching (DiDM)* approach is followed.

As a first step the Propensity Score Matching procedure in implemented: as expected there is self-selection in becoming a cross border M&A target, as target and non-target firms differ in some pre-acquisition characteristics. In particular, foreign investors tend to cherry-pick target firms, which are found to be larger in size, employing more skilled workers, located in the more dynamic areas and with higher intangible capital. This can be explained by the strategic motives behind the decision to acquire or merge with an international

company, instead of making a greenfield investment, such as acquiring foreign firm's local knowledge or eliminate a potential competitor.

Then a weighted pooled regression is carried out to measure the impact of cross-border M&A deals on target Italian firms' performance. What results show is a positive and significant long-term effect of ownership change on both efficiency and employment. From 2010 to 2013, Italian firms have benefitted from foreign ownership in terms of productivity – the delta to purely domestic firms 12,7% in the third year after the acquisition, 11,5% in the fourth and 11,9% in the fifth year. This result is in line with the profit maximizing hypothesis, which states that investors acquire foreign firms to realize efficiency gains – and well as increase their market power - through a more efficient reallocation of production across firms, the exploitation of economies of scale or scope, the sourcing of technological knowledge and the transfer of managerial and organizational practices. The absence of positive significant effect in the short term can be due to: reorganization and restructuration costs, lead time in the reorganization of activities after the M&A or the presence of less productive firms which are sold within 2 years from the acquisition. The slightly declining intensity of the impact of cross border M&A deals on productivity suggests that positive synergies are fully reaped in one year - the third in this case – and then tend to decrease in intensity over time. However, it must be always bear in mind that there could be an alternative explanation of the productivity increase, that calls into play mark-ups. In fact, since the calculation of tfp does not allow to distinguish between productivity and market power, the above mentioned efficiency effect could be alternatively seen a mark-up increase.

The effect of ownership change in terms of employment is also positive: the delta to purely domestic firms is 7,7% in the third year, 9,8% in the third year and 12,3% in the fifth year. Although M&As provide an opportunity for the new management to cancel work contracts and renegotiate labor conditions, target firms in host countries can also benefit from acquirer's competitive advantages, enlarged sales network and inflow of capital investments, which leads to an expansion of the business and an increase in employment. This is what is likely to be happened to Italian firms subject of cross border M&A over the years 2010-2013. Here again the positive effect is not immediate - no significant effect found in the first year after the acquisition – which can be explained by the time needed by a company to reorganizing its structure, select new employees and contract them.

The results summarized above are robust to several robustness checks, which try to overcome the potential sources of bias, such as: algorithm chosen for matching, misspecification of the propensity score equation, inclusion of less relevant sectors, exclusion of national M&A target firms from the control group and the effect of firm exiting the market on outcome variations.

Annex 1.1. Variables list

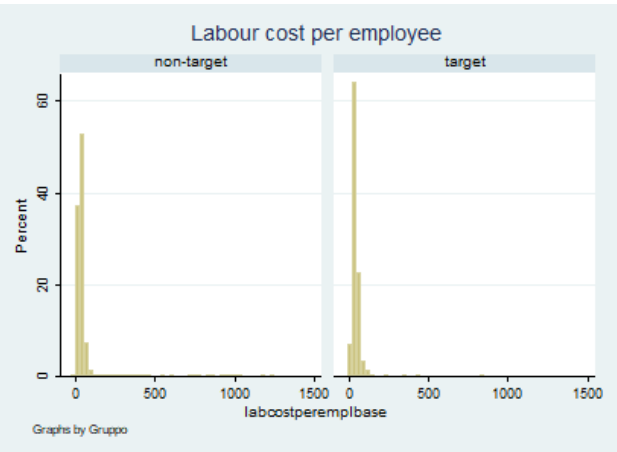
Table 1.1a. List of potential baseline variables for the estimation of the propensity score

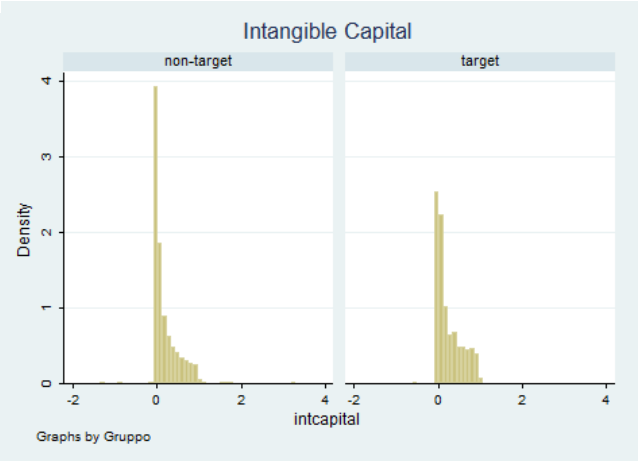
Dimension	**Variable**	**References**
sector	Two or three digit NACE industry levels	Schiffbauer M., Siedschlag I. e Ruane F. (2009) Bertrand, O. & Zitouna, H. (2008) Report ICE Prometeia (2014)
size	Employees or net sales	Schiffbauer M., Siedschlag I. e Ruane F. (2009) Report ICE Prometeia (2014) Heyman, Sjöholm, and Tingvall (2007) Arnold J. and Javorcik B. (2009) Bentivogli & Mirenda (2019)
	market share	Bertrand, O. & Zitouna, H. (2008)
labour productivity	VA / employee	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
total factor productivity	TFP	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
	Multilateral TFP Index (In Arnold J. and Javorcik B. TFP is used in level and growth in the PSM)	Bertrand, O. & Zitouna, H. (2008) Arnold J. and Javorcik B. (2009)
profitability	profit per employee	Report ICE Prometeia (2014) Heyman, Sjöholm, and Tingvall (2007)
	EBITDA	Bertrand, O. & Zitouna, H. (2008)
	Return on capital Or Return on equity	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
experience	Age, age-squared	Schiffbauer M., Siedschlag I. e Ruane F. (2009) Blonigen A. and Pierce R. (2016) Heyman, Sjöholm, and Tingvall (2007)
skilled labour	labour cost per employee	Blonigen A. and Pierce R. (2016)
	wage	Bertrand, O. & Zitouna, H. (2008) Blonigen A. and Pierce R. (2016)

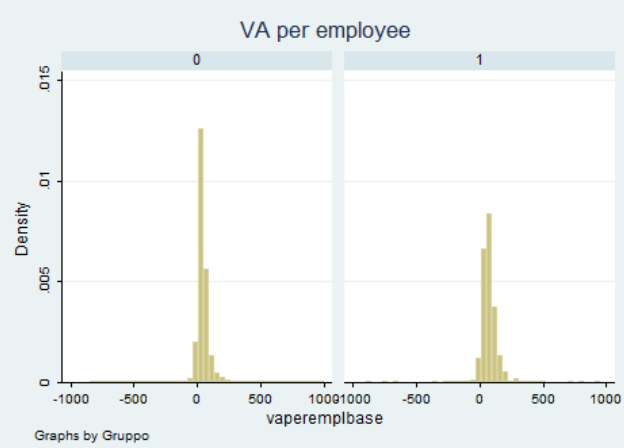
		Arnold J. and Javorcik B. (2009)
	Skilled labour share	Arnold J. and Javorcik B. (2009)
Knowledge intensity	intangible fixed assets over total assets	Report ICE Prometeia (2014) Bentivogli & Mirenda (2019)
	Capital labour ratio	Blonigen A. and Pierce R. (2016) Heyman, Sjöholm, and Tingvall (2007) Arnold J. and Javorcik B. (2009)
Involvement in international trade	Being exporter or not	Heyman, Sjöholm, and Tingvall (2007) Arnold J. and Javorcik B. (2009)
	Imported input share	Arnold J. and Javorcik B. (2009)
financial soundness	debts over total assets	Report ICE Prometeia (2014) Bentivogli & Mirenda (2019)
	interest expenses over total assets	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
	cash flow over borrowing costs	Report ICE Prometeia (2014)
	solvency status (solvent or not solvent)	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
ownership status	public or private	Schiffbauer M., Siedschlag I. e Ruane F. (2009) Arnold J. and Javorcik B. (2009)
quoted	Quoted or not	Schiffbauer M., Siedschlag I. e Ruane F. (2009)
region	North, center or south Italy	

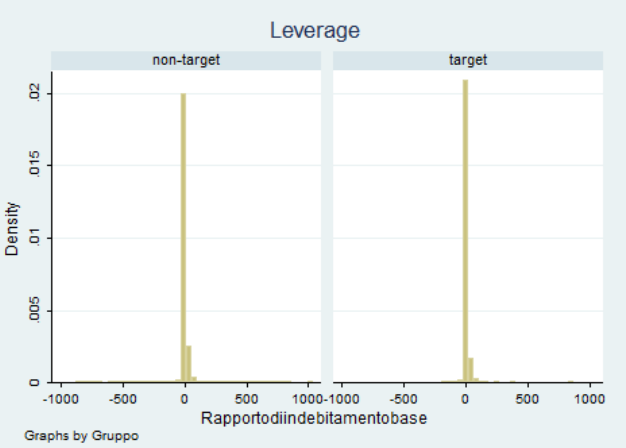
Annex 1.2. Distribution of additional variables for target and not-target firms

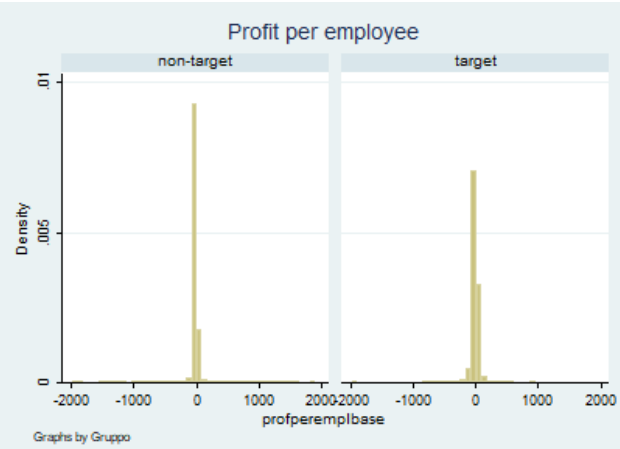
Graphs 1.2a – Distribution by labour cost, intangible capital, added value per employee, leverage and profit per employee - one year before the acquisition – and legal status – to date 2019 – of not-target (0) and target (1) groups. Some observations (outliers) are dropped to provide a better graphical representation

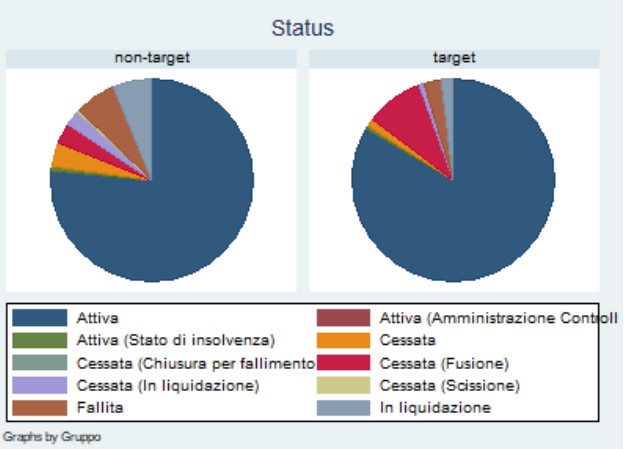












Annex 1.3. Distribution of baseline variables – control (0) and treatment (1) group

Graphs 1.3a – Distribution by area, size class, legal status (current), sector, labour cost, intangible capital, added value per employee, leverage and profit per employee - one year before the acquisition of control (0) and target (1) groups.

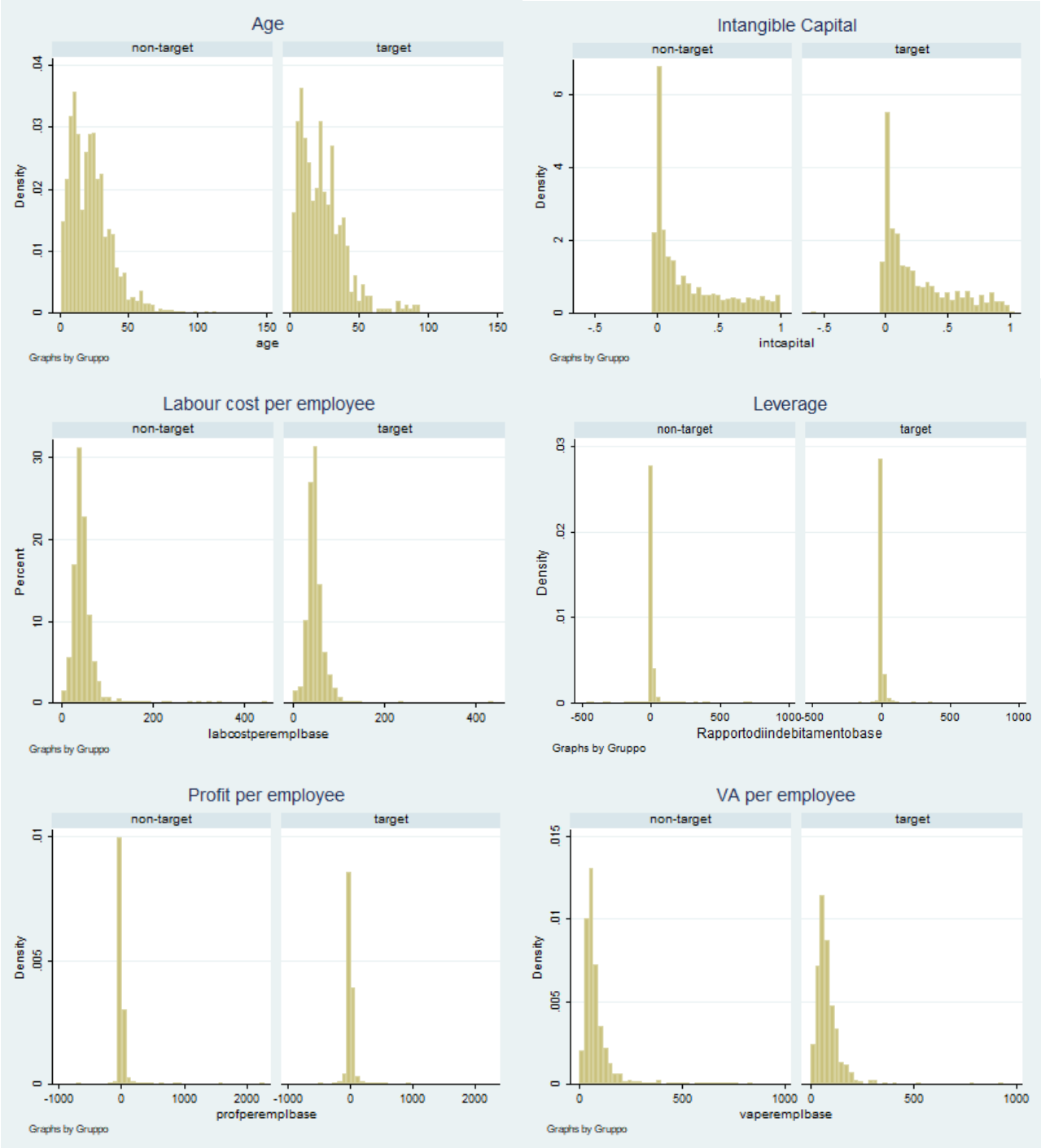
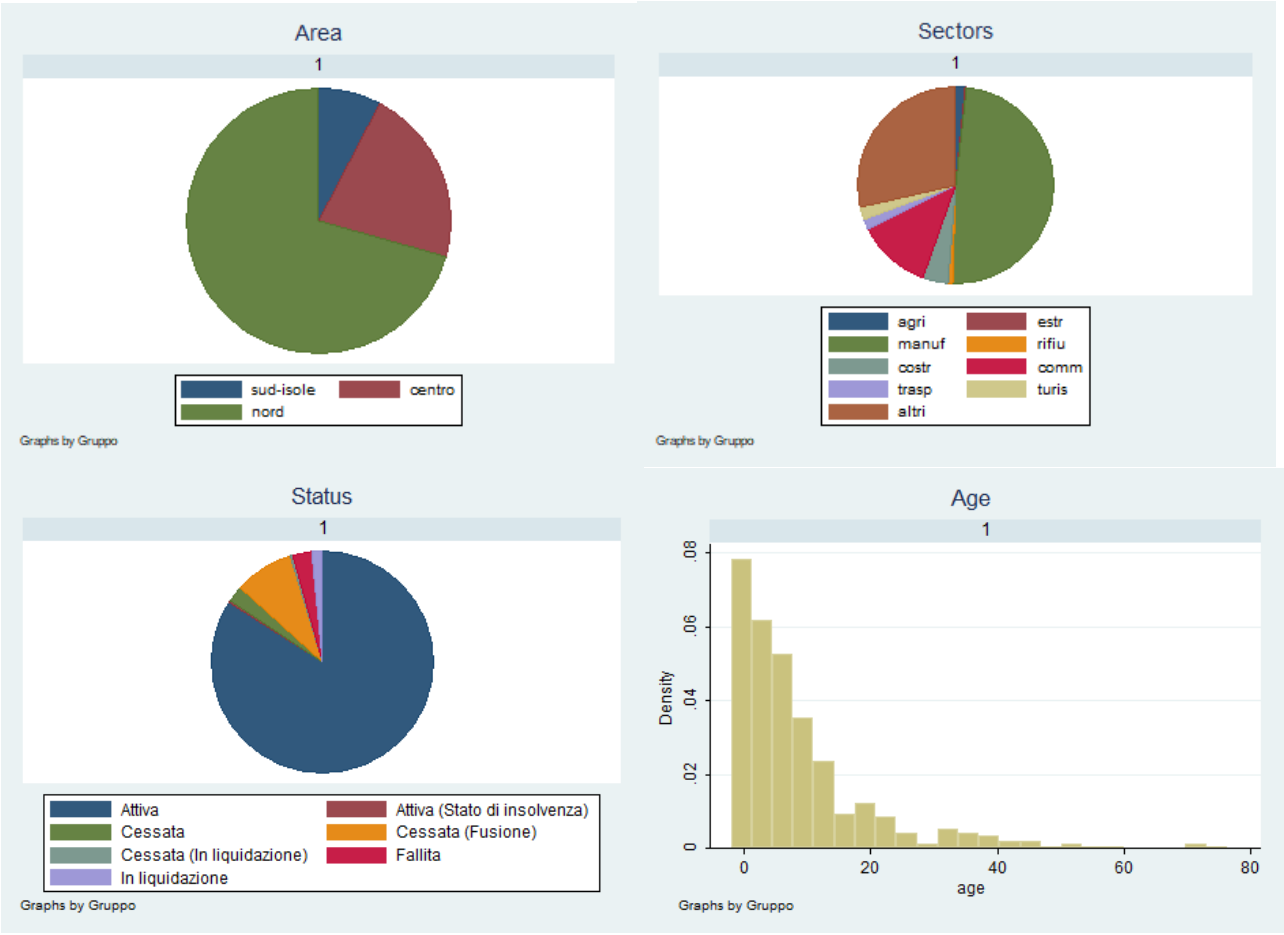

Age
non-target
target
Density
age
Graphs by Gruppo
Intangible Capital
non-target
target
Density
intcapital
Graphs by Gruppo
Labour cost per employee
non-target
target
Percent
labcostperemplbase
Graphs by Gruppo
Leverage
non-target
target
Density
Rapportodiindebitamentobase
Graphs by Gruppo
Profit per employee
non-target
target
Density
profperemplbase
Graphs by Gruppo
VA per employee
non-target
target
Density
vaperemplbase
Graphs by Gruppo

Table 1.3a – Mean values for the variables size class (Revenues 0_1, Revenues 1_2, Revenues 2_10, Revenues 10_50, Revenues 50), added value per employee, profit per employee, labour cost per employee, age, intangible capital, leverage and sectors (Agriculture, Manufacturing, Waste, Construction, Trade, Transportation, Tourism, Other services) - one year before the acquisition of control (0) and target (1) groups.

	Mean TARGET	***Mean CONTROL***
Revenues 0_1	.06464	.09506
Revenues 1_2	.07034	.07161
Revenues 2_10	.31179	.36439
Revenues 10_50	.34221	.31686
Revenues 50	.21103	.15209
Value added per employee	102.39	90.873
Profit per employee	9.9517	13.086
Labour cost per employee	50.073	48.726
Age	23.177	22.959
Intangible Capital	.26138	.24808
Leverage	7.7205	7.9775
Area	.95247	.95817
Agriculture	.0038	.0038
Manufacturing	1.4259	1.4259
Waste	.03802	.03802
Construction	.14259	.14259
Trade	1.0266	1.0266
Transportation	.43916	.43916
Tourism	.13688	.13688
Other services	2.0875	2.0875

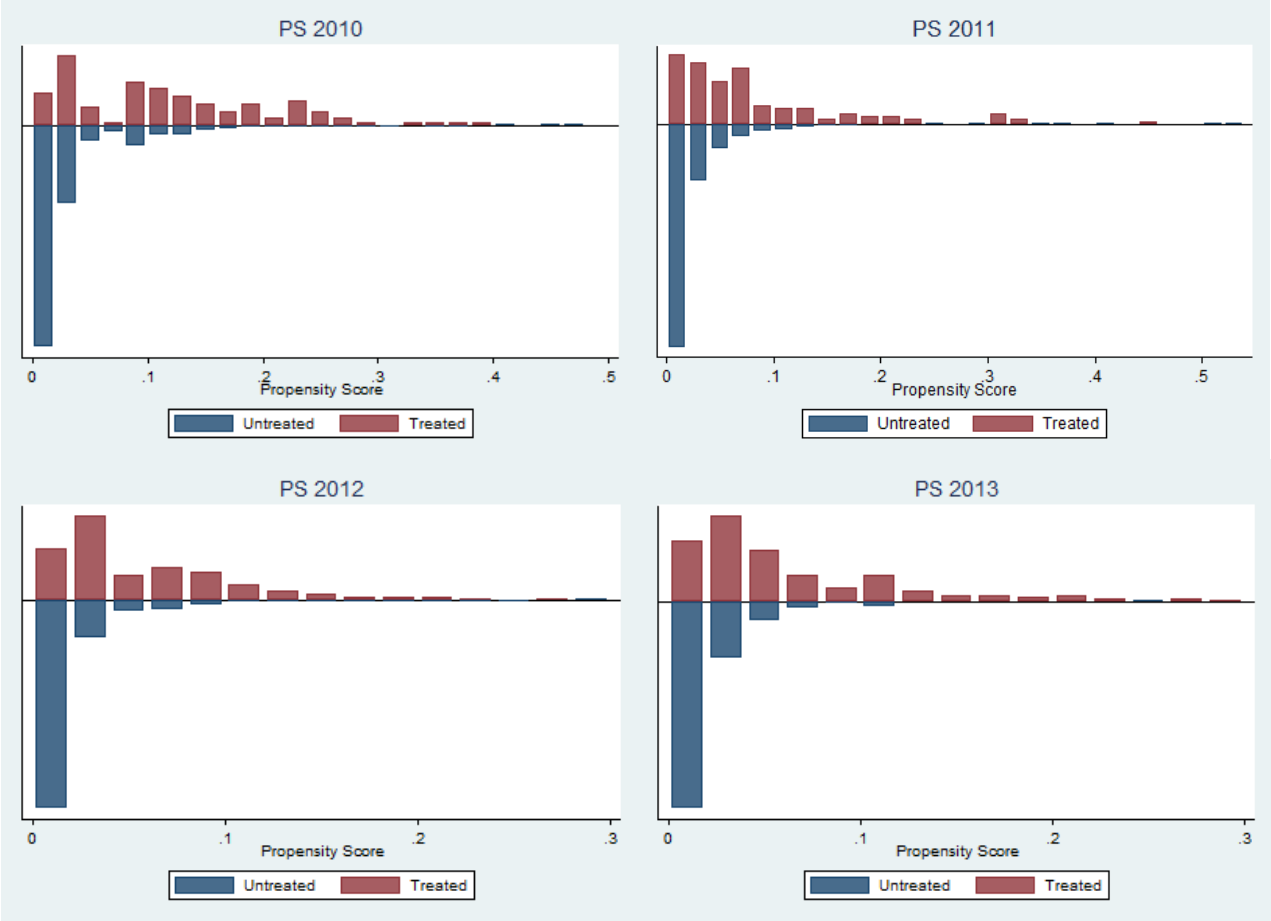
Annex 1.4. Main characteristics of not included target firms

Graphs 1.4a – Distribution by area, type, sector, legal status (current) and age - one year before the acquisition –of not included target firms.



Annex 1.5. Common support

Graphs 1.5a – Testing the common support hypothesis for 2010, 2011 2012 and 2013.



Annex 1.6 Production function estimation using Levinsohn-Petrin approach

In the year 2000, Levinsohn and Petrin built a structural approach to estimate TFP, based on the methodology developed by Olley and Pakes in 1996, by using intermediate inputs to solve the simultaneity issue in the production function estimation, which arises from the correlation between input levels and unobserved firm-specific productivity shocks. This approach allows to overcome the estimation problem typically encountered by using the Olley and Pakes methodology, that is ignoring all observation with zero investment, since firms' investment decision function must be strictly increasing in order to be inverted.

So, Levinsohn and Petrin consider the production function $y_{it} = \alpha + \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \omega_{it} + \varepsilon_{it}$

where m_{it} are intermediate inputs like material, fuel or electricity
and ω_{it} are unobserved productivity shocks

and assume that $m_{it} = f_t(k_{it}, \omega_{it})$ and f_t is invertible and therefore $\omega_{it} = f_t^{-1}(k_{it}, m_{it})$.
After that, the estimation follows Olley-Pakes (1996) very closely by first regressing y_{it} on l_{it} and a non-parametric estimate of $\theta_t(k_{it}, m_{it})$ to get $\widehat{\beta_l}$ and $\widehat{\theta_{it}}$, and after exploiting the conditional moment condition to recover $\widehat{\beta_k}$ and $\widehat{\beta_m}$.

In the present work, nominal variables have been deflated using the following ISTAT indices: agricultural price (for agriculture), 4 digit- production prices (for manufacturing), 2-digit services prices (for services), NIC (for retail and wholesale trade, food and accommodation), construction price (for construction), house price (for real estate). The result of the production function estimation across the years is:

2010

l_realvalagg	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l_dipendenti	.6128262	.0103782	59.05	0.000	.5924853	.6331671
l_realimmobmat	.0854632	.009961	8.58	0.000	.0659401	.1049863

Wald test of constant returns to scale: Chi2 = 458.55 (p = 0.0000).

2011

l_realvalagg	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l_dipendenti	.6497337	.0099906	65.03	0.000	.6301525	.669315
l_realimmobmat	.0881793	.0113453	7.77	0.000	.065943	.1104156

Wald test of constant returns to scale: Chi2 = 362.36 (p = 0.0000).

2012

l_realvalagg	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l_dipendenti	.6834592	.0079576	85.89	0.000	.6678626	.6990558
l_realimmobmat	.0845169	.0062575	13.51	0.000	.0722524	.0967814

Wald test of constant returns to scale: Chi2 = 612.12 (p = 0.0000).

2013

l_realvalagg	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l_dipendenti	.669377	.0061217	109.35	0.000	.6573787	.6813752
l_realimmobmat	.0816684	.0064394	12.68	0.000	.0690474	.0942893

Wald test of constant returns to scale: Chi2 = 1338.99 (p = 0.0000).

Annex 1.7. Effect on intermediate goods

Table 1.7a Effect of cross-border M&A deals on target Italian firms' intermediate goods, from 2010 to 2013 (NN5)

	NN5			
	Coef.	Std.Err	t	P>t
Δinter1year	7.581908	16.81654	0.45	0.652
Δinter2year	3.24295	29.36342	0.11	0.912
Δinter3year	6.742296	15.96722	0.42	0.673
Δinter4year	-4.756805	103.1897	-0.05	0.963
Δinter5year	-6.288054	184.8998	-0.03	0.973

Annex 1.8. Sensitivity test

Table 1.8a Rosenbaum bounds for the effect on TFP

Rosenbaum bounds for tfp3yeardiff (N = 504 matched pairs)

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	.000807	.000807	.079012	.079012	.030105	.126436
1.05	.003685	.000142	.067174	.091284	.018555	.138313
1.1	.012888	.000022	.055824	.101783	.007226	.150126
1.15	.035883	3.1e-06	.044966	.112111	-.004085	.161959
1.2	.082154	3.9e-07	.034973	.122013	-.014226	.172851
1.25	.159095	4.5e-08	.02513	.131418	-.024153	.182736
1.3	.267157	4.7e-09	.01609	.14102	-.033662	.192126
1.35	.397768	4.7e-10	.00691	.150527	-.042524	.200811
1.4	.535821	4.4e-11	-.002336	.159986	-.050982	.209492
1.45	.665211	3.9e-12	-.01051	.168995	-.059707	.218588
1.5	.774049	3.3e-13	-.018467	.177085	-.067862	.227382
1.55	.857081	2.6e-14	-.026309	.184969	-.076572	.235958
1.6	.915064	2.0e-15	-.033847	.192292	-.084442	.244985
1.65	.952428	1.1e-16	-.041006	.199229	-.092557	.253419
1.7	.974806	0	-.047707	.206079	-.100488	.260961
1.75	.987341	0	-.05429	.213006	-.108054	.268242
1.8	.993945	0	-.061103	.220158	-.114809	.275672
1.85	.997235	0	-.06762	.227204	-.121098	.282236
1.9	.99879	0	-.074408	.233813	-.127446	.28867
1.95	.999492	0	-.080599	.240661	-.134093	.295155
2	.999794	0	-.087034	.247628	-.140309	.301908

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Table 1.8b Rosenbaum bounds for the effect on employment

Rosenbaum bounds for dipendenti5yeardiff (N = 513 matched pairs)

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	1.4e-06	1.4e-06	.123953	.123953	.072393	.176459
1.05	.000013	1.2e-07	.111146	.136663	.060048	.189918
1.1	.000085	8.9e-09	.099208	.148612	.048244	.203166
1.15	.000435	6.2e-10	.087962	.160494	.036653	.215659
1.2	.001759	4.0e-11	.077102	.17165	.025564	.227864
1.25	.005776	2.4e-12	.066649	.182665	.015479	.239824
1.3	.015815	1.3e-13	.056921	.193365	.005044	.250949
1.35	.036924	6.9e-15	.047358	.204051	-.00456	.262509
1.4	.074962	3.3e-16	.038051	.213975	-.01348	.273577
1.45	.134644	0	.029011	.22399	-.022375	.283663
1.5	.217315	0	.020704	.233625	-.031225	.294048
1.55	.319641	0	.012713	.243005	-.039881	.304174
1.6	.434016	0	.004402	.251651	-.048636	.314212
1.65	.550543	0	-.003215	.260872	-.056577	.323736
1.7	.659647	0	-.010632	.270042	-.064341	.3328
1.75	.754213	0	-.017719	.278234	-.07206	.342276
1.8	.830583	0	-.02446	.286335	-.079956	.351521
1.85	.888379	0	-.031389	.294469	-.087177	.360806
1.9	.929581	0	-.038388	.302457	-.09428	.369846
1.95	.957378	0	-.044971	.309998	-.101023	.37805
2	.9752	0	.051685	.317776	-.107678	.386405

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Annex 1.9. Balance tests for robustness checks

Table 1.9a – alternative matching algorithms

	NN3				***RADIUS***			
Variable	*2013*	*2012*	*2011*	*2010*	*2013*	*2012*	*2011*	*2010*
Revenues 0_1	0.775	0.726	0.141	0.773	0.233	0.177	0.183	0.773
Revenues 1_2	1.000	1.000	0.848	0.762	0.841	0.865	0.552	0.795
Revenues 2_10	0.387	0.359	0.314	0.828	0.700	0.971	0.708	0.784
Revenues 10_50	0.880	0.542	0.699	0.584	0.656	0.482	0.831	0.802
Revenues 50	0.246	0.461	0.093*	0.898	0.840	0.942	0.461	0.983
Value added per employee	0.446	0.575	0.406	0.558	0.355	0.770	0.479	0.409
Profit per employee	0.512	0.019**	0.986	0.929	0.968	0.228	0.847	0.210
Labour cost per employee	0.203	0.072*	0.918	0.593	0.034	0.303	0.816	0.714
Age	0.308	0.114	0.552	0.605	0.368	0.096*	0.995	0.980
Intangible Capital	0.535	0.320	0.333	0.802	0.197	0.969	0.752	0.819
Leverage	0.533	0.825	0.937	0.859	0.707	0.830	0.868	0.423
Area	0.932	0.319	0.921	0.841	0.468	0.585	0.950	0.585
Agriculture	1.000	.	1.000	.	1.000	.	1.000	.
Extraction	.	.	.	.	.	.	.	.
Manufacturing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Waste	1.000	.	1.000	1.000	1.000	.	1.000	1.000
Construction	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.
Trade	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	.	1.000	1.000	.	.	.
Other services	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
p>chi2	0.984	0.413	0.921	1.000	0.978	0.834	1.000	0.999

Table 1.9b – exclusion of labour productivity

	NN5			
Variable	*2013*	*2012*	*2011*	*2013*
Revenues 0_1	0.613	0.402	0.165	0.074*
Revenues 1_2	1.000	0.857	0.656	0.337
Revenues 2_10	0.272	0.190	0.230	0.369
Revenues 10_50	0.716	0.548	0.840	0.210
Revenues 50	0.159	0.130	0.026	0.207
Value added per employee	0.556	0.348	0.615	0.575
Profit per employee	0.745	0.689	0.742	0.940

Labour cost per employee	0.105	0.521	0.603	0.558
Age	0.097*	0.199	0.988	0.583
Intangible Capital	0.539	0.773	0.270	0.209
Leverage	0.958	0.815	0.977	0.915
Area	0.920	0.615	0.709	0.949
Agriculture	1.000	.	1.000	.
Extraction	.	.	.	.
Manufacturing	1.000	1.000	1.000	0.953
Waste	1.000	.	1.000	0.752
Construction	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	.	1.000
Other services	1.000	1.000	1.000	1.000
p>chi2	0.986	0.579	0.853	0.916

Table 1.9c – exclusion of labour cost per employee

	NN5			
Variable	*2013*	*2012*	*2011*	*2013*
Revenues 0_1	0.694	0.714	0.178	0.03**
Revenues 1_2	0.894	0.961	0.694	0.482
Revenues 2_10	0.517	0.201	0.122	0.317
Revenues 10_50	0.980	0.555	0.706	0.154
Revenues 50	0.169	0.198	0.018**	0.316
Value added per employee	0.577	0.400	0.345	0.328
Profit per employee	0.969	0.034**	0.892	0.836
Labour cost per employee	0.144	0.297	0.986	0.558
Age	0.980	0.199	0.988	0.491
Intangible Capital	0.623	0.248	0.384	0.233
Leverage	0.959	0.491	0.770	0.830
Area	0.920	0.629	0.709	0.823
Agriculture	1.000	.	0.862	.
Extraction	.	.	.	.
Manufacturing	1.000	1.000	1.000	0.952
Waste	1.000	.	1.000	0.752
Construction	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	.	1.000

Other services	1.000	1.000	1.000	1.000
p>chi2	1.000	0.384	0.732	0.762

Table 1.9d – exclusion of Italian M&A

	NN5			
Variable	*2013*	*2012*	*2011*	*2013*
Revenues 0_1	0.766	0.582	0.290	0.098
Revenues 1_2	0.939	1.000	0.451	0.351
Revenues 2_10	0.297	0.226	0.331	0.264
Revenues 10_50	0.886	0.654	0.853	0.076*
Revenues 50	0.153	0.094*	0.047**	0.377
Value added per employee	0.719	0.494	0.379	0.583
Profit per employee	0.678	0.049**	0.809	0.837
Labour cost per employee	0.812	0.436	0.821	0.141
Age	0.130	0.157	0.996	0.702
Intangible Capital	0.445	0.840	0.488	0.260
Leverage	0.939	0.643	0.879	0.803
Area	0.457	0.895	0.895	0.640
Agriculture	.	.	.	.
Extraction	.	.	.	.
Manufacturing	1.000	1.000	1.000	1.000
Waste	.	.	.	.
Construction	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000
Tourism	.	.	.	.
Other services	1.000	1.000	1.000	1.000
p>chi2	0.996	0.583	0.957	0.904

Table 1.9e – exclusion of less relevant industries

	NN5			
Variable	*2013*	*2012*	*2011*	*2013*
Revenues 0_1	0.580	0.451	0.164	0.073*
Revenues 1_2	0.851	0.965	0.322	0.312
Revenues 2_10	0.422	0.196	0.228	0.296
Revenues 10_50	0.832	0.633	0.655	0.173
Revenues 50	0.170	0.082*	0.021**	0.178
Value added per employee	0.769	0.905	0.311	0.463
Profit per employee	0.613	0.156	0.992	0.959

Labour cost per employee	0.138	0.502	0.612	0.441
Age	0.128	0.162	0.743	0.561
Intangible Capital	0.440	0.855	0.311	0.240
Leverage	0.763	0.685	0.435	0.724
Area	0.616	0.568	0.618	0.788
Agriculture	1.000	.	1.000	.
Extraction	.	.	.	.
Manufacturing	1.000	1.000	1.000	0.974
Waste	1.000	.	1.000	0.882
Construction	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000
Tourism	1.000	.	.	1.000
Other services	1.000	1.000	1.000	1.000
p>chi2	0.959	0.39	0.606	0.805

Table 1.9f – exclusion of out-of-business target firms

	NN5			
Variable	*2013*	*2012*	*2011*	*2010*
Revenues 0_1	0.612	0.714	0.296	0.055*
Revenues 1_2	0.638	0.885	0.254	0.379
Revenues 2_10	0.610	0.272	0.525	0.473
Revenues 10_50	0.902	0.614	0.794	0.232
Revenues 50	0.229	0.193	0.066*	0.233
Value added per employee	0.985	0.414	0.941	0.242
Profit per employee	0.655	0.067*	0.495	0.813
Labour cost per employee	0.128	0.061*	0.574	0.416
Age	0.281	0.313	0.252	0.891
Intangible Capital	0.831	0.296	0.067*	0.138
Leverage	0.496	0.544	0.692	0.478
Area	0.711	0.524	0.850	0.942
Agriculture	1.000	.	1.000	.
Extraction	.	.	.	.
Manufacturing	1.000	1.000	1.000	0.947
Waste	1.000	.	1.000	0.753
Construction	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	.	1.000

Other services	1.000	1.000	1.000	0.000
p>chi2	0.997	0.557	0.772	0.834

SECOND CHAPTER:

2. Key factors affecting the impact of cross border M&As on target firms

2.1 Introduction

Following the significant increase in the number of M&A activities across the last decade, the first chapter investigated how cross-border M&A deals affect target firms' productivity, by looking at the Italian case. The study finds that Italian firms have benefitted from foreign ownership in terms of productivity: in the third year after the acquisition, the total factor productivity (tfp) of Italian target firms is 12,7% higher than the one of a sample of purely domestic firms with similar characteristics. In finding so, that piece of research has left room for additional study, specifically on the determinants of the variation in target firms' productivity. Thereby, the second chapter will briefly examine the most important factors affecting the impact of foreign investments which, according to economic literature, are: type of deal, industry heterogeneity, capital share, distance and acquiring firm-related characteristics. Then, it will focus the attention on an additional factor, which is not been considered by other economic studies but that is likely to have an effect on the performance of foreign-acquired firms, that is the type of buyer (which can be either strategic or financial). Understanding the extent and the mechanisms behind efficiency changes on target firms could also help provide policy advices on how to benefit the most from them.

To perform the analysis, target firms will be divided in two subsamples (strategic- and financial-acquired firms, according to the key factors identified (i.e. type of buyer), and matched with firms with ex-ante similar characteristics (control group), in accordance to the procedure followed in Chapter 1 (Difference-in-Difference Matching*)*. So, this study does not aspire to determine the causal effect between key M&A characteristics and productivity change of target firms, but it seeks to describe how subsamples of firms vary their productivity after been taken over by foreign investors.

Results confirm the key role played by the variable type of buyer when variations in target firms' productivity are considered. In fact, Italian target firms acquired by foreign investors operating in the non-financial sector (i.e. strategic buyers) show an increase in their 3-year post-acquisition productivity, while the same does not occur when target firms are taken over by financial investors. This can be explained by the primary concern for strategic buyers, who typically follow a buy and hold strategy, of increasing the firms' efficiency by optimizing the process and eliminating redundancies, compared to financial buyers, whose main objective is to generate high return for investors.

This paper is organized as follows: section 2 reviews the most relevant economic literature on the topic, section 3 explains the methodology implemented, section 4 provides a statistical description of the sample, section 5 illustrates the results of the matching analysis, section 6 includes some robustness checks and, finally, section 7 summarizes the main findings.

2.2 Literature review

The section aims at understanding which are the main variables that could influence firms' performances after a cross-border M&A; thus, to serve the purpose, it is necessary to identify M&A-related key features that - according to economic literature - are most likely to have an impact on the target firms' performance.

A main feature that is usually considered in this strand of research is the type of M&A, which is the motive behind the decision of investing. In case of strategic vertical (upstream or downstream) deals, productivity measures typically capture the impact of technology transfer as new technological innovations, advanced managerial practices and product specialization increase production and process efficiency, that result into higher productivity. However, productivity measures can also catch the effect of firm-level scale economies in presence of fixed cost of production (knowledge, reputation, brand), which instead is often the case with horizontal/market seeking FDI. These different effects are unfortunately hard to isolate as they may come simultaneously, however a distinction among types of M&A deals (horizontal, vertical and conglomerate) can help us understand which effects have been more prominent. As it is shown in Hendricks & Li (2013), horizontal M&A – defined as merging companies belonging to the same industry – and vertical M&A – defined as merging companies operating at different levels within a supply chain for one specific finished product – can indeed have a different impact. According to the literature reviewed, a methodology commonly adopted to distinguish between M&A types is the one developed by Fan and Lang (2000) or Fan and Goyal (2006), which is based on the coefficient of industry relatedness[17]. Thanks to this method, cross border M&As involving US firms have been divided into three categories:

- Horizontal, when acquirer and target firms belong to the same 4-digit SIC sector
- Vertical, when acquirer and target firms do not belong to the same 4-digit SIC sector, but their sectors show high level of relatedness (either forward or backward)
- Conglomerate, when acquirer and target firms neither belong to the same 4-digit SIC sector nor their sectors show high level of relatedness (either forward or backward)

Furthermore, some studies (Benfratello and Sembenelli 2002, Girma et al. 2006, Schiffbauer et al 2009) have investigated the country of origin of the investor, to find out to what extent the effects on productivity and employment may vary depending on the country of origin of the acquiring firm. In fact, according to this theory the transfer of knowledge and efficiency will be higher if the acquiring and target countries are closer in geographical or cultural terms. This type of analysis is usually done by dividing cross-border operations according to the geographical origin of the buyer (UE, USA, other). Benfratello and Sembenelli (2002) for example find a positive effect on target firms, but only in the case of US investors.

[17] The authors use US input-output tables to calculate a so-called coefficient of vertical relatedness, Vατ, which expresses how much the input industry α contributes in value-added to the output of industry τ. A threshold level indicates whether the two sectors are to be considered as being vertically integrated.

Following Nocke and Yeaple's (2007) theoretical suggestions, other studies (e.g. Hughes and Saleheen 2012, Schiffbauer et al 2009) have tried to understand if heterogeneity across industries can affect different target firms' performances. For example in a study on UK firms, Schiffbauer et al (2009) classify acquiring firms in relation to their industry and find that the effects of foreign acquisitions vary across industry (positive effect are largest in electronic industries); furthermore, the study confirms the theoretical predictions of the Nocke and Yeaple model, finding a greater effect on productivity when the acquirer operates in a R&D-intensive industry compared to acquirers operating in marketing-intensive sectors.

Another significant aspect concerns acquiring firms' related characteristics – such as level of productivity, firm size, level of intangible fixed assets or number of patents – which can all be responsible of a diverse effect of foreign ownership on the target firms' performance. In fact, the higher the ownership advantage that a multinational firm possesses, along with its transferability and the complementarity/relatedness with the target firms' assets, the higher the productivity effect on the target firm is expected to be. The share of capital the investor owns in the target firm can also be a discriminating factor. A 100% control may help target firms to reap synergies and efficiency gains in a more rapid and direct way, compared to smaller shares. On the contrary, a full control may reduce the acquired firm's chances of benefitting from potentially advantageous influences arising from a more differentiated shareholding structure. In conclusion, the resulting effect is potentially uncertain. To the knowledge of the author, there are no studies that have dealt with these last aspects yet.

For a short recap of empirical studies on key factors affecting the impact of cross border M&A see also Annex 1, which summarizes them in tabular form.

The present research work fits into this stream of studies, because it aims to analyze the role of an additional industry-related key factor, which has been completely overlooked by previous studies but that can be useful to explain difference in firms' performances after a foreign acquisition, i.e. the type of buyer. According to economic literature (Hege et al. 2012, Martos-Vila et al. 2019) acquiring firms can be divided in two groups: strategic (operating companies) or financial (investment companies) buyers. In business terms, a strategic buyer is typically the one looking for horizontal or vertical expansion, pursuing strategic synergies that will improve their operations, for example by absorbing products or services of the target firm into its business. On the other hand, a financial buyer is interested in investing in a certain company and making high returns out of this investment. This type of buyer usually identifies firms with considerable growth potential, uses leverage to finance the acquisition and would likely keep the acquired company for some years (typically 5 to 7) before seeking an exit to realize return on investment. A strategic buyer is interested in a "buy and hold" strategy and it will likely bring about visible changes in the target entity, by integrating it into the main business. Its goal is to generate some early synergies, typically by removing redundancies and optimizing processes. A financial buyer, on the contrary, may often take a more advisory role, by leaving day-to-day operations to the current team and most of the personnel in place, being more interested in generating acceptable return for investors than business synergies. Then, in theory, strategic buyers may have higher chances to positively impact target

firms' productivity than financial buyers, yet to date there is no empirical work testing this hypothesis; this study will try to test this theoretical prediction by looking at the Italian case.

2.3 Empirical strategy

To investigate the role played by the variable type of buyer in explaining the post-acquisition performance of foreign-acquired firms, the same empirical methodology adopted in chapter 1 is employed, which is a Difference-in-Difference Matching approach.

Difference-in-Difference Matching (DiDM):

The empirical strategy involves a double Propensity Score matching analysis, where target firms are first split in subgroups (strategic- and financial-acquired firms) according to the relevant key factor examined (type of buyer) and then the matching is performed for each subgroups of firms in a separate way. The matching procedure has been already described in the Identification Strategy of Chapter 1, so in this paragraph only the major phases will be reviewed.

As already mentioned in the previous chapter, the Difference-in-Difference Matching (DiDM) Estimator allows to take into account both ex-ante differences in observed firm characteristics, overcoming the selection bias problem (i.e. cross border M&A target firms are different from non-target firms), and temporally invariant differences in outcome levels, i.e. firm-level unobserved heterogeneity. So, target firms are compared with domestic firms with ex-ante similar characteristics (control group) on the basis of a propensity score (***PS***), which is defined as the probability of treatment (***T***) assignment conditional on observed baseline covariates ***X*** (Rosenbaum and Rubin,1983).

$$\boldsymbol{PS(X) = Pr[T = 1|X]}$$

Average outcomes are then compared to produce the treatment effect (ATT) – Eq 1:

$$\boldsymbol{ATT_{PSM-DID} = \frac{1}{N_T}\sum_{i\in T}\left\{\Delta Y_i - \sum_{j\in T} W_{ij}\Delta Y_j\right\}}$$

where:

$\boldsymbol{Y_i}$ = TFP

$\boldsymbol{W_{ij}}$ denotes the weight given to the j − th case in making the comparison with the i − th treated case (0 < Wji ≤1)

Following the first chapter, to match treated and untreated subjects with similar scores, three matching algorithms are used: 3-Nearest neighbour with replacement[18], 5-Nearest neighbour with replacement[19] and

[18] Every treated is matched with three untreated and untreated individuals can be used only once as a match.

[19] Every treated is matched with five untreated and untreated individuals can be used only once as a match.

Radius[20]. If the three underlying assumptions – conditional independence[21], common support and balancing – are true, the analysis mimics a randomized assignment and, conditioning on the propensity score, unbiased estimates can be obtained.

Within each 2-digit NACE sector, firms are matched conditioned on a propensity score, which, in this thesis, correspond to the firm's probability of foreign acquisition; the variables selected for the estimation of the propensity score equation are the following[22]:

Table 2.1. Baseline variables for the estimation of the propensity score

Variable name	**Description**
Revenues 0_1	From 0 to 1 ml € of revenues
Revenues 1_2	From 1 to 2 ml € of revenues
Revenues 2_10	From 2 to 10 ml € of revenues
Revenues 10_50	From 10 to 50 ml € of revenues
Revenues 50	Over 50 ml € of revenues
Value added per employee	Value added per employee
Profit per employee	Profit per employee
Age	Years of business
Labour cost per employee	Labour cost per employee
Intangible Capital	Intangible fixed assets over total assets
Leverage	Debts over total assets
Area	North-Central Italy vs South-Islands Italy

2.4 Data description

The empirical analysis employs an integrated dataset, which contains information both on target firms – Italian firms subject to cross-border M&A between 2010 and 2013 – and acquiring firms – foreign investors who undertake a M&A deal targeting Italian firms between 2010 and 2013. The whole dataset is constructed first by combining two databases on foreign investments, *Reprint* by Ice and Politecnico di Milano - which provides information on the identity of Italian multinational and foreign-owned firms - and *Zephyr* by Bureau van Dijk - which provides data on M&A deals and rumors across the world. Then, other two databases on firms' accounting variables are added, both provided by Bureau van Dijk: *AIDA* (Analisi Informatizzata Delle Aziende) - which contains classified balance sheets of more than 700.000 Italian firms – for target firms and *Orbis* - which contains classified information on around 300 million companies across the world – for acquiring firms.

Data on cross-border M&A deals targeting Italian firms between the years 2010 and 2013 - resulting in the foreign investor holding a control share (≥ 50%) - have been collected using in a complementary way the two databases *Reprint* and *Zephyr*. As mentioned in Blankenburg A. (2020), the resulting group would have

[20] Every treated is matched with untreated individuals that lies within the caliper ('propensity range').

[21] A sensitivity test, following the Rosenbaum bounds approach, will allow to determine how strongly an unmeasured confounding variable affects selection into treatment and undermine the results from the matching analysis

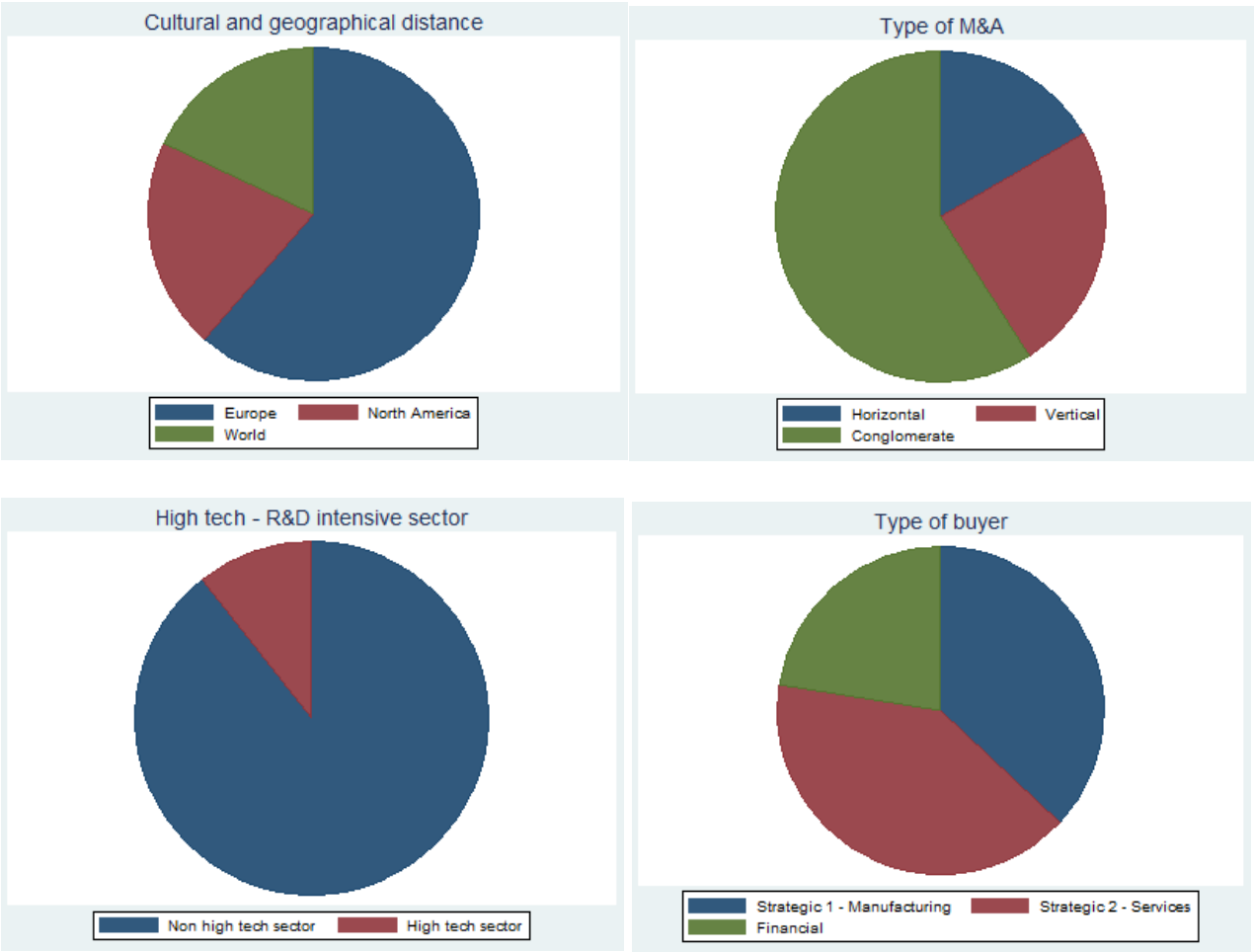
[22] For an in-depth analysis of the Propensity Score variable selection see Identification Strategy of Chapter 1.

summed up to 1155 firms (acquired between 2010 and 2013 by a foreign investor), but unfortunately over half of these firms could not be included because on the database *AIDA* they displayed non-positive or missing values on most relevant variables, guaranteeing a final coverage of 53%, which results in 612 firms representing the 'treatment' group. Out of these 612, only 504 firms display values for the outcome variable (tfp) in the third year after the acquisition, while the remaining 108 firms show missing values in that year; thereby in this study the sample will only consider these 504 target firms and related M&A deals.

Data on foreign investors are collected through the database *Orbis,* which guarantees a 91% level of coverage, corresponding to 457 cross border M&A deals with information available for both target and acquiring firms. This sample of deals - and related firms - represents indeed the bulk of this analysis. The number of acquiring firms may not strictly correspond to the number of M&A deals, as some investor may have carried out more than one acquisition. In this sample, foreign investors are found to be 378, which confirms that some of them have acquired more than one Italian firms during the years 2010-2013.

It could be interesting to review the main characteristics – according to economic literature - of cross border M&A deals targeting Italian firms between 2010 and 2013.

Graph 2.1 – Distribution of cross border M&A deals by cultural and geographical distance, type of M&A, R&D intensive sector and type of buyer



First, it is possible to see where investments come from. Geographical proximity is a drive for cross border M&A in the Italian case, as over half of the acquirers are European[23], followed by North America and Rest of the world.

In the sample, M&A deals are primarily conglomerate (57%), which means involving firms operating in unrelated sectors, while a smaller part is vertical (25%) and fewer are horizontal (18%). The classification of M&As into vertical, horizontal and conglomerate has been done by following the methodology developed by Fan and Lang (2000), which is based on the coefficient of industry relatedness. In short, horizontal M&A are all the deals where target and acquirer operate in the same NACE 3-digit industry code. The remaining deals are then classified into vertical or conglomerate M&A according to whether the inter-industry relatedness coefficient is above or below a certain threshold (in our case 0.1). These coefficients have been derived from the Italian Input-Output table (Istat 2018)[24], which groups sectors by NACE 2-digit industry code (second best), and not by 3-digit industry code, which would hypothetically be the first choice.

Across the sample, the percentage of R&D intensive investors is however modest, as only 49 deals out of 457 involve investors operating in high tech sectors. The list of high-tech sectors consists of a group of high-tech manufacturing industries (basic pharmaceutical products and pharmaceutical preparations, computers and electronic components, consumer electronics and optical instruments, measuring, testing, navigation and medical instruments, air and spacecraft and related machinery) and high-tech services industries (audiovisual and information activities, ICT related activities, scientific research and development) – also called Knowledge intensive services – according to the classification provided by the European Commission on R&D intensive – also called high-tech – sectors (Eurostat, 2016).

Then, when considering the variable object of the current investigation i.e. type of buyer - which refers to the business distinction between strategic and financial buyers - it is possible to notice that over three quarters of investors are strategic buyers, so they come from non-financial sectors. In this study, buyers are classified according to the sector of origin following the Eurostat classification: strategic buyers – which are the ones pursuing a buy and hold strategy – come from either the manufacturing or service (other than financial) sector, while financial buyers – which are the ones interested in making a financial investment – operate instead in the financial sector[25].

As for target firms' main features (control variables), Italian acquired firms are on average 23 years old, most of them comes from Center or North Italy (95%), almost one half operates in the manufacturing industry and only a small percentage of them (9%) is a micro-sized firm (less than 1ml € revenues). Lastly, with regard to

[23] 28 countries.

[24] Reference years: 2010-2015.

[25] Section K, Nace Rev.2 (Eurostat).

the value of shares the investor owns in the target firm, over three quarters of the M&A deals end up in having the acquirer holding a 100% control of the target firm.

2.5 Results

To evaluate the different impact of cross border M&As on target firms' productivity according to the type of buyer a double matching analysis is performed. As already mentioned, the analysis is a standard propensity score matching procedure, where firms are first divided in two subgroups (financial- or strategic-acquired firms) according to the relevant variable (type of buyer) and then matched with domestic firms with similar characteristics (control groups), as it is done in most of the studies on factors affecting the impact of cross-border M&A (Girma et al. 2006, Schiffbauer et al 2009).

The outcome variable is total factor productivity (tfp) in the third year after the M&A deal occurred. The choice of taking into consideration the third year post-acquisition for productivity is explained by the fact that the effect of foreign takeover is at its most three years after the acquisition, as it has been pointed out in chapter 1 (section 1.5 results).

The matching algorithm is NN5[26] and the specification is the one described in the Empirical Strategy, which is the same applied in Chapter 1. What results show is a delta of 21,3 percentage point in the third-year post-acquisition productivity between the two groups of target firms. That is, when target firms are acquired by investors who operate in the financial sector there is no significant productivity effect (they actually decrease their productivity by 9.8% but the effect is not statistically significant different from zero, which is due to the higher standard error, deriving from considering a smaller sample of firms[27]), while when firms are acquired by strategic investors they increase their productivity by 11.5%. A one-year common trend (CT) assumption - to understand whether the target and control groups had different pre-acquisition outcome paths – is also tested, showing similar pre-acquisition trajectories for both subgroups. The balancing assumption – which involves that the control group has a distribution of covariates very similar to the treatment group – and the common support assumption – which states that every subject has a nonzero probability to receive either treatment – are satisfied for each subgroup (see annex 2.2 and 2.3). As the Rosenbaum bounds test[28] shows (annex 2.4) the positive productivity effect for firms acquired by strategic investors is insensitive to a bias that would increase the odds of treatment by 10% but sensitive to a bias that would increase them by 20%, so only partially sensitive to hidden bias.

[26] which involves that each acquired firm is matched with five not-acquired firms - from the same 2-digit NACE sector - and not-acquired firms can be used only once as a match.

[27] 121 firms are acquired by financial buyers.

[28] Which is a sensitivity test to investigate whether the causal effect estimated from the Propensity Score matching is vulnerable to the influence of unobserved covariates is run.

Table 2.2. Propensity Score Matching on two subsamples: productivity variation for target firms acquired by strategic and financial investors (PS match NN5)

	Strategic					***Financial***				
	Coef.	Std.Err	T	P>t	Sample Size	Coef.	Std.Err	t	P>t	Sample Size
Δtfp3year	.114514	.043352	2.64	0.008	1862	-.09825	.082484	-1.19	0.234	552
Δtfp0year	-0.0047	.004448	-1.08	0.281	1726	-.00501	.004509	-1.11	0.226	517

What emerges from these previous results is the key role of the type of buyer in explaining variation in the target firms' productivity. In fact, we observe that when target firms are acquired from strategic investors there is evidence of a positive effect on their productivity, which is not true if they are acquired by financial investors. This finding supports common business economic knowledge, which typically stresses the occurrence of positive synergies whenever the acquiring firm is a strategic buyer. Strategic buyers typically pursue a buy and hold strategy and are interested in removing redundancies and optimizing processes between the two firms. Conversely, financial buyers aim primarily at generating acceptable return for investors rather than reaching business synergies, leaving day-to-day operations to the current team and taking a more advisory role. What can be concluded is that looking at the sectors where the international investors operate may provide policy makers with some indications on how to boost national firms' productivity. According to what has been found, public institutions working in a context of firm internationalization (International Trade Agencies, Ministry of Foreign Affairs, Ministry of Economic Development) should address their efforts towards the attraction of foreign investments realized by strategic buyers, since these investors are more likely to boost target firms efficiency[29], at least in a medium-term perspective.

However, we must consider the existence of an alternative explanation that could be given to productivity variations, which takes into account the role of market power. In fact, the standard calculation of tfp (Olley and Pakes 1996, Levinsohn and Petrin 2003) does not allow to disentangle between productivity and market power, so what has been previously described as an efficiency effect it could be alternatively seen a mark-up change. In the present case, the lack of productivity effect when firms are acquired by financial investors may depend on a reduction of mark-up instead of the lack of achievement of positive business synergies. A way to remove all doubts, it would be to follow the approach suggested by Bloningen and Pierce (2016), who, by applying a difference-in-differences framework, manage to distinguish the two effects and eventually find increases in average markups, but no effect on productivity, for a sample of US plants subject to M&A deals. This in-depth analysis is however out of the scope of the present study, so the question is left open for future research works.

2.6 Robustness checks

[29] No significant differences are instead found for the outcome variable employmentΔ3year.

As robustness checks, it is important to show how the results may vary by changing the way the outcome variable (target firms' productivity on the third year after the acquisition) is calculated. As it has been pointed out in the Empirical Strategy section, three matching algorithms are used in this research work: 3-Nearest neighbour with replacement, 5-Nearest neighbour with replacement and Radius. In the results section, a 5-Nearest neighbour with replacement[30] algorithm has been adopted to calculate the net impact – or average treatment effect for the treated group (ATT) – thereby it becomes necessary to show how results vary using different matching algorithms.

In the table below, a 3-Nearest neighbour with replacement[31] algorithm is employed to calculate the outcome. What emerges is a positive productivity effect only when target firms are acquired by strategic investors, thereby confirming previous results. The balancing assumption is also satisfied for both subgroups of firms (see annex 2.3).

Table 2.3. Propensity Score Matching on two subsamples: productivity variation for target firms acquired by strategic and financial investors (PS match NN3)

	Strategic					***Financial***				
	Coef.	Std.Err	T	P>t	Sample Size	Coef.	Std.Err	t	P>t	Sample Size
Δtfp3year	.124246	.04439	2.80	0.005	1300	-.11332	.084199	-1.35	0.179	375

A further matching algorithm that can be employed to estimate the net effect (ATT) is the Radius[32] (table 2.4). Here as well, estimates confirm the increase in 3-year post acquisition productivity for firms acquired by strategic investors, even though the delta between the two groups of firms is somewhat reduced (17 percentage point). Again, the balance test guarantees target and control firms are comparable in terms of pre-acquisition characteristics (see annex 2.3).

Table 2.4. Propensity Score Matching on two subsamples: productivity variation for target firms acquired by strategic and financial investors (PS match Radius)

	Strategic					***Financial***				
	Coef.	Std.Err	T	P>t	Sample Size	Coef.	Std.Err	t	P>t	Sample Size
Δtfp3year	.108440	.046549	2.33	0.020	13172	-.06073	.084431	-0.72	0.472	6812

[30] Every treated is matched with five untreated and untreated individuals can be used only once as a match.

[31] Every treated is matched with three untreated and untreated individuals can be used only once as a match.

[32] Every treated is matched with untreated individuals that lies within the caliper ('propensity range').

2.7 Conclusions

The second chapter follows the first one, which finds a positive impact of cross border M&A deals on Italian firms' productivity over the years 2010-2013, and seeks to identify the key source of productivity variation for Italian firms.

According to existing literature, there are several factors which may potentially affect variations in firms' productivity as a result of foreign investment: type of M&A (vertical, horizontal or conglomerate), industry heterogeneity (high-tech sector or not), cultural and geographical distance (communication and monitoring), capital share (degree of autonomy) and acquiring firms related-characteristics (productivity and level of intangible fixed assets). However, an additional - and overlooked - characteristic that can potentially influence the post-acquisition performance of foreign-acquired firms is the type of buyer, which is, according to the economic definition, the distinction between financial or strategic (or non-financial) acquirers.

To study the role of the type of buyer, a propensity score matching procedure, which follows the methodology adopted in Chapter 1, is implemented on two different subsamples of target firms, i.e. financial- and strategic-acquired firms. In doing so, a 5-Nearest neighbour algorithm (NN5) is employed, which involves that each acquired firm is matched with five not-acquired firms, from the same 2-digit NACE sector, as it was done in the first chapter.

What emerges from the data is that the variable type of buyer plays indeed a key role, that is target firms acquired by strategic (non-financial) investors increase their productivity by over 21% with respect to firms acquired by strategic buyers. This finding supports business economic theory which sees financial buyers – more focused on generating high return for investors – opposed to strategic buyers – interested in removing redundancies, transfer best practices and generating positive synergies. This would explain the negative role played by financial investors in boosting firms' productivity, compared to their counterparts (strategic buyers), who, by pursuing an integration of business through a buy and hold strategy, increased target firms' efficiency. If this interpretation is correct, relevant policy implications can be derived: according to the present findings, public institutions dealing with foreign direct investments (International Trade Agencies, Ministry of Foreign Affairs, Ministry of Economic Development) should focus their effort on attracting investments coming from strategic investors, more than financial ones, since they will likely bring an increase in target firms' overall level of efficiency.

Two robustness checks are carried out in order to test the strength of the results obtained; they both aim at testing how results vary by using different matching algorithm (3-Nearest neighbour algorithm and Radius), within the Propensity Score procedure. Estimates confirm the positive productivity effect when target firms are acquired by strategic investors and the absence of effect when M&As deals carried out by financial investors.

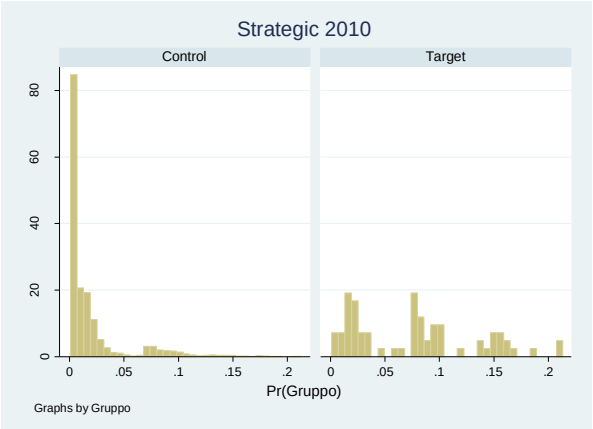
Annex 2.1. Empirical studies on key factors affecting cross-border M&As

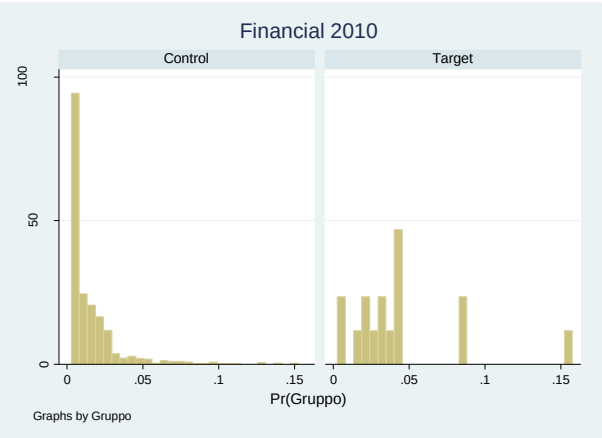
Table 2.1a. Empirical studies on key factors affecting cross-border M&As

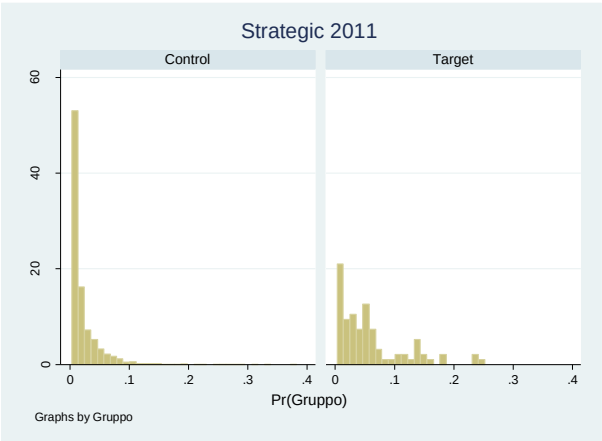
	Positive	***Negative***
Type Of M&A		- Hendricks & Li (2013) find negative effect on employment in case of horizontal M&A. - Schiffbauer et al (2009) find no significant difference between horizontal and vertical deals.
Geographical Distance	- Benfratello and Sembenelli (2002) and Schiffbauer et al (2009) find a positive effect on target firms productivity in case of US investors.	
Industry Heterogeneity	- Schiffbauer et al (2009) find positive effect are largest in electronic industries	

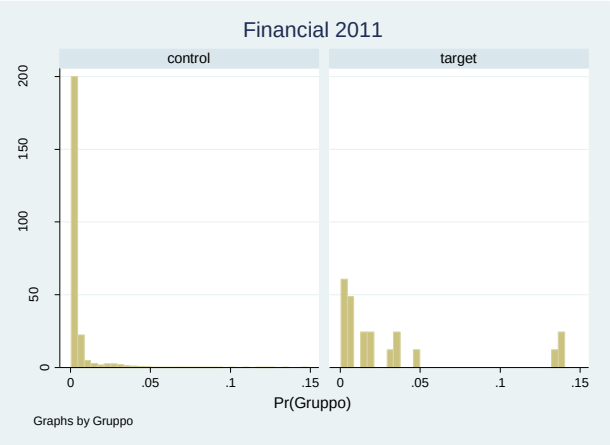
Annex 2.2. Common support

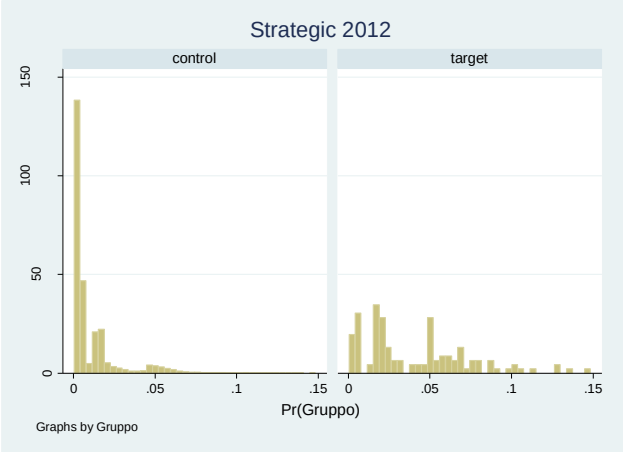
Graphs 2.2a – Testing the common support hypothesis for 2010, 2011 2012 and 2013 for firms acquired by Strategic and Financial investors.

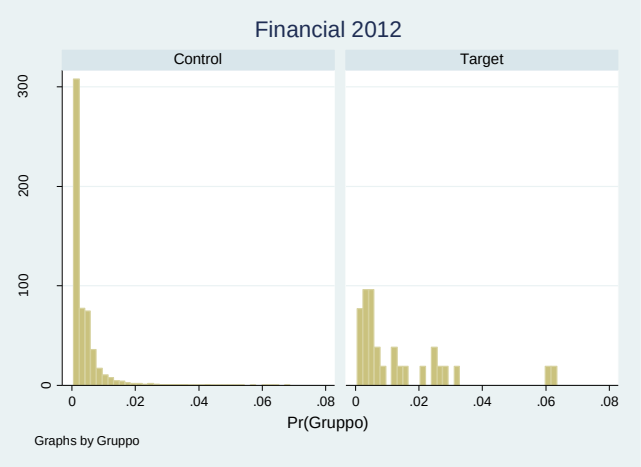


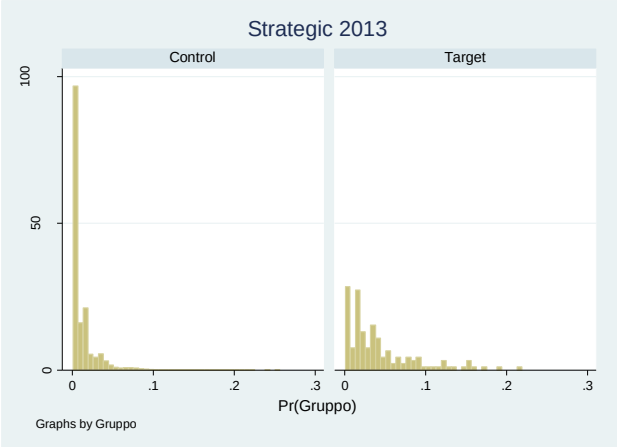


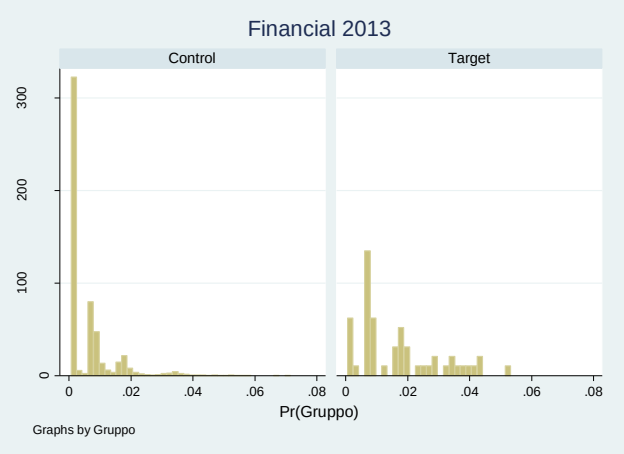












Annex 2.3. Balance test

Table 2.3a Comparison between treatment and control group (p values), 1-year before baseline covariates

	NN5		***NN3***		***Radius***	
Variable	*Financial*	*Strategic*	*Financial*	*Financial*	*Strategic*	*Financial*
Revenues 0_1	0.345	0.170	0.225	0.776	0.010**	0.010**
Revenues 1_2	0.518	0.369	0.464	0.916	0.146	0.504
Revenues 2_10	0.353	0.058	0.161	0.334	0.498	0.500

Revenues 10 50	0.807	0.140	0.236	0.726	0.105	0.448
Revenues 50	0.151	0.019*	0.090*	0.068*	0.547	0.301
Value added per employee	0.060*	0.773	0.463	0.201	0.380	0.801
Profit per employee	0.408	0.597	0.876	0.886	0.894	0.975
Labour cost per employee	0.768	0.736	0.550	0.248	0.176	0.772
Age	0.145	0.426	0.375	0.895	0.423	0.506
Intangible Capital	0.978	0.441	0.506	0.468	0.942	0.288
Leverage	0.987	0.630	0.751	0.928	0.790	0.929
Area	0.590	0.541	0.457	0.459	0.506	0.765
Agriculture	.	.	.	.	.	.
Manufacturing	1.000	1.000	1.000	1.000	1.000	1.000
Waste	1.000	1.000	1.000	1.000	1.000	1.000
Construction	1.000	1.000	1.000	1.000	1.000	1.000
Trade	1.000	1.000	1.000	1.000	1.000	1.000
Transportation	1.000	1.000	1.000	1.000	1.000	1.000
Tourism	1.000	1.000	1.000	1.000	1.000	1.000
Other services	1.000	1.000	1.000	1.000	1.000	1.000
p>chi2	0.719	0.979	0.986	0.937	0.745	0.897

Annex 2.4. Sensitivity test

Table 2.4a Rosenbaum bounds for the effect on 3-year post acquisition TFP for firms acquired by strategic investors

Rosenbaum bounds for tfp3yeardiff (N = 354 matched pairs)

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	.003501	.003501	.082215	.082215	.022126	.141582
1.1	.027275	.000253	.0587	.105533	-.00108	.165652
1.2	.111339	.000014	.036929	.126229	-.022185	.188034
1.3	.282711	5.7e-07	.017103	.146755	-.042952	.209647
1.4	.508451	2.0e-08	-.000633	.165084	-.061946	.229667
1.5	.71771	6.0e-10	-.01663	.182116	-.079587	.247926
1.6	.863395	1.6e-11	-.032996	.198485	-.096406	.265698
1.7	.943501	3.8e-13	-.047707	.214705	-.11163	.283697
1.8	.97969	8.2e-15	-.062128	.229952	-.12708	.299433
1.9	.993548	2.2e-16	-.075573	.243578	-.141831	.315103
2	.998161	0	-.087499	.256923	-.154699	.33

* gamma - log odds of differential assignment due to unobserved factors

sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Table 2.4b Rosenbaum bounds for the effect on 3-year post acquisition TFP for firms acquired by financial investors

Rosenbaum bounds for tfp3yeardiff (N = 101 matched pairs)

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	.296825	.296825	-.029824	-.029824	-.129236	.086829
1.1	.17103	.452948	-.050562	-.005408	-.154214	.107265
1.2	.091391	.602836	-.066558	.014402	-.176378	.125668
1.3	.045899	.728964	-.085571	.038541	-.20156	.146348
1.4	.021906	.824758	-.102014	.052085	-.222366	.161261
1.5	.010022	.891845	-.118487	.072405	-.241842	.181771
1.6	.004427	.935861	-.131164	.090125	-.261286	.197329
1.7	.001899	.963244	-.147591	.102336	-.279737	.211914
1.8	.000794	.979547	-.160289	.111526	-.302327	.226701
1.9	.000325	.988905	-.174205	.123835	-.322953	.245075
2	.000131	.994112	-.188713	.136759	-.341106	.256273

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Concluding remarks

The thesis is about the economics of cross-border Mergers and Acquisitions (M&As). It begins with a review of the literature of cross-border M&As and their performance effects on target firms. Then, it presents the propensity score matching, an econometric technique that allows to obtain unbiased estimates of causal effects in presence of selection bias. Once the effect of cross-border M&As on the target firms' performance is estimated, the attention is shifted to the factors potentially accountable for it. The research work uses a panel integrated dataset about Italian firms and places the focus of the econometric analysis on a propensity score matching approach. Both chapters end with conclusions, but it is worthwhile drawing some concluding remarks for the whole thesis.

As discussed in the first chapter, the majority of studies on the effect of cross-border M&As on target firms found mixed productivity and employment effects. This thesis, which looks at the Italian firms subject to cross-border M&As from 2010 to 2013, found a positive long-term impact of foreign ownership in terms of productivity. The resulting efficiency gains could depend on a more efficient reallocation of production across firms, the presence of scale or scope economies, sourcing of technological knowledge or transfer of best practices. The effect of ownership change in terms of employment is also clear and positive, and it tends to increase over time. Apparently, foreign investors have not used the opportunity to cancel work contracts, as it is often stressed by the public opinion, but quite the contrary, enlarging their workforce in the years following the acquisition.

A few lessons can be learned from the estimation strategy. The implementation of a counterfactual approach – such as propensity score matching – is pivotal when dealing with the causal effect of cross border M&As on target firms. In fact, as expected, there is self-selection in becoming a cross border M&A target across the sample. Foreign investors cherry-pick target firms which are larger in size, hold higher intangible capital, employ more skilled workers and are located in the more dynamic areas. As target firms differ from non-target domestic firms in some pre-acquisition characteristics, there is a need to select a comparable control group.

Previous studies suggest taking into account heterogeneity among M&A deals. M&As can indeed be either vertical, horizontal or conglomerate, involve different levels of control and be carried out by different types of acquirers (high tech or not, geographically close or distant, strategic or financial,). The suggestion is quite useful: in fact, what the second chapter shows is that target firms acquired by strategic investors increase their productivity, while this does not happen with firms acquired by financial investors. This finding may find explanation in business economic theory: financial buyers – compared to strategic buyers – are more focused on generating high rates of return for their investors than transferring best practices and generating positive synergies with the acquired firm.

Some policy implications can be also derived. If the objective is to maintain employment in the acquired firms, the public concern of workforce rationalization following a change in ownership (from national to foreign)

should be minimized, as no reduction in employment levels has been observed. If, instead, the objective is to increase the acquired firms' productivity, a concern on the type of investors is legitimate given the different role played by strategic and financial buyers; in particular, public institution and policy makers should concentrate their efforts on the attraction of foreign investments realized by strategic investors, since they are more likely to boost the target firms' productivity.

This interpretation is in line with the profit maximizing hypothesis, however it must be bear in mind that the difference in productivity could be also be driven by a mark-up change (e.g. firms are acquired by financial investors see a decrease in their mark-up). The only way to measure the intensity of the two effects is to further decompose tfp, by, for example, following the approach suggested by Bloningen and Pierce (2016), who applied a difference-in-differences framework to disentangle the effects. This must be indeed the task of future research works on the topic.

From a methodological standpoint, results are robust several robustness checks, which involve the use of alternative matching algorithms, different specifications of the equation model and the analysis of firms' sub-samples. The main limitation of the study is an incomplete coverage of the sample of firms (53% of the number of Italian firms subjected to cross-border M&As between 2010 and 2013) due to missing data for relevant variables (essential for the calculation of total factor productivity). However, a more detailed analysis shows that there isn't any notable difference between included and not included target firms, except for their age: not included target firms are indeed younger (25% of which are start-ups), which can partially explain the lack of information on relevant variables for this group of firms.

Bibliography

Almeida, P. and Phene, A., 2004. Subsidiaries and Knowledge Creation: The Influence of the MNC and Host Country on Innovation. *Strategic Management Journal*, 25 (8-9), 847-864.

Arndt, C. and Mattes, A. (2010): Cross-Border Mergers and Acquisitions of Multinational Firms. New Firm-Level Evidence, IAW Discussion Paper 62.

Arnold J. and Javorcik B. (2009), Gifted kids or pushy parents? Foreign direct investment and plant productivity in Indonesia, Journal of International Economics, 79, issue 1, p. 42-53.

Barba Navaretti, G. and Venables, A.J., 2004. Multinationals in the World Economy. Princeton: Princeton University Press

Bellak, C., Pfaffermayr, M. and M. Wild (2006), "Firm performance after ownership change: a matching estimator approach", Applied Economics Quarterly, 52(1), pp.29-54

Benfratello, Luigi and Sembenelli, Alessandro, Foreign Ownership and Productivity: Is the Direction of Causality so Obvious? (November 2002). Centro Studi Luca d'Agliano Development Studies Working Paper No. 166.

Bertrand, O. & Zitouna, H. (2008) Domestic versus Cross-Border Acquisitions: Which Impact on The Target Firm's Performance? Applied Economics, Vol. 40, pp. 2221-2238

Blonigen, B. A., Fontagné, L., Sly, N., & Toubal, F. (2014). Cherries for sale: The incidence and timing of cross-border M&A. Journal of International Economics, 94 (2), 341-57.

Blonigen, B.A. and J.R. Pierce (2016). Evidence for the effects of mergers on market power and eciency. NBER WP n. 22750.

Branstetter, L.G., 2006. Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI in the United States. *Journal of International Economic,* 68 (2), 325-344.

Caves, R. E. 1989: Mergers, Takeovers and Economic Efficiency: Foresight vs. Hindsight, International Journal of Industrial Organization, 7(1), 151-174.

Criscuolo, P., 2004. *R&D Internationalisation and Knowledge Transfer: Impact on MNEs and their Home Countries*. Unpublished PhD thesis at the Maastricht Economic Research Institute on Innovation and Technology (MERIT).

Conyon, M. J., Girma, S., Thompson, S., & Wright, P. W. (2002) The Productivity and Wage Effects of Foreign Acquisition in the United Kingdom. Journal of Industrial Economics, Vol. 50, pp. 85–102.

Dunning, J. H. (1993) Multinational Enterprises and the Global Economy (Harlow: Addison-Wesley).

Dunning, J. H. (1977): "Trade, Location of Economic Activities and the MNE: A Search for an Eclectic Approach", in P.O. Hesselborn, B. Ohlin and P.M Wijkman (eds), The International Allocation of Economic Activity, London: MacMillan.

Elia et al (2017) Strategic asset-seeking acquisitions by emerging market multinationals. International Business Review. Volume 26, Issue 5, October 2017, Pages 855-866

Eurostat (2016): High-tech industry and knowledge-intensive services. Metadata. Source:

https://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm

Fan, J.P.H. and L.H.P.Lang (2000) 'The measurement of relatedness: an application to corporate diversification,' Journal of Business 73, 629-660.

Fan, J.P.H. and V.K.Goyal (2006) 'On the patterns and wealth effects of vertical mergers,' Journal of Business 97, 877-902.

Gioia, C. & Thomsen, S. (2002) International Mergers and Acquisitions and the Market for Lemons. International Acquisitions and Firm Performance in Denmark 1990-1997, Paper proposed for presentation at the 28th

Girma, S. & Görg, H. (2007) Multinationals' Productivity Advantage: Scale or Technology? Economic Inquiry, Vol. 45(2), pp. 350-362

Girma, S., Thompson, S. & Wright, P. (2006) International Acquisitions, Domestic Competition and Firm Performance, International Journal of the Economics of Business, Vol. 13, pp. 335-349

Grimpe, C. & Hussinger, K. (2008) Market and Technology Access Through Firm Acquisitions: Beyond One Size Fits All. Discussion Papers No. 08-037, ZEW.

Greenstone, M., & Hanna, R. (2011). "Environmental regulations, air and water pollution, and infant mortality in India" (No. w17210). National Bureau of Economic Research.

Griffith, R., Harrison, R. and Van Reenen, J., 2006. How Special Is the Special Relationship? Using the Impact of U.S. R&D Spillovers on U.K. Firms as a Test of Technology Sourcing. *American Economic Review*, 96 (5), 1859-1875.

Gugler, K., Mueller, D. C., Yurtoglu, B. B., and Zulehner, C. (2003). The effects of mergers: an international comparison. International Journal of Industrial Organization, 21 (5), 625-653.

Gugler, K. & Yurtoglu, B. B. (2004). The effects of mergers on company employment in the USA and Europe. International Journal of Industrial Organization, 22(4), 481–502.

Harris, R. & Robinson, C. (2002) The Impact of Foreign Acquisitions on Total Factor Productivity: Plant-level Evidence from UK Manufacturing, 1987-1992, Review of Economics and Statistics, Vol. 84, pp. 562-568

Harris, R., Siegel, D. S., & Wright, M. (2005). Assessing the Impact of Management Buyouts on Economic Efficiency: Plant-Level Evidence from the United Kingdom. The Review of Economics and Statistics, 87(1), 148–153.

Hege, Ulrich, Stefano Lovo, Myron B. Slovin, and Marie E. Sushka. "Asset Sales and the Role of Buyers: Strategic Buyers versus Private Equity." HEC Paris working paper (2012).

Helpman, E., Melitz, M.J. and Yeaple, S.R., 2004. Export Versus FDI with Heterogeneous Firms. *American Economic Review*, 94 (1), 300-316.

Hendriks P. and Li R. (2013) - The Dynamic Influence of Vertical and Horizontal Mergers and Acquisitions on Employment in the United States An Empirical Study

Heyman, F., Sjöholm, F., & Tingvall, P. G. (2007). Is there really a foreign ownership wage premium? Evidence from matched employer–employee data. Journal of International Economics, 73 (2), 355-376.

Hughes, A. & Saleheen, J. (2012) UK Labour Productivity Since The Onset Of The Crisis - An International And Historical Perspective, Bank of England Quarterly Bulletin, Vol. 52(2), pp. 138-146

Karpaty, P. (2007) Productivity Effects of Foreign Acquisitions in Swedish Manufacturing: The FDI Productivity Issue Revisited, International Journal of the Economics of Business, Vol. 14, pp. 241-260.

Levinsohn, James and Petrin, Amil, (2003), Estimating Production Functions Using Inputs to Control for Unobservables, Review of Economic Studies, 70, issue 2, p. 317-341.

Lichtenberg, F.R. & Siegel, D. (1987) Productivity and Changes in Ownership of Manufacturing Plants, Brookings Papers on Economic Activity, Vol. 3, pp. 643–673.

Maksimovic, V., Phillips, G. and N.R. Pranhala (2011). Post-merger restructuring and the boundaries of the rm. Journal of Financial Economics, 102, 317-343.

Martos-Vila, M., Rhodes-Kropf, M., & Harford, J. (2019). Financial versus Strategic Buyers. Journal of Financial and Quantitative Analysis, 54(6), 2635-2661. doi:10.1017/S0022109019000139),,

McGuckin, R.H. and S.V. Nguyen (2001). The impact of ownership changes: a view from labour markets. International Journal of Industrial Organization. 19, 739762

Nocke, Volker and Yeaple, Stephen, (2007), Cross-border mergers and acquisitions vs. greenfield foreign direct investment: The role of firm heterogeneity, Journal of International Economics, 72, issue 2, p. 336-365

Olley, G Steven and Pakes, Ariel, (1996), The Dynamics of Productivity in the Telecommunications Equipment Industry, Econometrica, 64, issue 6, p. 1263-97.

Piscitello, L. and Rabbiosi, L. (2005). The impact of inward FDI on local companies' labour productivity: Evidence from the Italian case. International Journal of the Economics of Business, 12(1), 35-51.

Rosenbaum P.R., Rubin D.B. The central role of the propensity score in observational studies for causal effects. Biometrika. 1983a;70:41–55.

Schiffbauer M., Siedschlag I. e Ruane F. (2009), Do Foreign Mergers and Aquisitions Boost Firm Productivity? ESRI Working Paper 305, ESRI

Stiebale, Joel and Trax, Michaela, (2011), The effects of cross-border M&As on the acquirers' domestic performance: firm-level evidence, Canadian Journal of Economics, 44, issue 3, p. 957-990.

Stiebale, Joel, (2016). "Cross-border M&As and innovative activity of acquiring and target firms," Journal of International Economics, Elsevier, vol. 99(C)

UNCTAD (2019). "The World Investment Report 2019" ISBN: 978-92-1-112949-6. eISBN: 978-92-1-004158-4. ISSN: 1020-2218. Sales No: E.19.II.D.12. UN, New York, UN Publications.