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Bachelor Thesis in Strategy Economics

INTERNATIONAL BACHELOR ECONOMICS AND BUSINESS ECONOMICS

M&As and Labour Productivity: Impact on Cross-Border and Domestic Acquirers

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ABSTRACT

This bachelor thesis is an investigation into the impact of mergers and acquisitions on the labour productivity of domestic and cross-border acquirers, also aiming to compare the effects between the two groups of acquirers. The study uses a sample of firms from the EU27 and NAFTA with a minimum deal value of $2 million, for deals between 2010 and 2017. The combination of a Difference-in-Difference model and Propensity Score Matching is used to assess labour productivity effects as well as employment and operating revenue changes. The results show no significant impacts on the labour productivity of cross-border acquirers in both the short and long-term. Conversely, domestic acquirers see a negative impact on productivity in the short-term, with the effect failing to endure over the long-term. A simple T-Test reveals no difference in effects between the groups. The findings could stem from cross-border acquirers facing challenges related to cultural and organizational integration in a new environment, while domestic acquisitions may encounter short-term productivity losses due to initial integration issues, failure to efficiently use labour and mismanagement. The results have important implications for business leaders, highlighting the necessity for careful consideration of risks before undertaking a deal, particularly across borders. Policy makers must aim to create environments for smoother cultural integration for international firms to realise the economic benefits of M&As. Potential areas for future research are also discussed, including explorations into long-term effects and the use of different methodologies to understand the dynamic impacts of M&As.

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1. INTRODUCTION

The past decades have seen a substantial increase in the volume of mergers and acquisitions globally. In Europe, mergers and acquisitions (M&A) activity has experienced an annual growth rate of 21.2%. Specifically, there has been notable acceleration in cross-border deals, constituting about 47% of total deal volume in Europe in 2022 (Drazdou, 2023). Similar trends are noted in North American acquirers, driven by the potential of M&As to create value for all the shareholders of the acquiring firm. Nevertheless, the intricacies of M&As lead to several complexities which create obstacles to realising these gains. With a record number of deals in 2021 and continued projected increases in deal volume, the overall impact of M&As for firms become more relevant to business leaders and policy makers by the day (Morgan Stanley, 2023). Furthermore, increasing rates of globalization and international diversification warrant an investigation into the potential of acquiring across geographical borders.

M&As have been the subject of wide range academic research for several years. However, majority of research investigating the returns to M&As focus on the financial aspects such as stock returns and market value. Within literature exploring synergies and efficiencies from M&As, literature mostly lends itself to looking at target firms, with limited investigation on acquirers. Studying acquiring firms can provide insights into the intricacies of how firms navigate M&As, managing risks, leveraging new capabilities and restructuring themselves to realise efficiencies. Furthermore, while past literature agrees that target firms benefit from M&As, evidence for acquiring firms is unclear. This thesis aims to add to existent literature by focusing exclusively on acquirers, using labour productivity as a measure reflecting value gains accruing to firms. Recent economic and strategy literature has used labour productivity as a key measure of capturing operational efficiencies, focusing not only on wealth creation but the full value within the firm (Bertrand & Capron, 2014; Lieberman & Dhawan, 2005). Despite this, past M&A literature has rarely focused on labour productivity as the primary outcome of interest.

M&As can be the source of performance improvements for the acquiring firm through several channels, ranging from improved capacity utilization and economies of scale and scope, to reduced transaction costs (Bertrand & Betschinger, 2012). Both domestic, referring to M&As within the same country, and international M&As have the potential to show such positive impacts for the acquiring firm. Nevertheless, the mechanisms through which these effects are realised vary. Through domestic M&As, firms achieve economies through

restructuring, costs cutting (Lubatkin, 1983) and increased market power (Lehto & Böckerman, 2008). R&D investments are pushed to realise innovative capabilities, increasing efficiency. Other general effects such as administrative and operational efficiencies are also achieved through improved management, increasing productivity (Singh & Montgomery, 1987). Cross-border acquirers, on the other hand, are incentivised to internationalize for the access to new resources and markets (Hitt & Pisano, 2003; Bertrand & Capron, 2014) that are otherwise inaccessible. Theory highly emphasizes learning effects, and firms gain efficiencies through the transfer of knowledge across borders. However, both groups of acquirers face multiple barriers to successful M&As. While both can face integration issues (Zhu et al., 2015; Larsson & Finkelstein, 1999), these are exacerbated by the increased cultural distance for cross-border acquirers (Morosini et al., 1998). Domestic firms are likely to see failure due to mismanagement (Singh & Montgomery, 1987), while the burden of operating in new economic and legal environments hurts the potential of international acquisitions (Bertrand & Capron, 2014). Therefore, while both domestic and cross-border M&As show promise, effects can often be ambiguous, as found by past literature. Similarly, the comparison between the two groups of acquirers is unclear in existent literature. Aiming to bridge these gaps and to add to the vast literature on M&As, the following research question is formulated:

To what extent do M&As affect labour productivity of cross-border and domestic acquirers, and how do these effects differ?

The terms M&A, acquisitions and mergers are used interchangeably in this thesis as in most literature. To answer the question, this thesis uses a sample of M&As from the EU27 and NAFTA, focusing on deals with a minimum value of $2 million between 2010 and 2017. A Difference-in-Difference (DID) methodology is used, combined with Propensity Score Matching (PSM). This allows a comparison of acquiring firms to a constructed sample of non-acquiring firms as the control group, beyond the extraneous changes that can occur over the given period and in the business environment. To compare the effects of domestic acquirers to cross-border acquirers a simple T-Test is employed. Short and long-term effects are looked at, defined as 2- and 5-years post-acquisition, respectively. Apart from labour productivity, employment and operating revenue effects are also investigated to better understand the source of productivity changes. Results find that cross-border acquirers do not see any changes in labour productivity resultant of the M&A in either the short or long-term, opposed to most literature. Domestic acquirers see a decline in productivity in the short-term. There is no significant difference in effects between domestic and cross-border acquirers, in line with past

literature that uses other measures of performance. The results provide important implications for business leaders and policy makers. The insignificant difference in effects suggests that strategists should carefully weigh the pros and cons before making the decision to acquire internationally, considering the large number of involved risks. Policy makers must aim to make integration processes easier for firms to realise the benefits cross-border M&As can bring to the host country through spillover of superior management and production techniques (Hijzen et al., 2013).

2. LITERATURE REVIEW

A considerable amount of the literature dealing with M&A topics pertains to financial impacts of deals, where returns to M&As are analysed using metrics such as stock price and shareholder value. However, for the purposes of this thesis, it is more relevant to focus on studies that use metrics that represent the operational performance of acquirers, such as sales, profitability, productivity and other accounting measures. These better reflect the synergies obtained from an acquisition, driving focus away from simply wealth creation (Papadakis & Thanos, 2010).

2.1 Comparing Acquirers and Non-Acquirers

Empirical literature dealing with domestic acquisitions show a variety of impacts of M&As on firm performance in the short-term compared to non-acquirers. Liu and Qiu (2013) investigate the characteristics and performance of firms involved in M&As. Using a range of performance measures, they find that domestic acquirers improve their performance post-merger as compared to non-participants, particularly sales and labour productivity. Healy et al. (1992) look at 50 mergers in the US, finding significant improvements in asset productivity and cash flow returns for the merged firms as relative to their industries. Other studies such as Sharma and Ho (2003), using four accrual and four cash-flow measures, find that there is no significant improvement in post-acquisition operating performance. They do so by investigating a sample of 36 domestic acquisitions in Australia. Negative effects are also noted. Gugler et al. (2003) use a large dataset of M&As for several countries, comparing merging firms to a control group of non-merging firms. They find that actual sales are significantly lower than projected sales for one to five years after the merger, therefore showing negative effects both in the short and the long-term.

Literature exploring cross-border M&As, in contrast, seem to mostly note positive effects as compared to non-acquirers. Bertrand and Capron (2014) use a sample of French firms, on average, firms that made cross-border acquisitions were found to have higher domestic productivity following an acquisition than did non-acquiring firms. Similar results are noted by Stiebale and Trax (2011), who use a dataset of acquiring companies in the UK from 2000-2007 to explore the effects of cross-border M&As on the firms' domestic performance. They find that cross-border M&As positively affect domestic sales and investment and labour productivity in knowledge intensive industries. They attribute this effect to cost differences between countries or access to new technologies. Edamura et al. (2014), using a dataset of Chinese acquiring firms from 2006-2011 investigate the effects of cross-border acquisitions on several metrics of the acquiring firm's performance, including sales, productivity, tangible and intangible assets and R&D intensity. They find that all these metrics increase substantially after M&A transactions as compared to non-M&A firms.

On the other hand, most long-term investigations do not see any significant improvements caused by the M&As for either domestic or international acquirers. However, these long-term investigations are limited. Similar to their findings on the short-term impacts of domestic M&As, Sharma and Ho (2003) do not find significant long-term effects of acquisitions on firm performance. Martynova et al. (2007) use EBIDTA as a measure of operating performance to investigate the long-term effects of European M&As. They find that although the combined performance of the acquiring and target firms does not change significantly post-merger, their individual profits drop significantly. Betrand and Betschinger (2012), use return on assets (ROA) as a measure of long-term operational performance, finding that acquisitions are performance-reducing for both domestic and cross-border acquirers as compared to non-acquiring firms.

2.2 Comparing Domestic and Cross-Border Firms

Several papers have also compared the effects of international and domestic acquisitions. Most have however focused on target firms rather than acquirers. Bertrand and Zitouna (2008) use French-manufacturing level data. They find that M&As significantly raise the productivity of target firms, concluding that these efficiency gains are stronger for cross-border M&As as compared to domestic for acquirers originating from outside the European Union. Piscitello & Rabbiosi (2010) explore the same, focusing on foreign acquisitions of local companies that

occurred in Italy between 1994 and 1997. They find similar results that suggest that foreign acquisitions increase the local target companies' labour productivity in the short-term.

On the other hand, literature specifically comparing acquirer performance between international and domestic firms is limited. Studies, however, note that there exists ambiguity in the comparison. Martynova et al. (2007) compare operating performance changes caused by domestic and cross-border M&As, where they do not find a significant difference between the two. They attribute these findings to the trade-off between the potential benefits and the complications in managing the post-merger process due to regulatory and cultural differences. As mentioned, Gugler et al. (2003) as well as Betrand and Betschinger (2012) find significant effects of M&As on sales, profits and firm performance. However, both studies conclude that the difference in the impact between international and domestic acquirers not significant in the short or long-term. Rao-Nicholson et al. (2016) find the same; they use several metrics of operating performance such as ROA and sales ratio to explore the effects of M&As and note no significant differences.

2.3 Employment Effects

Employment effects of international and domestic M&As are well explored in literature. Employment changes have important implications for firm efficiency, important to understand for this thesis.

Dealing with domestic M&As in the UK, Conyon et al. (2002) find that merger activity is followed by statistically significant falls in employment for the acquiring firm. Related mergers see persistent falls in labour two years post-acquisition, while hostile mergers have persistent labour reductions even in the long-term. As they control for output change, they conclude that these results indicate an increase in efficiency of production post-merger. Danzon et al. (2007) investigate the determinants and effects of M&As in the pharmaceutical and biotechnology industry without limiting the scope to domestic or international M&As. Their results suggest that in the year after the merger, there are no significant employment changes for large firms caused by a merger. On the other hand, two and three years after the merger, firms see a decrease in employment. Gugler and Yurtoglu (2004) investigate employment demand as a result of M&As in the US and Europe. They find that mergers in the US leave labour demand virtually constant, merger activity reduces employment by 10% in Europe, attributing this difference to the more rigid labour markets in Europe.

Existing literature hence presents several studies investigating M&As and their effects. However, the brunt focus on financial returns and other measures dealing exclusively with shareholder wealth creation, with fewer studies focusing on measures reflecting synergies and value creation. Among the literature using such measures, comparing acquirer performance to non-acquirers, most results are ambiguous. Moreover, comparisons between domestic and international acquisitions lend their focus to target firms, with limited research for acquirers. Among literature comparing the two groups of acquirers, most find unclear results. Literature using labour productivity as the main outcome of interest is highly limited, particularly long-term investigations. Therefore, this study contributes, focusing on acquirer labour productivity, both in the short and long-term. Comparison of effects between domestic and international acquirers are also made.

3. THEORETICAL FRAMEWORK

Having looked at the literature dealing with M&As, the following section develops the theory that underpins the study, where I formulate the hypotheses to be analysed. Through this section, I aim to explore the mechanisms through which M&As effect firm performance, focusing on labour productivity.

3.1 Effects of M&A

There are a variety of costs and benefits for the firm emerging from M&As. Apart from wealth effects and increasing shareholder value, firms can benefit from efficiency improvements through technical and pecuniary economies. While technical economies lead to immediate profits through altering a firm's physical processes to enjoy cost advantages, pecuniary economies reflect the firm's ability to dictate prices and hold market power achieved through size, synonymous to scale economies. Benefits can also accrue from diversification economies or conglomeration effects, referring to the benefits gained from combining activities with other firms (Lubatkin, 1983).

On the other hand, gains can be of a much more general variety. M&As might result in reduced financing costs, administrative efficiencies or human capital gains not specific to products or the business (Singh & Montgomery, 1987). The type of gains is hence also

dependent on the type of deal. For instance, merging firms competing in the same market have higher potential for market power-related gains. In domestic settings, M&As within the same market reduce the number of independent players, concentrating the market (Lehto & Böckerman, 2008). Such market power gains hence result in an improvement in profits post-merger (Gugler et al., 2003). The commonality in technology and marketing can also give rise to gains from economies of scale and scope.

Efficiency gains from M&As could also originate from changes in the employment structures of the firms. Employment losses seem to be commonplace in mergers of all types, emerging from the necessity to maximise profits (Conyon et al., 2002). They facilitate cost reductions through restructuring, retaining the "best people for those jobs" (Danzon et al., 2007). Changes in ownership also allow the new managers to renegotiate employees' implicit and explicit labour contracts that are obstacles for layoffs. This is commonplace particularly in cases of hostile acquisitions (Lehto & Böckerman, 2008; Conyon et al., 2002).

While M&As are associated with synergy gains and other positive effects, they might not always lead to benefits for the acquiring firms. Reasons could include managers simply making mistakes in choosing the right target firm due to the plethora of factors to be considered, or even the possibility of managers working for their own interests. They might seek to maximize their own wealth at the expense of creating value for the company. Administrative problems might also accompany the merger and cancel out potential benefits. These could include agency problems as well as integration and organizational costs. Negative effects could occur due to business stealing effects as well as a biased focus on exploiting free cash flows (Lubatkin, 1983).

Apart from organizational issues, unsuccessful M&As for domestic firms seem to mostly occur in cases of mismanagement. Therefore, despite obstacles, theory shows several economic and strategic benefits advantages of M&As. Particularly in the short-term, cost reductions and employment restructuring can lead to significant efficiency gains. This allows me to formulate my first hypothesis pertaining to domestic acquirers:

Hypothesis 1a: M&As significantly improve domestic acquirers' labour productivity as compared to non-acquiring firms in the short-term.

The overall long-term impact of M&As is more difficult to estimate given the factors that might impact returns, ranging from economic uncertainty to internal changes in firms. However, many gains can be expected to persist over time. Conglomerate M&As often result

in improved management techniques, leading to operating efficiencies that can improve firm productivity over the long-term (Seth, 1990). Furthermore, apart from production-linked economies of scale, economies can also be achieved in other functional areas such as R&D (Capron, 1999). As fixed costs are spread over a larger range of output, the incentive to invest in R&D increases, pushing the innovative capabilities of firms. Firms are able to diffuse knowledge over more productive units, increasing overall efficiency (Bertrand & Zuniga, 2006). Increased knowledge can lead to long-term productivity improvements. Therefore, although more ambiguous than in the short-term, several of the potential gains from mergers can be expected to persist over time. I hence come to my next hypothesis:

Hypothesis 1b: M&As significantly improve domestic acquirers' labour productivity as compared to non-acquiring firms in the long-term.

3.2 Cross-Border M&A

Several firms undertake M&A deals across geographical borders to exploit the potential advantages of expanded markets. The motives of acquiring internationally are often the same as the intended effects. Firms engage in cross-border deals when the expected productivity benefits of foreign expansion outweigh the costs, for instance, access to and transfer of new knowledge in the host country (Bertrand & Capron, 2014). National cultural distance can enhance firm performance by providing access to a valuable pool of critical routines previously not available to the firm. This occurs through learning, where firms interact and pool organizational routines, or through specialized access to routines in the target's local environment. Organizational routines embedded in the target country are transferred back to the acquirer through several mechanisms such as internal reporting systems and global co-ordination functions involving people from different cultural backgrounds (Morosini et al., 1998).

Firms also acquire frequently to obtain complementary resources or skills, entering new resource domains to supplement internal resources (Bertrand & Capron, 2014). In a growingly competitive environment, a firm's resources must be unique and difficult to imitate to sustain a competitive advantage. Such resources are often better found outside the usual domain of the firm (Hitt & Pisano, 2003).

New markets in foreign countries might present high barriers of entry. This could include regulations and the lack of relationships with local suppliers and customers (Hitt & Pisano,

2003). Firms prefer M&As in cases where concentrated product markets see incumbents earning supernormal profits, making entry through FDI expensive and complicated (Singh & Montgomery, 1987). International M&As expand the market for a firm's goods, leading to rapid profit growth. This leads to increased market power, giving rise to economies of scale like with domestic acquisitions, increasing the efficiency of the firm (Hitt & Pisano, 2003). Strategic perspectives also suggest that cross-border mergers might speed market access and promote synergies obtained from globalization (Larsson & Finkelstein, 1999).

Hence, there are a range potential benefits from cross-border M&As for the acquiring firm that could lead to enhancement of productivity in the short-term. Similar employment effects as with domestic acquirers can also be expected for international acquirers, which is also seen in the literature. Prior literature also suggests positive productivity effects, which leads me to my next hypothesis:

Hypothesis 2a: M&As significantly improve cross-border acquirers' labour productivity as compared to non-acquiring firms in the short-term.

As with to domestic acquirers, long-term effects for cross-border acquirers are more uncertain than in the short-term due to a range of confounding factors. Nevertheless, in successful deals, certain conditions can improve the gains from M&As over the long run. High technological distance between the home and host country improves long-term productivity, suggesting that the right choice of host country can see persisting productivity increases (Liu et al., 2024). If firms have the capacity to accumulate knowledge, learning effects can persist (Hitt & Pisano, 2003). As established, this is one of the main forms of synergies for cross-border acquisitions. Furthermore, innovation is important to gain a competitive advantage in international markets, incentivizing cross-border acquirers to develop product and process innovations. The innovations originate from a diverse market and cultural perspectives available internationally (Hitt et al., 1997). Therefore, such factors allow cross-border acquirers to sustain long-term productivity gains through increased efficiencies. Hence, I formulate my next hypothesis:

Hypothesis 2b: M&As significantly improve domestic acquirers' labour productivity as compared to non-acquiring firms in the long-term.

3.3 Cross-Border vs Domestic M&As

Comparing the effects of cross-border and domestic acquisitions suggests that international acquirers have greater potential to gain than domestic acquirers. Domestic gains usually accrue from organizational efficiencies and increases in market power. Cross-border acquirers can see increased efficiency through learning effects that are not as prominent in domestic deals. Furthermore, they have access to new resources and dramatic increases in economies of scale and scope, overcoming the restrictions of domestic goods markets (Betrand & Betschinger, 2012). In essence, cross-border deals have the potential to see amplified effects of the benefits accruing to domestic acquirers. These effects can be expected to materialize particularly in the short-term through immediate increases in profits and efficiency. This leads me to the next hypothesis:

Hypothesis 3a: Cross-border acquirers realise higher labour productivity increases in the short-term than domestic acquirers.

However, if higher performance of cross-border M&A than domestic M&As can be expected due to higher synergy gains, a greater likelihood of M&A failure must also be considered (Bertrand & Zuniga, 2006). The burden of internationalization might offset the positive effects acquirers can reap in the long-term. Firms need to operate in new economic, legal, administrative and cultural environments, that can lead to several costs. Apart from direct costs, international expansion is hence fraught with difficulties and increases organizational complexity (Bertrand & Capron, 2014). A high level of cultural distance can lead to "cultural ambiguity" and losses due a collision of different cultures. As discussed by Morosini et al. (1998), higher levels of cultural distances see a higher degree of conflict post-acquisition. Furthermore, there are likely also significant information asymmetries. This can particularly affect the productivity of international acquirers due to integration issues, that domestic acquirers are less at risk to face. Cross-border firms are also more likely to overestimate synergies, overpaying for foreign targets than domestic firms would (Betrand & Betschinger, 2012).

As hypothesized, both domestic and international acquirers are expected to see productivity increases persist in the long-term. However, the comparative risks for international acquirers are much higher in the long-term. Therefore, I formulate my final hypotheses:

Hypothesis 3b: Domestic acquirers realise higher labour productivity increases in the long-term than cross-border acquirers.

All the aforementioned hypotheses have a null hypothesis associated with them. For hypotheses *1a, 1b, 2a, 2b* they state that M&As have no effect on acquirer labour productivity. For hypotheses *3a* and *3b*, they state that there is no difference in effects between domestic and cross-border acquirers.

3.4 Use of Labour Productivity as a Measure

It is important to justify using labour productivity the metric of choice for the purposes of this study. Labour productivity as a measure of firm performance accurately captures the synergies and efficiency changes in firms, making it appropriate to understand the effect of M&As. It has become a key measure for strategy scholars seeking to understand how a firm's resources create value through operational and organizational efficiency. It is also used in literature as a measure of firm competitiveness (Bertrand & Capron, 2014).

Productivity gains flow not only to the firm's shareholders, but also to employees and customers. Therefore, as compared to financial measures such as profitability and share prices, labour productivity provides a more holistic representation of performance improvements (Lieberman & Dhawan, 2005). It allows to capture the operational consequences of M&As, reflecting the full value created within the firm, focusing not only on maximising shareholder wealth (Bertrand & Capron, 2014).

Using measures such as labour productivity also reduces measurement error (Rawley, 2010). It is less prone to influences from heterogeneity in accounting practices or by earnings manipulation, nor the firms' accounting and financing decisions (Bertrand & Capron, 2014). It is hence noted that several literature dealing with M&A topics uses labour productivity to measure gains, both for acquiring and target firms (Stiebale & Trax, 2011; Siegel & Simons, 2010; Edamura et al., 2014; Gugler et al., 2003; Liu & Qiu, 2013), justifying the use of this metric as the main outcome of choice.

4. DATA & METHODOLOGY

4.1 Empirical Strategy

To investigate the effects of cross-border and domestic M&As, I employ a Difference-in-Difference (DID) methodology Propensity Score Matching (PSM), along with a T-Test to compare cross-border and domestic acquirers. DID with PSM is employed by several literature dealing with similar topics (Edamura et al., 2014; Betrand & Zitouna, 2008; Stiebale & Trax,

2011). DID estimates the effect of a specific treatment or event on an outcome over time by comparing the changes in the outcome between the population being treated and a control group of those that did not undergo the treatment, estimating the treatment effect on the treated (TET). In this case, the M&A is treated as the treatment or an "event", with the treatment group comprising of all cross-border and domestic acquirers. The control group, on the hand, consists of firms that did not undertake an M&A, or non-acquirers. As noted by Betrand and Zitouna (2008), this method is justified in the fact that simply comparing the outcome for the acquirers before and after the M&A is not satisfactory, as the changes can be attributed to exogenous factors such as a change in the economic situation. Therefore, using the DID methodology allows to account for these factors. Time-invariant unobserved factors that differ between the treatment and control group as well as time-variant factors that do not differ between the groups can be accounted for through this method.

The DID methodology, however, cannot account for time-variant factors that differ between the treatment and control group. Hence, an important assumption that needs to hold for a DID analysis to be valid is the parallel trends assumption. In the case of this analysis, this assumes that the trends in dependent variables for both the acquirers and non-acquirers before the M&A are the same, that is, there are no time-varying differences between the treatment and control groups. PSM helps ensure that this assumption holds. This method estimates the probability of a firm being selected into the treatment group based on chosen observables. A probit model estimates the probabilities, the choice of using a probit model stemming from treatment being binary, that is, a firm is either an acquirer or non-acquirer (Caliendo & Kopeinig, 2008). The firms in the treatment group are matched to the control group based on similarity in these probabilities or propensity scores.

An important assumption of PSM is that of common support. In this case, this assumes that every firm has a positive probability of being in both the treatment and control groups for a given value of a covariate (Caliendo & Kopeinig, 2008). To ensure this, the condition is imposed while performing the matching procedure, and the firms off common support are removed from the sample.

Through PSM, I therefore ensure that the groups do not differ in terms of observable characteristics. The firms are similar enough to be expected to follow the same trajectory before the treatment and hence fulfil the parallel trends assumption. However, this means that I assume selection into treatment is measured based on these observable covariates. Furthermore, PSM

also assumes that the covariates included in the procedure are unaffected by the decision of treatment. Both these assumptions cannot be tested. Nonetheless, the use of a wide range of matching covariates supported by literature helps validate the methodology (Caliendo & Kopeinig, 2008).

Furthermore, for a valid DID estimate, the Stable Unit Treatment Value Assumption (SUTVA) must be fulfilled. According to this, the potential outcome for a firm must not be affected by the treatment status of another firm. Therefore, a firm's outcome should not be affected by whether another firm undertakes an M&A. This cannot be tested, however the use of similar approaches in a wide range of literature dealing with similar topics justifies the use of the DID method.

4.2 Data

I use a firm-level dataset including cross-border and domestic acquirers from the European Union (EU27) and North American Free Trade Association (NAFTA) involved in M&A deals with a minimum deal value of 2 million USD between 2010 and 2017 to ensure a large enough sample size, as well as include a wide range of company sizes. To the best of my knowledge, prior literature has not analysed such a recent sample. The M&A data is obtained from Orbis M&A combined with firm-level financial data from Orbis. If a deal involves multiple acquirers, only the company with the highest operating revenue before the acquisition is kept in the sample. Companies that made acquisitions both domestically and internationally are removed. If companies undertake more than one deal within the time period, only their first deal is kept in the data. Doing so ensures no selection, providing a more representative and unbiased sample, while also ensuring an adequate sample size. After this, performing PSM leaves me with a sample of 238 domestic acquirers and 93 cross-border acquirers. For the control group, data on a random sample of companies not involved in either cross-border or domestic M&As within this period from the EU27 and NAFTA is collected. After PSM, the control group consists of 1275 firms. The number of acquirers by region can be seen in Appendix A.

Data is collected on operating revenue, number of employees and value added for each of the 3 years pre-acquisition and 2- and 5-years post-acquisition to investigate short-term and long-term effects, respectively. Data for all the 5 years after the deal is not collected to prevent a reduction in the sample size due to missing data. Data beyond 5 years is not collected for similar reasons. Further, data is also gathered on capital intensity, tangible and intangible assets

in the year before acquisition. Capital intensity is equal to total assets divided by total operating revenue. Tangible and intangible assets are used to calculate a ratio. Apart from this, I have data on acquirer and target industry, depicted by their NACE Rev.2 core code, firm country and target country.

Labour productivity is calculated as value added divided by the number of employees, where "value added" is defined as the firm's total revenue minus the total costs of non-labour input (Betrand & Capron, 2014). This measure of labour productivity is used in a wide range of literature (Piscitello & Rabbiosi, 2010; Doms & Jensen, 1998). As the database already provides data on value added, there are no calculations required. Descriptive statistics on all variables are presented below in Table 2 and 3, split into the periods before and after the deal.

Table 2. Descriptive Statistics for 3 Years Before M&A

Variables	Group	Mean	St. Dev	Min	Max
Labour Productivity	*Domestic*	292.41	743.37	0.39	7,034.82
	Cross-Border	177.42	253.78	0.57	1,639.53
	Control	201.18	957.17	0.28	50,562.20
Number of Employees	*Domestic*	11,403	47,452	1	611,020
	Cross-Border	15,623	54,965	5	497,745
	Control	15,970	75,437	4	2,300,000
Operating Revenue	*Domestic*	2,817.64	10,475.91	0.99	109,152.10
	Cross-Border	4,247.60	11,106.44	2.05	77,898.46
	Control	5,021.79	2,0589.76	0.02	485,873.00
Capital Intensity	*Domestic*	4.08	12.58	0.26	137.62
	Cross-Border	2.97	7.59	0.26	62.53
	Control	1.93	40.80	0.12	82.38
Intangible Assets/Tangible Assets	*Domestic*	19.70	162.42	0.000	2374
	Cross-Border	2.88	6.52	0.001	55.63
	Control	10.49	68.61	0.000	341.29

Note. The table presents the descriptive statistics of the matched dataset for the 3 years before the M&A. It is split between three groups, namely domestic acquirers, cross-border acquirers and the control group comprising of non-acquirers. "St. Dev" refers to the standard deviation of the variables, "Min" and "Max" refer to the minimum and maximum recorded observations. The units of Labour Productivity are thousand USD per employee, Operating Revenue is in million USD.

As seen in Table 2, the mean labour productivity for domestic acquirers before the deal is approximately $292,410 per employee, while for cross-border acquirers it is lower at $177,420 per employee. The matched non-acquirers in the control group see show a mean labour productivity of approximately $201,180 per employee. The number of employees before the M&A, on average, are higher for cross-border acquirers as compared to domestic, while the control group has the highest number of employees. The means for operating revenue follow the same pattern. On the other hand, the mean capital intensity is lowest for the control group while the ratio of intangible assets to tangible assets is lowest for cross-border acquirers.

Table 3 presents the statistics for the years after the acquisition.

Table 3. Descriptive Statistics for 2 and 5 Years After M&A

Variables	Group	Mean	St. Dev	Min	Max
Labour Productivity	*Domestic*	357.08	1,520.47	0.09	24,951.63
	Cross-Border	181.46	261.60	0.57	1,504.47
	Control	217.09	694.61	0.26	18,692.78
No. Employees	*Domestic*	13,491	53,791	1	709,720
	Cross-Border	15,170	53,727	5	488,824
	Control	18,132	81,080	1	2,300,000
Operating Revenue	*Domestic*	3,129.62	12,143.66	0.15	109,152.10
	Cross-Border	4,602.91	4,602.91	0.00	94,387.52
	Control	6,019.94	24,991.25	0.17	611,289.00

Note. The table presents the descriptive statistics of the matched dataset for 2 and 5 years after the M&A. It is split between three groups, namely domestic acquirers, cross-border acquirers and the control group comprising of non-acquirers. "St. Dev" refers to the standard deviation of the variables, "Min" and "Max" refer to the minimum and maximum recorded observations. The units of Labour Productivity are thousand USD per employee, while Operating Revenue are million USD.

Table 3 reveals that post-acquisition, domestic acquirers still have the highest mean labour productivity among the three groups of firms at approximately $357,080 per employee. The means for cross-border acquirers and the control group are $181,460 and $217,090, respectively. The values are higher than the short-term means for both groups of acquirers, providing an indication that labour productivity increases post-acquisition. Nevertheless, the mean productivity of non-acquirers also increases, therefore it remains to be seen if the increase

is greater for acquirers as compared to non-acquirers. Employment increases for domestic acquirers and the control group as compared to pre-acquisition figures. On the other hand, employment falls for cross-border acquirers. Operating revenue increases for all three groups.

Tables 3 and 4 also show that the standard deviations are high, suggesting that there is a high level of variation in the observations. Furthermore, the minimum and maximum values represent extreme observations, which is dealt with in the following section.

4.3 Model Specification

For the first stage of my analysis, I use several covariates supported by literature in the probit model. I include the logarithm of the number of employees in the 2 years before the acquisition and the square of the number of employees in the year before the acquisition. This captures the firm's ability to realize economies of scale and other size advantages (Stiebale & Trax, 2011; Bertrand & Zitouna, 2008). The logarithm of the ratio of intangible assets to tangible assets in the year before acquisition is used as a proxy for R&D; a high ratio represents large investments into intangible assets such as intellectual property and patents. This accounts for the technology and knowledge of a firm, which is important for M&As and might affect returns (Stiebale & Trax, 2011; Edamura et al., 2014). The logarithm of the capital intensity in the year before acquisition is also used, capturing differences in the production process of firms (Stiebale & Trax, 2011). The logarithms of labour productivity in the 3 years pre-acquisition are also included. This acts as a balancing method, ensuring the growth trajectories of the treatment and control groups are the same before the M&A. As seen in the descriptive statistics, there exist extreme values that can bias the data and findings. This is the reason I use the logarithm of all the mentioned variables to prevent skewness, ensuring normality and dealing with extreme observations. Finally, dummies for the acquirer's home country and their core industry are also used in the estimation. It is evident through the literature that the location of the firm determines the extent of the access to resources in the target country due to various factors such as cultural distance (Betrand & Capron, 2014; Morosini et al., 1998). Different effects can also be expected for different industries, as discussed by Stiebale and Trax (2011) and Betrand and Zuniga (2006). The probit model can be depicted as follows:

$$(1)\quad \Pr\left(AF_{i,s,c,t}=1\right)=$$
$$F\{\log\left(Employees_{i,s,c,t-1}\right),\log\left(Employees_{i,s,c,t-2}\right),\left(Employees_{i,s,c,t-1}\right)^2,$$
$$\log\left(Ratio_{i,s,c,t-1}\right),\log\left(CapitalIntensity_{i,s,c,t-1}\right),$$
$$\log\left(Productivity_{i,s,c,t-1}\right),\log\left(Productivity_{i,s,c,t-2}\right),\log\left(Productivity_{i,s,c,t-3}\right)\}$$

In equation 1, AF takes the value of 1 if the firm is an acquirer, either cross-border or domestic, and 0 if otherwise. The acquiring firm *i* in industry *s* in country *c* that acquires in year *t* is matched to a non-acquiring firm in the control group based on propensity scores. The success of the matching procedure is evaluated through a Standardized Bias test (Caliendo & Kopeinig, 2008), comparing the biases in the used covariates before and after matching.

I evaluate the impact of cross-border and domestic M&As on labour productivity as hypothesized, along with the effect on the number of employees and operating revenue. As discussed, investigating the effects on employment and revenue could provide insights into the causes of productivity changes. I perform logarithmic transformations for the outcome variables for the same reasons as the covariates, to prevent skewness and ensure normality. This also makes the interpretation of results more intuitive, as changes in the outcomes can be interpreted as relative to the baseline. Therefore, the DID equation is depicted as follows:

$$(2)\quad \log\left(Outcome\right)_{it}=\alpha_i+\beta_1\times Post\times CrossBorder+\beta_2\times Post\times Domestic+$$
$$\gamma_t+\varepsilon_{it}$$

In equation 2, Outcome is either labour productivity, number of employees or operating revenue. Post takes the value of 1 for observations after the M&A and 0 for the ones before. CrossBorder is 1 for international acquirers and 0 otherwise; similarly, Domestic is 1 for domestic acquirers and 0 otherwise. α_i and γ_t represent firm-specific and time fixed-effects, respectively, to account for within-company variation and time effects. Using fixed effects also captures the initial differences between the groups noted in the descriptive statistics in Table 2. These regressions will be performed to investigate both short-term and long-term effects, that is, the outcomes 2- and 5-years after the deal. The inclusion of both the interaction terms allows β_1 and β_2 to isolate the effects of a cross-border and domestic M&A as compared to non-acquirers. These coefficients and their significance while performing the analysis for labour productivity will allow me to test hypotheses *1a, 1b, 2a,* and *2b.* I employ clustered standard errors in the analysis, clustered at the firm-level. A simple t-test will then be used to check if these coefficients are significantly different from one another, testing hypotheses *3a* and *3b.*

Three robustness checks are performed. The first uses Nearest-Neighbour matching instead of PSM. The second increases the threshold for deal size to $10 million dollars. Finally, the third robustness check removes the acquirers who undertake multiple deals in the time period.

5. RESULTS

5.1 Propensity Score Matching

To evaluate the success of PSM, I perform a Standardized Mean Bias Test to check the balance between the treatment and control group based on the listed covariates, results of which are presented below.

Table 4. Standardized Mean Bias Test

Covariates		**Means**		**% Bias**	**% Reduction in Bias**	**p > |t|**
		Treated	**Control**			
Log of Employees $_{t-2}$	*Unmatched*	6.991	7.632	-28.7		0.000
	Matched	7.151	7.145	-1.0	94.6	0.851
Log of Employees $_{t-1}$	*Unmatched*	6.927	7.588	-29.5		0.000
	Matched	7.106	7.142	-1.6	96.4	0.903
Log of Capital Intensity $_{t-1}$	*Unmatched*	0.408	0.186	24.7		0.000
	Matched	0.363	0.406	-4.8	80.6	0.598
Log of Ratio $_{t-1}$	*Unmatched*	-0.889	-0.057	-33.1		0.000
	Matched	-0.722	-0.519	-8.1	75.6	0.327
Log of Productivity $_{t-3}$	*Unmatched*	4.760	4.688	6.7		0.182
	Matched	4.740	4.789	-3.6	46.5	0.713
Log of Productivity $_{t-2}$	*Unmatched*	4.736	4.660	7.4		0.153
	Matched	4.695	4.727	-3.1	57.7	0.741
Log of Productivity $_{t-1}$	*Unmatched*	4.714	4.643	6.7		0.183
	Matched	4.674	4.699	-2.4	64.1	0.782
(Employees $_{t-1}$)^2	*Unmatched*	2.9×10^9	4.1×10^9	-1.7		0.818
	Matched	2.0×10^9	2.9×10^9	-1.4	16.6	0.604

Note. This table presents the results of the Standardized Bias Test. The covariates are relative to the acquisition year, where "t" is the acquisition year. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As seen in Table 4, there were significant biases in the covariates before the matching procedure. PSM led to significant reductions in bias for all the covariates being matched on, reflecting that the matching was a success. The matched non-acquiring firms are therefore an appropriate control group to use in the DID regression analysis.

5.2 Main Analysis

After the matching procedure, DID regressions for the main variable of interest, labour productivity, as well as employment and operating revenue are performed. The analysis is split into short and long-term, with the same model estimating the effects of domestic and cross-border M&As. Therefore, the short-term analysis tests hypotheses *1a* and *2a*, while the long-term regression tests hypotheses *1b* and *2b*. Further, the difference in the coefficients is estimated, allowing to test for hypotheses *3a* and *3b* that checks if the effects for the two groups are significantly different from one another. The results are presented below.

Table 5. Effects of Cross-Border and Domestic M&As

	Short-Term			**Long-Term**		
	PROD (1)	**EMPL (2)**	**REV (3)**	**PROD (4)**	**EMPL (5)**	**REV (6)**
Post * Cross-Border Acquirer	0.031 (0.054)	0.040 (0.055)	0.033 (0.058)	0.041 (0.067)	-0.048 (0.053)	-0.056 (0.089)
Post * Domestic Acquirer	-0.065** (0.033)	0.121*** (0.028)	0.098*** (0.033)	-0.061* (0.036)	0.093*** (0.034)	0.068* (0.038)
Constant	4.635*** (0.002)	7.442*** (0.002)	13.195*** (0.002)	4.646*** (0.002)	7.461*** (0.002)	13.218*** (0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
T-Test	0.096 (0.061)	-0.081 (0.060)	-0.065 (0.065)	0.102 (0.074)	-0.141** (0.061)	-0.124* (0.074)
N	7,988	8,026	8,031	7,878	7,952	7,970
R-Squared	0.880	0.988	0.985	0.867	0.981	0.978

Note. The table presents the results of the DID regression. Columns 1-3 present the short-term analysis and Columns 4-6 are the long-term analysis. "PROD" refers to the outcome log of labour productivity, "EMPL" refers

to log of number of employees, "REV" refers to log of operating revenue. Firm-specific and time fixed effects are used. The T-Test coefficients are obtained by subtracting the coefficient of domestic acquirers from cross-border acquirers. "N" refers to the total number of observations used in the analysis. Standard errors are in parentheses, clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5 presents the results of the analysis detailing the short-term effects of cross-border and domestic M&As on the log of labour productivity. As seen in Column 1, M&As do not significantly affect labour productivity of cross-border acquirers as compared to non-acquirers at the 5% level. Therefore, the evidence is not strong enough to support hypothesis *2a*, and the null hypothesis of no effect cannot be successfully rejected. On the other hand, the coefficient for domestic acquirers in Column 1 shows a decline in labour productivity as compared to non-acquirers, significant at the 5% level. On average, the log of labour productivity decreases by 0.065 units. Since this is a log difference, the value must first be transformed to interpret as a percentage difference. Using the formula $(e^{\beta} - 1) \times 100$, where β is the coefficient, this translates to a percentage decrease in labour productivity of approximately 6.7% relative to non-acquirers. Therefore, the null hypothesis of no effect pertaining to hypothesis *1a* can successfully be rejected. However, the direction of the effect is contrary to what was expected.

The results of the t-test, also presented in the Column 1 in Table 5, suggest that the difference in effects between cross-border and domestic acquirers is not significant at the 5% level. Therefore, hypothesis *3a* is not supported and there is not enough evidence to reject the null hypothesis of no difference between the groups.

Table 5 further presents the results of the DID regression on two more outcome variables, namely the number of employees and operating revenue. As seen in Column 2 and 3, while cross-border acquirers do not see a significant change in either, domestic acquirers see positive increases in both as compared to non-acquirers, significant at the 1% level. The log of the number of employees increases by 0.121 units and the log of operating revenue increases by 0.098 on average. This approximately equals an increase of 12.9% and 10.3% relative to non-acquiring firms, respectively. However, the t-tests for both outcomes, presented in Column 2 and 3, reveal that the difference in effects between domestic and international acquirers is insignificant.

The results from the long-term analysis are also presented in Table 5. Similar to the short-term results, cross-border M&As do not have a significant impact on labour productivity of firms relative to non-acquiring firms, seen in Column 4. There is not enough support for

hypothesis *2b* and the null hypothesis of no effect cannot be rejected at the 5% level. The coefficient for domestic acquirers presented in Column 4, in contrast to the short-term, shows that productivity does not significantly change compared to non-acquirers at the 5% level. Hypothesis *1b* is not supported and there is insufficient evidence to reject the related null hypothesis. The decrease in labour productivity hence does not persist in the long-term. As with the short-term, the difference in effects presented in the t-test in Column 4 is not significant at the 5% level. This is opposed to hypothesis *3b,* leading to failure of rejection of the null hypothesis stating no difference between the two groups of acquirers.

As seen in Column 5, employment for cross-border acquirers also is not affected by M&As relative to non-acquirers, with an insignificant coefficient at the 5% level. Nevertheless, the employment increase for domestic acquirers as compared to non-acquirers seen in the short-term persists in the long-term, seen through a 0.093 unit increase in the log of number of employees on average. Employment hence increases by approximately 9.7% in the long-term in comparison to non-acquirers. Furthermore, the difference in employment effects for domestic and international acquirers is significant at the 5% level, with a unit difference of -0.141, seen through the t-test in Column 5. The change in long-term employment is hence, on average, approximately 15.1% lower for cross-border acquirers as compared to domestic acquirers. However, the impact of M&As on operating revenue presented in Column 6, for both types of acquirers as compared to non-acquirers is not significant at the 5% level. The difference in effects on operating revenue is also insignificant at the 5% level, concluding no difference between domestic and international acquirers.

Other results to note are the high R-squared values for the DID models of all short and long-term regressions, seen in the last row pf Table 5. These values suggest that the models are a good fit in explaining the variance in the outcome variables, evidencing the validity of the results.

5.4 Parallel Trends

As mentioned, to build confidence that the performed DID regression is valid, it is important to check the parallel trends assumption. To do so, I generate lead variables of the interaction terms Post * Cross-Border Acquirer and Post * Domestic Acquirer for one and two years. Adding these variables to the empirical model allows to check if there is a deviation from the trend for the treatment and control group by shifting the time of the event to the lead year.

For instance, in the case that the deal takes place in 2014, the first lead moves this so that the "acquisition" takes place in 2013. By checking if the coefficients for the lead variables are significant, I can see if the trend significantly changes in the years prior to the acquisition. Hence, insignificant coefficients for all the leads would suggest that the parallel trends assumption holds. The results of this check are presented in Table 6.

Table 6. Formal Check for Parallel Trends

	PROD **(1)**	**EMPL** **(2)**	**REV** **(3)**
Post * Cross-Border Acquirer	0.052 (0.082)	0.041 (0.051)	0.055 (0.053)
Post * Domestic Acquirer	-0.074* (0.041)	0.092*** (0.020)	0.082*** (0.028)
Post * Cross-Border Lead 1	-0.036 (0.043)	0.004 (0.030)	-0.009 (0.037)
Post * Cross-Border Lead 2	0.084 (0.067)	-0.001 (0.036)	-0.002 (0.027)
Post * Domestic Lead 1	0.021 (0.045)	0.016 (0.018)	0.009 (0.024)
Post * Domestic Lead 2	0.005 (0.037)	0.013 (0.020)	0.020 (0.027)
Constant	4.629*** (0.005)	7.408*** (0.003)	13.160*** (0.004)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
N	6,391	6,419	6,427
R-Squared	0.897	0.992	0.989

Note. The table presents the results of the DID regression. "PROD" refers to the outcome log of labour productivity, "EMPL" refers to log of number of employees, "REV" refers to log of operating revenue. Firm-specific and time fixed effects are used. The interaction terms with the leads check for the parallel trends assumption. "N" refers to the total number of observations used in the analysis. Standard errors are in parentheses, clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Therefore, as seen in Table 6, none of the coefficients for the leads are significant for any of the outcome variables, labour productivity, number of employees and operating revenue. There is hence enough evidence to support the fulfilment of the parallel trends assumption.

5.5 Robustness Checks

I perform three checks to ensure the found results are robust. For the first robustness check, I perform the same analysis using a different form of matching, namely Nearest-Neighbour Matching. This method allocates a "nearest neighbour" from the control group to the observations in the treatment group based on a specified set of covariates. I use the same covariates as for the main analysis and then perform the same DID analysis as before, for both the short and long-term. The results are presented below.

Table 7. First Robustness Check

	Short-Term			**Long-Term**		
	PROD (1)	**EMPL (2)**	**REV (3)**	**PROD (4)**	**EMPL (5)**	**REV (6)**
Post * Cross-Border Acquirer	0.024 (0.056)	0.070 (0.055)	0.051 (0.055)	0.025 (0.066)	-0.022 (0.056)	-0.062 (0.070)
Post * Domestic Acquirer	-0.079** (0.032)	0.115*** (0.028)	0.087*** (0.034)	-0.085** (0.035)	0.095** (0.033)	0.059 (0.036)
Constant	4.483*** (0.002)	7.103*** (0.002)	12.699*** (0.002)	4.496*** (0.002)	7.117*** (0.002)	12.721*** (0.002)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
T-Test	0.103 (0.063)	-0.045 (0.060)	-0.036 (0.062)	0.110 (0.073)	-0.117* (0.063)	-0.121 (0.078)
N	10,872	10,976	10,994	10,764	10,896	10,927
R-Squared	0.888	0.986	0.986	0.876	0.978	0.977

Note. The table presents the results of the DID regression. Columns 1-3 present the short-term analysis and Columns 4-6 are the long-term analysis. "PROD" refers to the outcome log of labour productivity, "EMPL" refers to log of number of employees, "REV" refers to log of operating revenue. Firm-specific and time fixed effects are used. The T-Test coefficients are obtained by subtracting the coefficient of domestic acquirers from cross-border acquirers. "N" refers to the total number of observations used in the analysis. Standard errors are in parentheses, clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As seen in Table 7, most of the results are consistent with what was found in the main analysis using PSM. There are no noted significant effects on any of the outcome variables for cross-border acquirers, either in the short or long-term, as found in the prior analysis. The log of labour productivity for domestic acquirers in Column 1 sees a significant decrease of 0.079 units as compared to non-acquirers, at the 5% level, translating to an 8.2% decrease on average. Although the magnitude is higher, the effect seen is the same as the main analysis presented in Table 5. Columns 2 and 3 show that employment and operating revenue for domestic acquirers significantly increase in the short-term as compared to non-acquirers, which was also found in the main analysis. Similarly, in Columns 5 and 6, the increase in employment compared to non-acquirers persists in the long-term for domestic acquirers, while the increase in operating revenue does not.

There are two main differences to note. In contrast to the results of the main analysis, the decrease in labour productivity for domestic acquirers relative to non-acquirers, persists in the long-term. There is a decrease of 0.085 units on average, significant at the 5% level, translating to a decrease in labour productivity of approximately 8.9% in comparison to non-acquirers. While the prior analysis showed a significant difference in the long-term employment effects for the two groups of acquirers, results in Column 5 of Table 7 present no significant difference. Despite these differences, the similarity between the results in Table 5 and 7 build confidence in the robustness of the results, particularly the matching procedure used.

As the second robustness check, I limit the sample to acquirers undertaking deals with a minimum value of 10 million USD as opposed to 2 million USD in the main analysis. This is to check if the same results hold for a smaller sample consisting of larger deals. PSM is performed here too, with the data being matched on the same covariates. Other data specifications remain the same. The results are presented below.

Table 8. Second Robustness Check

	Short-Term			Long-Term		
	PROD (1)	**EMPL (2)**	**REV (3)**	**PROD (4)**	**EMPL (5)**	**REV (6)**
Post * Cross-Border Acquirer	-0.004 (0.052)	0.020 (0.048)	0.021 (0.048)	-0.012 (0.063)	-0.029 (0.054)	-0.065 (0.054)
Post * Domestic Acquirer	-0.063* (0.037)	0.127*** (0.032)	0.102*** (0.036)	-0.059 (0.038)	0.100*** (0.039)	0.071* (0.040)
Constant	4.636*** (0.002)	7.510*** (0.002)	13.262*** (0.002)	4.649*** (0.002)	7.526*** (0.002)	13.280*** (0.002)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
T-Test	0.059 (0.061)	-0.108* (0.056)	-0.081 (0.058)	0.047 (0.072)	-0.129** (0.064)	-0.136** (0.065)
N	7,353	7,377	7,382	7,253	7,313	7,331
R-Squared	0.881	0.988	0.986	0.869	0.981	0.979

Note. The table presents the results of the DID regression. Columns 1-3 present the short-term analysis and Columns 4-6 are the long-term analysis. "PROD" refers to the outcome log of labour productivity, "EMPL" refers to log of number of employees, "REV" refers to log of operating revenue. Firm-specific and time fixed effects are used. The T-Test coefficients are obtained by subtracting the coefficient of domestic acquirers from cross-border acquirers. "N" refers to the total number of observations used in the analysis. Standard errors are in parentheses, clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The short-term labour productivity results for domestic acquirers presented in Column 1 of Table 8 are different to what was found in the main analysis. In contrast to the significant short-term decrease noted in Table 5, there is no significant change in labour productivity for domestic acquirers as compared to non-acquirers at the 5% level. Nevertheless, as with the main analysis, the results of this check show that in the long-term, there is no significant effect on the labour productivity of domestic acquirers relative to non-acquirers. The results for cross-border acquirers are in line with the previous findings. As seen in Table 8, there is no significant impact of cross-border deals on acquirers as compared to non-acquirers, the same as noted in Table 5 of the main analysis.

Employment and operating revenue of domestic acquirers see a positive effect relative to non-acquirers, similar to what was found in the main analysis in Table 5. Similarly, the increase

in employment persists over the long-term, while the change in operating revenue is only significant in the short-term.

Another varying result to note is the difference in long-term operating revenue effects between domestic and international acquirers. While the main analysis did not suggest a significant difference between the two, Column 6 shows that in the long-term, the effect is 0.136 units lower for cross-border acquirers than domestic acquirers, translating to a difference of approximately 14.6% on average.

Therefore, in contrast to the main analysis, the results of the second robustness check suggest that for a limited sample comprising of larger deals, there is no significant change in labour productivity for domestic acquirers in the short-term relative to non-acquirers.

Finally, as the third robustness check, I remove all firms that undertake more than one acquisition within the 2010 to 2017 timeframe. Removing "serial" acquirers and re-estimating the model will provide insight into whether there are any variations in effects that might be caused by their presence.

Table 9. Third Robustness Check

	Short-Term			**Long-Term**		
	PROD (1)	**EMPL (2)**	**REV (3)**	**PROD (4)**	**EMPL (5)**	**REV (6)**
Post * Cross-Border Acquirer	-0.011 (0.078)	0.046 (0.080)	0.012 (0.081)	0.068 (0.103)	-0.034 (0.077)	-0.023 (0.093)
Post * Domestic Acquirer	-0.085** (0.037)	0.084** (0.031)	0.064 (0.037)	-0.072 (0.037)	0.047 (0.035)	0.011 (0.040)
Constant	4.636*** (0.002)	7.400*** (0.002)	13.144*** (0.002)	4.656*** (0.002)	7.422*** (0.002)	13.178*** (0.002)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
T-Test	0.073 (0.084)	-0.038 (0.085)	-0.053 (0.088)	0.140 (0.108)	-0.082 (0.083)	-0.034 (0.100)
N	6,896	6,992	6,926	6,823	6,880	6,895
R-Squared	0.880	0.988	0.986	0.865	0.981	0.980

Note. The table presents the results of the DID regression. Columns 1-3 present the short-term analysis and Columns 4-6 are the long-term analysis. "PROD" refers to the outcome log of labour productivity, "EMPL" refers to log of number of employees, "REV" refers to log of operating revenue. Firm-specific and time fixed effects are used. The T-Test coefficients are obtained by subtracting the coefficient of domestic acquirers from cross-border acquirers. "N" refers to the total number of observations used in the analysis. Standard errors are in parentheses, clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As seen in Column 1 and 4 of Table 9, the results describing the effect of M&As on labour productivity are in line with the results of the main analysis in Table 5. Cross-border acquirers do not see a significant change in labour productivity relative to non-acquirers at the 5% level, either in the short or long term. Domestic acquirers see a short-term labour productivity decline in comparison to non-acquirers significant at the 5% level, with the change not persisting in the long-term. The log of labour productivity decreases by 0.085 units on average, translating to a decline of approximately 8.9%. Similarly, the difference in effects between both groups of acquirers is not significant at the 5% level.

The differences to the main analysis to note here are the insignificant coefficients of domestic acquirer revenue in the short-term, seen in Column 3 and domestic long-term employment, seen in Column 5. Both were seen to be significant and positive in the main analysis. Therefore, the exclusion of firms that underwent more than one acquisition within the time frame does not oppose the results found for labour productivity in the short or long-term, for both groups of acquirers.

6. DISCUSSION & CONCLUSION

This thesis aimed to investigate the impact of a M&A on domestic and cross-border acquirer labour productivity, looking at both the short-term and long-term. A sample of deals from the EU27 and NAFTA between the years 2010 and 2017 were used, with a minimum deal value of $2 million. A Difference-in-Difference approach combined with Propensity Score Matching was employed, comparing acquiring firms over the period to a matched sample of non-acquiring firms. The results indicate that M&As do not have a significant effect on acquirer productivity for cross-border deals as compared to non-acquirers, either in the short or long-term, in opposition to what was hypothesized. Domestic acquirers, however, saw a significant short-term drop in labour productivity caused by the M&A, of approximately 6.7% relative to non-acquirers on average. While this successfully rejects the null hypothesis of no effect, the sign of the effect was contrary to the expected outcome. Nonetheless, the difference in effects

between the two groups of acquirers was found to be insignificant at the 5% level for both the short and long-term, contrary to the hypotheses. Employment and revenue were seen to have no changes for cross-border acquirers, while domestic acquirers saw increases in both in the short-term. However, only the employment increases persisted in the long-term. Robustness checks mostly confirmed these results, with slight differences to be noted.

6.1 Implications

Literature provides theoretical explanations for the occurrence of these results. Sharma and Ho (2003) posit certain hypotheses explaining value gains might not be visible through performance indicators such as labour productivity. Firstly, they discuss the agency hypothesis that suggests that acquisitions are motivated by the self-interests of managers rather than creating value. Through acquisitions, management diversifies their personal portfolio and acquire assets so the dependency on management increases. The second hypothesis mentioned by the study is the hubris hypothesis, that presents a behavioural explanation to the lack of operating performance increases. It is argued that when the potential synergy gains from an acquisition are over or under-estimated by the managers, they are not likely to yield positive returns to the deal. The presence of "hubris" in the management's belief of the gains from the acquisition will result in a lack of performance improvement.

Looking specifically at cross-border mergers, the potential causes of insignificant results are multi-fold. As theory has suggested, several organizational difficulties can occur while undertaking international acquisitions. Firms often need to adapt to a completely new environment, that can create more costs than benefits (Bertrand & Capron, 2014). Furthermore, it is highly possible that the performance of firms is correlated with the economic situation in the home and target country; poor conditions could counterbalance gains from M&As. Political economics could also influence gains from cross-border M&As: additional costs can be imposed on firms through encouragement of ill-valued deals that are politically motivated (Renneboog & Vansteenkiste, 2019). Studies have noted that cultural distance is an important factor in value creation for cross-border M&As. When the involved firms are in vastly different countries, there are barriers to integration that affect performance (Morosini et al., 1998; Zhu et al., 2015). Zhu et al. (2015) further discuss integration effects, specifically for employees, that could inhibit productivity. Several obstacles to employee integration such as language differences exist. They note how according to social identity theory, language is the strongest

indicator of social identity. Hence, communication could be affected by employees from the acquiring and target firm socially categorizing each other as different groups, resulting in lack of coordination and productivity issues.

There are also many potential causes for the negative productivity effects for domestic acquisitions in the short-term. Firstly, acquisitions see high rates of failures. For instance, Papadakis and Thanos (2010) note a failure rate of 50% to 60% from a sample of 50 domestic acquisitions carried out by Greek firms. Similar outcomes for the domestic firms in this analysis are possible. Furthermore, like cross-border acquisitions, much of the value created from a M&A may originate through the integration process post-acquisition (Larsson & Finkelstein, 1999). Negative employee reactions to the deal could hence affect firm productivity. Corporate relatedness is also an important factor contributing to M&A success. The technological overlap and human capital relatedness can affect the realised gains. It is also noted that acquirers sometimes acquire distressed targets, incentivised to obtain them at a discount below their fundamental value, possibly leading to negative returns (Renneboog & Vansteenkiste, 2019). The low threshold for deal value of $2 million makes this a possibility in the case of this analysis.

Labour productivity effects could also be explained through other results of the analysis. It is seen that relative to non-acquirers, employment is not affected by cross-border M&As. This is contrary expectations according to theory and past literature. Acquisitions, both domestic and international, usually see a drop in employment, either as an attempt to cut costs or increase firm efficiency. This can be a key factor in realising gains, as firms can lay off low quality workers becoming more efficient in their use of labour (Renneboog & Vansteenkiste, 2019). The lack of an employment decrease might hence prevent efficiency increases, leading to no visible productivity improvements. Domestic acquirers also do not see an employment decline, rather both employment and operating revenue significantly increase in the short-term. Particularly, the relative increase in employment is higher than the operating revenue. Therefore, it is possible that there is a decrease in the value added by employees, translating into a loss of labour productivity. Nevertheless, although the increase in employment persists in the long-term for domestic acquirers, the relative decline in labour productivity does not. This could suggest that other efficiencies that were not achieved in the short-term are observed over time, for instance, through R&D development or operational efficiencies from improved management techniques (Conyon, 1999; Seth, 1990).

The difference between the effects for domestic and cross-border acquirers is also insignificant in both the short and long-term, which does not support the hypotheses. However, much prior literature also does not find significant differences using different measures (Gugler et al., 2003; Rao-Nicholson et al., 2016; Bertrand & Betschinger, 2012). Most literature justifies the ambiguity through similar issues as discussed before, ranging from organizational issues to the regulatory environment the firms face. Another perspective as described by Shimizu et al. (2004) is that domestic and international acquirers undertake M&As for different reasons. For instance, while cross-border acquirers do so to access new customer bases and resources, domestic firms are usually motivated by efficiency improvements and market consolidations. Similarly, the acquired synergies originate from different sources. Therefore, it is possible that the missing significant differences in domestic and international outcomes the changes is because impacts stem from different mechanisms where neither can be demonstrated to be more substantial than the other.

There are slight differences to the main analysis noted in the robustness checks. The first robustness check, using a different form of matching, shows a significant drop in labour productivity in the long-term as well, as opposed to the main analysis. This difference is likely because of a varying matched sample. Nevertheless, the similarity in the rest of the results builds confidence regarding the main analysis. The second robustness check that limits the sample size to deals above 10 million shows no significant short-term decrease in labour productivity as compared to non-acquirers, while it is seen in the main analysis. Larger deals are usually more strategically planned, and firms are more selective with the choice of targets. Furthermore, firms undertaking larger deals might already be operating at a larger scale, allowing them to integrate labour with less disruptions to their operations, which might pacify the negative productivity effects. Finally, the third robustness check, firms making more than one acquisition in the chosen acquisition years of 2010-2017 are excluded. The results for productivity are the same as found in the main analysis, for both groups of acquirers in the short and long-run. This suggests that their inclusion did not bias the original results, further supporting the robustness of the results. Nevertheless, it cannot be concluded from this check that acquisition experience does not matter to realising gains from an M&A, as the main analysis only included the first deal for each firm in the period.

6.2 Limitations

As with all empirical studies, there are limitations to the study. Firstly, the analysis is highly limited by the missing values in the data. The databases do not contain data on all the required years for many firms, impeding the sample size of the data. This therefore creates several barriers that affect the validity of results; the sample might be unrepresentative of the larger population; the data is more susceptible to outliers and variability and statistical power is reduced. To mitigate this, I include a low threshold for deal size to maximise the sample size as much as possible. The same reasoning justifies the use of all EU27 and NAFTA countries as host countries and a wide range of acquisition years. However, this hurts the focus of the study, hence there is the possibility of other confounding factors unaccounted for.

Furthermore, although the parallel trends assumption holds, the study cannot be confirmed to be completely internally valid. Firstly, there is no way to confirm the SUTVA. Secondly, there is likely selection bias, as the firms' selection into treatment, that is, the decision to undertake a M&A, is unlikely to be completely random. The exclusion of firms undertaking both domestic and international acquisitions might also introduce bias. The PSM methodology relies on the assumption that all relevant confounding factors are included into the model. The inability to account for this might further bias results and affect internal validity. It was assumed that the chosen covariates to match are not influenced by the treatment decision, however this cannot be confirmed. It is likely that firms show anticipation effects, which therefore might undermine this assumption. Despite the wide geographic and time range improving external validity, decisions such as the exclusion of firms undertaking both domestic and international M&As reduce the generalizability of the study.

There are also several effects of an M&A not accounted for. For instance, post-acquisition integration is an important factor affecting the returns to an acquisition. Literature suggests different effects exist for related and unrelated mergers, that are not accounted for in this study. Internal differences within firms such as the proportioned of skilled labour and wages are not considered. Furthermore, as mentioned, using three outcome variables does not provide a holistic view of the effects of an M&A. However, accounting for all these factors is out of the scope of this study.

6.3 Contributions and Future Research

This study provides some important contributions for firms and strategy. The results indicate that M&As might not be as beneficial to improve productivity of firms as suggested by theory and some prior literature. Such results can be useful for firms while taking the decision of conducting M&As to improve firm efficiency and achieve value gains. Furthermore, firms should carefully weigh the benefits and costs of acquiring internationally, particularly because results from this study and prior indicate that doing so shows no significant gains as compared to acquiring domestically. Therefore, if firms can achieve the expected benefits from going abroad in their home country, for instance through economies of scale, they could save valuable resources and costs by doing so domestically.

Nevertheless, it is important to note that this a narrow view of the potential of M&As to benefit companies. Beyond the labour productivity, there are several other benefits that can be realised from an M&A that are not represented in these results for labour productivity and revenue growth. The discussed positive effects such as learning effects, transfer of knowledge, replication of organizational capabilities and routines as well as access to resources unavailable in the home country. These effects are not necessarily captured in labour productivity as a measure. M&As, especially cross-border, have a plethora of advantages that can benefit the home country. This thesis as a result also provides important information for policymakers. Cross-border M&As seem to often be impeded by cultural and integration barriers that might disincentivize firms from undertaking potentially economically beneficial deals. Economic policy uncertainty deters cross-border deals (Paudyal et al., 2021). Policies hence should focus on easing these restrictions, striving to mitigate economic policy related uncertainness, aiming to promote such cross-border relations between firms. They must create sustainable environments that ease the complicated processes firms involved in cross-border deals have to go through.

Considering that the past literature dealing with the topic is highly ambiguous, future research should focus on using larger sample sizes with a broader range of data, while focusing the scope of the research to avoid bias and dilution of results. Long-term effects can be further explored, and additional outcome variables can be incorporated. Sector and industry specific analyses can also be undertaken. Different methods such as event studies can be used to study the dynamic effects of M&As, both before and after the acquisition. Research can also specifically focus on serial acquirers to understand the influence of experience on outcomes.

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APPENDIX A

Table A1. Number of Firms per Region in Treatment and Control Group after Matching

	Treatment		Control
	Domestic Acquirers	**Cross-Border Acquirers**	**Non-Acquirers**
EU27	194	86	975
NAFTA	44	7	300
Total	238	93	1275

Note. The table represents the number of unique firms per political area in the dataset. These are the number of firms after the matching procedure.

APPENDIX B: Abbreviations

Here listed are all the abbreviations used in the thesis.

M&A	Mergers and acquisitions. In this thesis, it is used interchangeably with merger and acquisition, common in most literature.
DID	Difference-in-Difference method.
PSM	Propensity Score Matching.
EU27	The European Union. Includes 27 countries after the UK left in 2020.
NAFTA	North American Free Trade Association. Includes the US, Canada and Mexico.