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Foreign ownership, foreign acquisitions and firm performance: Evidence from Sweden

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Abstract

Foreign ownership and its impact on firm performance is a subject of debate in academia and of great importance to policy makers and investors. In this study the relationship between foreign ownership and target firm profitability is examined. Two models are applied to data on Swedish companies during the period 1998-2017. The first model is used to examine the difference in performance between domestic and foreign subsidiaries, that can be attributed to different owner types. In the second model, a propensity score matching method and a Difference-in-Differences regression design are combined to study the change in performance following a foreign acquisition. Taken together, the findings suggest that foreign acquisitions have a negative impact on target firm profitability and provide evidence that foreign firms are less profitable than domestic firms in Sweden. The results corroborate previous findings from recent research on European firms and contribute to a deeper understanding of the implications of Foreign Direct Investment in Sweden.

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Table of Contents

1. Introduction

During the last decades the world has witnessed an unprecedented trend of globalization, and Sweden is one of the countries in which this trend has been most pronounced (Jakobsson, 2007). One of the most visible facts of globalisation can be observed from the development of Foreign Direct Investment (henceforth, FDI) (Busse & Groizard, 2005). Over the years, the Swedish government has gradually undertaken measures to improve the business environment and attract foreign investors (Englund, 1990). Several organizations such as the Swedish Trade Council and Investment in Sweden Agency, which today make up Business Sweden, were established with the mandate to strengthen the global image and encourage foreign investment in Sweden (Business Sweden, n.d.; Invest in EU, n.d.). These commitments have contributed to the 'Swedish model', an economy which features openness and competitiveness (Government Offices of Sweden, Ministry of Finance, 2017, pp. 23). Sweden is ranked by the World Bank (2020) as 10th in the world in ease of doing business, and as the 15th most attractive country for FDI in a recent report from A.T Kearney (Laudicina et al., 2019).

Increased efforts to attract more FDI stems from the belief that it benefits the economy in general (De Mello, 1997; De Mello 1999) and brings about positive effects on firm performance in terms of increased revenue and higher profitability (Business Sweden, 2019. p.4). FDI comes about in mainly two different forms. On the one hand there is what is commonly known as "greenfield investment" which is when a foreign company establishes a new production site, for example. On the other hand, there is foreign investment through mergers and acquisitions (henceforth, M&A) (OECD, 2008). M&A FDI constitutes the dominant share of foreign investments (Jakobsson, 2007, p.14.).

There is consensus that greenfield FDI benefits the economy through multiple channels, such as an important source of capital, new job opportunities, technology transfer, spillover and knowledge enhancement (Blomstrom & Kokko,1998; Borensztein et al., 1998; Chowdhury & Mavrotas, 2005; Dunning & Lundan, 2008, pp.356-366). However, FDI through M&A is often viewed with mixed feelings. Those who support foreign investments argue that M&As benefit the economy through similar channels as greenfield investment. They argue that on the firm level, FDI through M&A improves the performance of target firms through synergies, managerial discipline and organizational restructuring (see Bellak et al., 2006 for a summary).

Those who are suspicious perceive it as a threat. They argue that empirical evidence of firm performance post acquisition is ambiguous (Aitken & Harrison, 1999; Carkovic & Levine, 2002; Görg & Greenaway, 2004). They believe that foreign investment deteriorates the balance of payments as profits are repatriated, bringing about negative impacts on competition in national markets (Ozturk**,** 2007) and disturbs the local employment market (Mattes, 2010), which contributes to the uprising of 'protectionism'.

During recent years, anti-globalisation forces have been gaining ground. In 2018, the US-China trade war escalated and restricted international business and financial markets to a large extent (Steinbock, 2018). Brexit is, among all others, another manifestation of protectionism. Under the shadow of national protectionism, foreign investment is being challenged on the global arena. FDI decreased 13 % globally in 2018 (Business Sweden, 2019, p.3.). In Sweden, FDI inflow fell in 2018 with 17 % from the previous year and ended up below the average for the period 2000–2018, despite the robust underlying economy (Business Sweden, 2019, p.3.).

The ongoing trend has attracted increasing academic attention from the fields of business, economics and finance to investigate the role of foreign ownership, as well as on the motivations and effects of foreign investment. The implications of the studies go beyond the frontier of academia. From a macro perspective, it is of vital significance for policy makers to make proper decisions on international trade and financial regulation. For example, the inward investment into Sweden supports 20 % of the jobs in the private sector (OECD, 2017, p.1). From a micro perspective, it is of relevance for individual shareholders to understand whether they should be motivated to alter the ownership structure in order to improve performance and maximize firm value. These findings are of interest to Sweden, as one-third of the GDP in Sweden depends on foreign markets (OECD, 2017, p.1).

1.1 Purpose

This paper focuses on the micro perspective and studies the effect at the firm level. The purpose is to analyze the effect of foreign ownership on firm performance in the Swedish setting. First, it examines whether there is a difference in performance levels between firms controlled by foreign owners and their domestically controlled counterparts. It is estimated to what extent this difference, if existent, can be explained by the ownership structure (foreign or domestic). To

complement the understanding of the relationship between foreign ownership and firm performance, a more dynamic approach is adopted. More specifically, the effect of foreign acquisitions on the target firms' performance is examined. Following the example of some recent studies (e.g. Lindemanis et al., 2019; Mattes, 2010; Villalonga, 2004; Weche Geluebcke 2015), it is first examined what firm specific characteristics determine the probability for a firm being a target of a foreign takeover. Then a propensity score matching method and a Difference-in-Differences regression design are used to investigate the development of a firm following a foreign acquisition. The purpose of combining these approaches is to give a more holistic picture of the role of foreign ownership in determining firm performance.

1.2 Contribution

This study builds on a recent article by Lindemanis et al. (2019) that examines the effect of foreign acquisitions using data from 22 European countries. This study complements with a more static comparison of the performance levels between domestic firms and firms with foreign owners. By also using a large sample from a single country, this study provides additional evidence on the effect of foreign ownership and contributes to a deeper understanding of the implications of M&A FDI in a specific setting. Furthermore, the use of propensity score matching in combination with a Difference-in-Differences regression design mitigates self-selection bias and accounts for time-invariant effects when analysing the post-acquisition performance development. This method allows for comparison of the results to Lindemanis et al. (2019) and sheds light on the robustness of their findings to different estimation techniques.

1.3 Scope

This study is limited to private firms registered in Sweden with no less than 10 employees during the period 1998 - 2017. Furthermore, the study is restricted to limited liability companies (aktiebolag) in order to increase comparability between firms in this study as well as with other studies in Sweden and abroad. A micro perspective is taken; thus, the intention with the study is not to investigate the effect of foreign investment on the national economy as a whole.

1.4 Disposition

This study consists of 8 sections. In Section 2, the literature on FDI, foreign ownership and foreign takeovers is reviewed. In parallel, the hypotheses are developed and presented. In

Section 3, the sample selection process is described. Methodological considerations, the study design and the regression models used to test the hypotheses are presented in Section 4. In Section 5, descriptive statistics, correlations and test results are presented together with analyses. In Section 6, robustness tests are reported and validity of assumptions is discussed. Limitations with the study and suggestions for further research are presented in Section 7. Section 8 concludes the study.

2. Literature review and hypotheses

In this section, theories on which the study is built on are reviewed. Abounding research in business, economics and corporate finance explores the relationship between foreign ownership and firm performance, the firm characteristics that attract FDI and the effects of foreign acquisitions. This section begins with an introduction to foundational FDI theory which is followed by a review of the theories on the relationship between foreign ownership and firm performance. Lastly, the theories on the motivations for foreign M&As and their impact on target's firm performance are summarized. Hypotheses are also developed and presented.

2.1 Foreign direct investment (FDI)

FDI is defined as a foreign entity acquiring more than 10 percent of the voting power of a domestic firm. (OECD, 2008, p.197). Greenfield investment and cross-border M&A are the two most common channels of FDI. When a foreign firm establishes a production (or similar) site abroad it is categorized as a greenfield FDI. As one main form of foreign market entry, greenfield FDI is usually registered as a 100 percent foreign owned subsidiary of a foreign parent (Golub et al., 2011). When a foreign firm instead takes control of an existing domestic firm, FDI occurs through the channel of cross-border acquisitions (OECD, 2008). On the firm level, the rationale behind the increasing endeavors to attract FDI is that it has a positive impact on firm performance by increasing revenue and improving profitability (Business Sweden, 2019). The economic theory of transaction costs also offers a theoretical justification for the increased attractiveness of M&A FDI. Imperfect markets for intellectual property or intangible resources give rise to considerable transaction costs when such assets are exchanged on a market. If transaction costs for intangible resources are sufficiently high, companies can get access to them at a lower overall cost by acquiring another company (Capron, 1999; Williamson, 2000).

2.2 Foreign ownership and firm performance

It has been a lasting subject of debate in the literature of corporate finance whether there is a relationship between ownership structure and firm performance, and if so, what the relationship looks like. Theories provide conflicting predictions regarding the existence and direction of the relationship, which is reflected in mixed empirical findings.

2.2.1 Theory on multinational enterprises (MNEs)

One stream of research that argues for a positive effect stems from the theory on multinational enterprises (henceforth, MNEs), which argues that firms with foreign ownership are more globally connected and are endowed with several comparative advantages, such as superior technology and managerial systems compared to local firms (Borensztein et al., 1998; Casson, 1987, pp.11-12, 35-36; Dunning & Lundan, 2008, pp. 356-366). Aitken and Harrison (1999) find that smaller domestic firms in Venezuela benefit from foreign investments due to potential technological spillovers that have positive effects on productivity. Piscitello and Rabbiosi (2005) show that MNEs serve as a channel to transfer firm-specific advantages and thus increase the target firm's labor productivity using data from Italy. In a number of studies conducted in the U.S., firm's performance after the ownership change are examined. The findings suggest that labor productivity or total factor productivity increases following the change to foreign ownership (Lichtenberg et al., 1987; Maksimovic et al. 2008).

Theory on managerial disciplining effects maintains that foreign ownership can benefit firms by improving the standards of governance (Jensen & Ruback, 1983). Coffee (1999) suggests that cross-border acquisitions, similar to cross-listings, provide a medium for firms, whether target or acquirer, to bond to better institutions. Col and Sen (2019) provide evidence of the governance effect in a study of Indian firms. They find that Indian firms exhibit significant changes in corporate governance practices after acquiring firms in developed markets. The adoption of higher corporate governance practices leads to a higher valuation. Lindemanis et al. (2019) show that the targets acquired by foreign owners from countries with better governance practices perform better compared to targets that are acquired by investors from countries with weaker governance institutions. These findings suggest that the general quality

of governance practices in the new parent's home country matters for the post acquisition performance of the target.

Moreover, firms with international connections have better access to financing, for example through internal capital markets. Aulakh and Mudambi (2005) extend the internal capital market theory to MNEs and their findings support that foreign owned firms take advantage of the internal capital markets created by the network of MNEs when their home country's external capital markets are inefficient. This allows foreign owned firms to take advantage of more investment opportunities (see e.g. George, 2007; Stein, 1997).

2.2.2 Liability of foreignness

There are some theories, however, that predict a negative relationship between foreign ownership and firm performance. In the field of economics, foreign disadvantages are often referred to as "liability of foreignness", a concept first introduced by Hymer (1960). See e.g. Petersen and Pedersen (2002) and Zaheer (1995) for a summary of the concept. The disadvantages are caused by the extra costs of operating in a foreign market, such as higher co-ordination and transportation costs (Buckley, 1997, pp. 200-211).

One important liability is increased information asymmetry, which suggests that foreign acquirers suffer information disadvantages due to for example physical distance and cultural differences (Johanson & Vahlne, 2009). Thus, they face higher agency costs to obtain accurate information about foreign subsidiaries and have weaker incentives to engage in governance activities due to higher monitoring costs (Basu & Chevrier, 2011; Roth & O'Donnell, 1996). One study from the US indicates that information asymmetry is of crucial importance to corporate governance activities which is negatively related to physical distance from the targets (Kang & Kim, 2010). Basu and Chevrier (2011) use data from Canada and find that the distance between the acquirer and target is negatively related to operating performance.

2.2.3 'Cherry-picking' or 'Lemon-grabbing'

In order to understand how foreign ownership is related to firm performance, one needs to have some insight into the determinants of foreign ownership. A significant relationship between foreign ownership and performance can, to some extent, be explained by the kind of firms that

attract foreign investors. If acquisitions are not random, and foreign investors acquire firms that systematically perform better or worse than the average domestic firm, the relationship is going to be confounded by the determinants of foreign ownership, and therefore, they have to be taken into account. Two theories often referred to in the field that explain which firms are more likely to be subjects of a foreign takeover; firms that are referred to as 'lemons' or 'cherries'.

Managerial discipline theory proposes that an important role of corporate takeovers is to discipline the top managers of poorly performing target firms ('lemons') to control the non-value maximizing behavior of top corporate managers (Denis & Kruse, 2000; Kenneth & John, 1991; Lichtenberg et al., 1987). According to this theory, underperforming firms exhibiting lower productivity, profitability or weaker financial position are more likely to be targets of takeovers. By altering the company structure in the targeted firms, managerial efficiency will be largely improved which contributes to improved firm performance, thus a higher level of return on investment. Lindemanis et al. (2019) find evidence, using data on companies from several EU countries, that foreign investors tend to acquire less profitable firms.

In contrast, the 'cherry- picking' theory states that foreign investors predominantly acquire domestic firms that exhibit above average performance before the acquisition (see a summary in Kim & Lu, 2013). Evidence from the Spanish manufacturing sector suggests that MNEs acquire the local firms with higher productivity and firms that are more innovative. The reason for this, as Guadalupe et al. (2012) demonstrate, is that the value created by foreign acquisition is higher if the target is more productive initially. A number of studies corroborate the theory. Paprzycki and Fukao (2008, pp. 118-120) find that foreign investors choose Japanese targets with higher productivity. Weche Geluebcke (2015) looks at acquisitions of manufacturing firms in Germany by foreign and domestic investors. Firms that are acquired, both by foreign and domestic acquirers, are on average larger, pay higher wages and are more productive. Bandick and Karpaty (2011) conclude that Swedish manufacturing firms with better performance are more likely to be targets of foreign acquisitions. Bandick (2011) finds some evidence that foreign investors 'cherry-pick' Swedish manufacturing firms because they are, among other things, on average more productive than the firms that are not acquired. Compared to Bandick (2011), Karpaty (2007) finds no support for the 'cherry-picking' hypothesis.

2.3 Hypothesis 1: Foreign ownership and firm performance

The first hypothesis concerns the relationship between firm performance and foreign ownership. Given the conflicting theories and empirical findings outlined above, it is not possible to predict the direction of the outcome. Consequently, a non-directional hypothesis is formulated:

H1a: Foreign firms are more profitable than domestic firms.

H1b: Foreign firms are less profitable than domestic firms.

2.4 Foreign acquisitions and target firm performance

Recent studies claim that a dynamic approach by examining the change to foreign ownership and its effect on performance, complements and sheds light on the disparity in firm performance between foreign owned and domestic firms (Lindemanis et al., 2019; Mattes, 2010; Weche Geluebcke, 2015). Most theories on M&A argue for positive effects of acquisitions and the main rationale is that a foreign takeover can lead to positive effects through multiple channels, among which are increased managerial discipline (see Section 2.2.3), spillovers and synergy effects (Berkovitch & Narayanan, 1993; Capron, 1999; Seth et al., 2000). Even so, a number of studies have shown that foreign acquisitions sometimes are followed by deteriorating performance.

Synergies play an important role in any discussion about M&As. Acquisitions are often followed by divestitures of some of the targets (and/or the acquirers) assets or cut-backs on personnel which can lead to cost savings. After a takeover, it also happens that the target firm and the acquirer can utilize each other's assets and capabilities through resource redeployment which can lead to revenue-based synergies (Capron, 1999). Target firms can for example benefit from the reputation of the acquirers' brand, R&D and marketing capabilities, manufacturing and distribution expertise, and access to the parent's home market (Capron, 1999; Capron and Hulland, 1999; Guadalupe et al., 2012).

Naturally, synergies are not unique to foreign acquisitions. However, there are some reasons for why the nationality of the acquirer can be thought to lead to differential impacts on performance. One important reason is that targets of foreign takeovers benefit to a greater extent from access to export markets. Another reason is that targets benefit from rare and valuable

resources, such as proprietary technology and managerial know-how, which lead to lower innovation costs (Chhibber and Majumdar, 1999; Douma et al., 2006; Guadalupe et al., 2012). However, physical and cultural distance between foreign acquirers and their targets may impair the post-acquisition performance relative to domestic ones (Capron, 1999).

Regarding post acquisition firm performance, the empirical results are once again mixed. In a study of Spanish manufacturing firms, Guadalupe et al. (2012) find that firms acquired by foreign entities tend to innovate more and become more productive. Capron (1999) finds, in a study of M&As by U.S. and European firms, that the synergy effects can benefit acquiring firms (the consolidated entity), while target firms often suffer from rationalization which have negative effects on revenue generating capabilities and cost savings. Lindemanis et al., (2019) find a considerable time lag in the impact of foreign acquisitions on performance. Foreign acquisitions lead to lower growth in ROA but higher sales growth in the short term. In the long term, operational efficiency improves but the effect on profitability is insignificant. When Mattes (2010) seeks to estimate the impact of foreign acquisitions on German firms, he concludes they neither have a positive nor negative effect on employment or productivity in the short term. Weche Geluebcke (2015) finds that German manufacturing firms that become foreign owned experience a decline in employment and unchanged productivity relative to non-acquired firms.

For Sweden, Karpaty (2007) studies the impact of foreign acquisitions on productivity using a panel of Swedish manufacturing firms and concludes that foreign acquisitions have a positive impact on both productivity and profits. In a later study on Swedish manufacturing firms, Bandick (2011) finds evidence that vertical acquisitions lead to relatively higher growth in productivity compared to non-acquired firms. However, he finds no evidence that horizontal acquisitions would give rise to any improvements in productivity growth.

2.5 Hypothesis 2: Foreign acquisitions and target firm performance

Whereas the first hypothesis regards foreign ownership and firm performance, the second hypothesis specifically regards the change in performance following acquisitions. Again, the theories predict both positive and negative effects which are reflected by mixed empirical

findings. Some of the studies do not find an effect at all. Consequently, a second non-directional hypothesis is formulated:

H2a: Foreign acquisitions lead to higher growth in profitability (ROA).

H2b: Foreign acquisitions lead to lower growth in profitability (ROA).

3. Sample

In this section, the data collection and sample selection processes are described. The selection process for the Full Sample which is used in Model I is presented first. Then, the selection process of the Matched Sample which is used in regression Model II is described.

3.1 Data collection

Most of the raw data is obtained from a single source, the Serrano Database from the Swedish House of Finance, which covers a large sample of companies of most legal forms registered in Sweden. Serrano contains a comprehensive financial history on the company level (from 1998 to 2017), from which one can obtain the data of the firm's financial performance and ownership information. Data from Nasdaq OMX Stockholm is used to eliminate firms that are listed on a stock exchange.

3.2 Sample selection - the Full Sample

The initial sample consists of all legal entities registered in Sweden from 1998 to 2017. It consists of 11 285 261 firm-year observations. The sample is sequentially trimmed to meet all the key criteria described below.

First, all firms with legal forms other than limited liability (aktiebolag) are dropped and the sample is reduced to 8 143 718 observations. Second, micro firms with less than 10 employees are removed since they rarely are controlled by foreign owners in the sample, which leaves 648 114 observations.[1] Next, firms in the financial and real estate industry are excluded due to the comparability issue with other firms. (Lindemanis et al., 2019). Firm-years with a missing industry code are also excluded, after which 618 443 observations remain.

[1] Only 2.64 % of all firm-years with less than 10 employees are controlled by foreign owners. For comparison, this share for firm-years with more than 10 employees is 12.48 %.

Firms that are listed at some point during the sample period are excluded next. Data from Nasdaq OMX Stockholm is used to remove any firm that became listed or were delisted at some point during the period 2005-2017. This leaves 615 601 firm-year observations in the sample. The number of listed firms that might remain in the sample because they were listed before 2005 is expected to be low compared to the number of non-listed firms and should therefore not constitute too much of a concern. Listed firms are excluded in order to make the study more comparable to Lindemanis et al. (2019). Listed firms may also have different monitoring and governance practises compared to private firms, for example due to dispersed ownership, and are subject to other regulatory pressures.

Then foreign acquirers that are domiciled in tax haven countries are excluded to mitigate the ownership changes that are mainly with the purpose of receiving tax advantages (Lindemanis et al., 2019). These are parent companies that are registered in Bermuda, Bahamas, Guernesey, Gibraltar, Isle of Man, Cayman Island, Liechtenstein, Luxemburg, Marshall Islands, Panama and the Virgin Islands of Britain. Observations that have the parent company registered in an unknown state are further excluded, which leaves 608 691 firm-year observations in the sample.

Regarding the group relationship, all independent and Swedish parent firms are removed from the sample because there is no information on whether they are controlled by domestic or foreign owners. 320 017 firm-year observations remain, for subsidiaries of a Swedish or foreign parent. To further increase comparability, all observations for firms that report consolidated financial information at some point are removed since most of the subsidiary firms in the sample report financial statements at the firm level only. In total, 276 226 firm-year observations are left.

Finally, all the observations that lack one or more of the data points necessary for calculating values for the variables used in the regression models are excluded. This process that has been outlined so far generates what is called the Full Sample, which is used in regression Model I. It consists of 38 863 firms and 258 939 firm-year observations. Table A in Appendix.1 presents the numbers in detail.

3.3 Sample selection- the Matched Sample

In this section, the Matched Sample, which is generated by a two-step procedure, is presented. First, the Probit Sample is formed to be used in the Probit Model, solely for the purpose of finding the target firm characteristics on which to match acquired firms with domestic units. Second, the Matched Sample is presented based on the results from the Probit Model.

To begin with, the variable that indicates a change to foreign ownership is defined and generated. This variable is used to identify the acquired (treated) firms, which is a necessary variable for the Probit Model presented in Section 4.3.2. Investment is usually characterized as FDI if the foreign entity acquires at least 10 % of the voting rights, as was described in Section 2.1. However, the Serrano database used in this study code firms as foreign-owned when a single foreign entity controls more than 50 % of the votes and therefore has a controlling majority. Due to this limitation in data availability, "Change to foreign ownership" (henceforth, $Change2F$)is defined in this study as when a single foreign entity acquires a controlling stake (>50%) of a firm. This means that a firm changes from being a subsidiary in a Swedish group to a subsidiary in a foreign group. In this way, the year in which ownership changes can be identified. Exhibit 1 below provides an example and is inspired by Lindemanis et al., (2019).

Exhibit 1. Example of the recording of ownership change

	1998	1999	2000	2001	2002	2003	2004
Foreign	0	0	1	1	1	0	0
Change2F	0	0	1	0	0	0	0
Change2D	0	0	0	0	0	1	0

Notes: Exhibit 1 illustrates the recording of changes in ownership from domestic to foreign, and from foreign to domestic. Foreign=0 if the firm is a subsidiary in a Swedish group. Foreign=1 if the firm is a subsidiary in a Foreign group. In this example, the change in ownership from domestic to foreign happens in the year 2000, and from foreign to domestic in 2003.

From the Full Sample, firms that at any time change back to domestic ownership during the period they exist in the sample are excluded. Afterwards, 37 919 firms and 248 555 firm-year observations remain in the sample. Then firm-years with missing values for the lagged financial variables are deleted. This process generates a Sample Pool with 31 760 firms and 206 319 firm-year observations. See Table B in Appendix.1 for the process. From this Sample Pool, the Probit Sample and the Matched Sample will be selected.

Based on the definitions stated above, firms are taken to be 'treated' if they at any point during the sample period experienced a foreign acquisition and remained under foreign control for the rest of the time they exist in the sample. In total, 1 407 firms are identified and form the 'treatment group'. For each treated firm, the observations after the year of the acquisition are deleted. See Table C in Appendix. 1 for a detailed description of the process. Thus, the final Probit Sample consists of all observations for firms with domestic owners during the entire time they exist in the sample, and all observations for the treated firms up until the point of the acquisition. In sum, the Probit Sample consists of 167 061 firm-year observations.
In the second step, the Matched Sample is generated based on results from the Probit Model. The Matched Sample consists of a treatment group and a control group. The treatment group is the same as in the Probit Sample, except that firms acquired in 2017 (the last year in the panel) are excluded. These observations cannot be used to estimate the effect of foreign acquisitions due to the missing data post acquisition. Excluding these firms leaves 1 325 firms in the treatment group, with observations from year 2000 to year 2016.

To obtain the control group, the treated firms are sorted by the year they were acquired and matched year by year with a domestic firm from the aforementioned Sample Pool. A 1:1 nearest propensity score matching algorithm without replacement is used. The variables used in the matching process are those that are found to be significant in the Probit Model. When a domestic firm has been matched to a treated firm, it is removed from the pool of potential control units to ensure that it is not matched again in the following years. The final Matched Sample consists of 1 325 pairs of treated and control units. Please see Table D. in Appendix 1. for a detailed description of the process.

4. Methods

In this section, the regression models used to test the hypotheses are presented and methodological considerations are discussed. First, Model I is presented, where a conventional approach is used to study the relationship between foreign control and firm performance. Second, some methodological considerations are addressed regarding the first model. Third, the matching process used to obtain the sample for Model II is described, where firms are matched using the propensity score matching method. Lastly, a Difference-in-Differences regression

model is estimated using the matched sample of firms to estimate the change in ROA following a foreign acquisition.

4.1 Model I

With the first regression model, the aim is to estimate the difference in performance (ROA) between firms with domestic owners and firms with foreign owners that is due to different owner types. In order to get a better picture of the relationship, the model is estimated in progressive configurations which allows for an evaluation of the robustness of the findings to different estimation methods. The first 3 configurations include different sets of control variables and the fourth configuration is estimated using firm fixed effects.

$$ROA_{it} = \alpha_0 + \delta Foreign_{it} + \beta X_{it} + \gamma Year + \psi Industry + \alpha_i + u_{it}$$

In Model I, the dependent variable ROA for firm i in year t is regressed on the dummy variable $Foreign_{it}$ which is equal to 1 for firm-years with controlling foreign owners and 0 otherwise. X_{it} is a vector of control variables for firm i in year t. All the control variables are described in detail below. For detailed descriptions of the variables, please see Table A. in Appendix 2. $Year$ and $Industry$ are controls for time trends and industry characteristics. α_i represent firm fixed effects and u_{it} is an error term for firm i in year t.

Control variables will mitigate bias in δ by holding factors that can be thought to be correlated with ROA or $Foreign$ constant. In addition, firm fixed effects eliminates any between-firm variation and thus control for time-invariant firm heterogeneities that may be correlated with ROA or $Foreign$, and can therefore reasonably be assumed to help mitigate omitted variable bias in δ (Wooldridge, 2018, pp. 84-87, 439-440, 462-466).

4.1.1 Dependent variable

ROA is the dependent variable in all configurations of Model I. ROA is a profitability ratio, calculated as the ratio of adjusted operating profit or loss after financial income to total assets. Most studies on the relationship of foreign ownership and firm performance focus on productivity as a measure of efficiency (e.g. Aitken & Harrison 1999; Bandick, 2011; Karpaty, 2007; Lichtenberg et al., 1987; Maksimovic et al., 2008). In this study, profitability is used as

a measure of firm performance. Profitability reflects a company's competitive position in the market and management quality. The ability to generate profit on capital invested (assets) is a key determinant of a company's overall performance (Robinson et al. 2015, pp. 329-331). Both ROA and return on equity (ROE) are important measures of profitability. ROE can be seen as a function of a company's operational profitability (ROA) and its use of financial leverage. Thus, as a measure of operational performance, ROA is superior to ROE in the sense that ROE is heavily affected by leverage (Robinson et al. 2015, p. 336). Furthermore, ROA is one of the most commonly used measures of performance (Lindemanis et al., 2019). Examples of studies that use ROA as a performance measure include Aydin et al. (2007); Douma et al. (2006), Gurbuz and Aybars (2010), Nakano and Nguyen (2013). ROA is winsorized at the 1st and 99th percentile.

4.1.2 Independent variables

Foreign is the independent variable of interest. It is a dummy variable that is equal to 1 for firm-years with a controlling foreign owner. This study follows the precedent set by previous research and adopts the definition of a foreign acquisition as when foreign investors acquire more than 50% of the voting power (e.g. Bandick & Karpaty, 2011; Lindemanis et al., 2019; Guadalupe et al., 2012; Weche Geluebcke, 2015). Consequently, a firm is considered to be controlled by a foreign owner when they control more than 50% of the votes. This gives the foreign owner controlling majority. This definition is chosen due to limited data availability, since Serrano only categorizes a company as foreign-owned if it is controlled by a *single* foreign parent company. However, a controlling majority have, in theory, substantial influence on corporate governance in general and ultimately managerial decisions in daily practice.

Leverage is included as a control variable and is defined as the ratio of total debt to total assets. This variable is included as it is found in Lindemanis et al. (2019) to be a significant predictor of the likelihood of foreign takeovers and can therefore be presumed to be correlated with *Foreign*. *Leverage* is winsorized at the 1st and 99th percentile.

Firm_size is one of the most commonly used control variables and can be proxied for by a number of different observables, such as the natural logarithm of sales (e.g. Lindemanis et al., 2019), number of employees (e.g. Bandick, 2011) or assets (e.g. Nakano and Nguyen, 2013).

In this study, the size of the firm is represented by the natural logarithm of total assets, drawing on previous research on foreign ownership and in related fields (Campa and Kedia, 2002; Demsetz and Lehn, 1985; Demsetz and Villalonga, 2001; Gurbuz and Aybars, 2010; Nakano and Nguyen, 2013; Villalonga, 2004). Conditional on industry, the size of the firm may still be correlated with *ROA* due to economies of scale or market power. If foreign investors tend to acquire 'cherries' or 'lemons', *Firm_size* should also be correlated with foreign ownership (Weche Geluebcke, 2013b).

Drawing on Guadalupe et al., (2012), *Growth* is controlled for because it may be correlated with foreign ownership if 'cherry-picking' or 'lemon-grabbing' occur. In this study, *Growth* is measured as the growth rate of revenues. *Growth* is winsorized at the 1st and 99th percentile.

Productivity is another variable that is used by many researchers studying foreign ownership, either as a dependent or independent variable (e.g. Bandick, 2011; Karpaty, 2007; Mattes, 2010; Weche Geluebcke, 2015). In this study, the natural logarithm of sales per employee is the proxy for *Productivity*, which is exclusively used as a control variable. The main rationale behind including this variable is because it has been found to significantly predict foreign acquisitions and can therefore be expected to be correlated with foreign ownership (Guadalupe et al., 2012).

Asset_intangibility is in this study calculated as the ratio of fixed intangible assets to total assets. The reason for including this ratio as a control variable is related to the proposition that markets for intangible resources are imperfect, and that firms as a result may get access to them at a lower overall cost by acquiring other firms (Capron, 1999; Williamson, 2000). Therefore, it may be related to foreign ownership. Another purpose of the variable is to control for different levels of valuable assets such as patents, to proxy for different levels of R&D activity among firms, which is used as a control variable in many related studies (e.g. Demsetz and Lehn, 1985; Demsetz and Villalonga, 2001; Karpaty, 2007; Villalonga, 2004). *Asset_intangibility* is winsorized at the 1st and 99th percentile.

For the variable *Industry,* Serrano's classifications of industries into 11 overall sectors are used, of which the real estate, financial and missing sectors are excluded (see Section 3.2 for motivation). Remaining sectors are: Energy and environment, materials, industrial goods,

construction industry, shopping goods, convenience goods, health and education, IT and electronics, telecom and media, corporate services and others. Industry is controlled for since profitability may vary among them (Porter, 2008), and some industries might be more interesting to foreign investors (Weche Geluebcke, 2013b). Furthermore, *Industry* is controlled for in practically every study related to ownership structure and firm performance (e.g. Bandick 2011; Guadalupe et al., 2012; Lindemanis et al., 2019; Weche Geluebcke, 2013b).

Year fixed effects are included in all models to control for time trends that affect all firms equally. Like *Industry* fixed effects, *Year* controls are included in practically every study related to ownership structure and firm performance (Guadalupe et al., 2012; Karpaty, 2007; Lindemanis et al., 2019).

4.2 Methodological considerations

Model I, configurations 1-3, provide a comparison of the levels of performance of firm-years with foreign and domestic owners respectively. The fourth configuration in Model I which is estimated using fixed effects make use of the panel structure of the dataset and only uses within-firm variation to estimate the relationship, thus controlling for any unobserved and time-invariant confounders (Wooldridge, 2018, pp.462-466). However, none of the configurations in Model I provide much insight into the direction of the relationship, or equivalently, if it is the change to foreign ownership that drives the observed difference or if it is the change in performance that leads to a change in ownership. Therefore, Model II is dedicated to complement Model I by estimating the change in ROA following a foreign acquisition.

Endogeneity is a major concern in all non-experimental research on ownership structure. Some researchers have for a long time argued that ownership structure and firm performance are jointly determined in equilibrium where ownership structure is a result of the value/utility maximizing behaviour of shareholders; i.e., ownership structure should be thought of as an endogenous outcome (Demsetz, 1983; Demsetz and Lehn, 1985; Villalonga, 2019). In the case of a foreign acquisition, sellers and buyers are actually making decisions that change the ownership structure of the firm. Including foreign ownership as an exogenous variable would then lead to a biased estimate of its impact on performance (Demsetz and Villalonga, 2001). Consequently, researchers have to consider the reasons for altering the ownership structure in

the first place. If cherry picking occurs, or if lemons are the most likely targets such that foreign acquisition cannot be taken as random, self-selection is an issue that needs to be dealt with to estimate the effect of foreign acquisition on the target's performance (Demsetz and Villalonga, 2001; Villalonga, 2019).

4.3 Matching method for Model II

Estimating the effect of foreign acquisitions on firm performance is done in two steps: First, the propensity score matching method (henceforth, PSM) is used to create a treatment and control group with similar pretreatment characteristics. In the second step, a Difference-in-Differences (henceforth, DiD) regression equation is estimated using the matched sample. The matching method is discussed in detail in this section before the DiD regression model is presented in the following section.

4.3.1 Propensity score matching (PSM)

Several strategies for dealing with the endogeneity problem have been proposed, such as instrumental variable regression (henceforth, IV), Heckman's two-stage method or the use of structural models (e.g. Campa & Kedia, 2002; Coles et al., 2012). Building a structural model is outside the scope of this study. The IV regression approach requires the use of an exogenous instrument that is only correlated with *Foreign* (Wooldridge, 2018, pp.496-500). Due to the difficulty of finding a valid instrument, this method is not used in this study. Another commonly adopted way to deal with the self-selection issue is the use of matching methods. In this study, PSM is used following the examples of studies in related fields (e.g. Bandick, 2011; Karpaty, 2007; Lindemanis et al., 2019; Villalonga, 2004; Weche Geluebcke, 2015). PSM is a method that can be used in a non-experimental setting to estimate average treatment effects by matching treated units with control units that exhibit similar characteristics such that treatment assignment can be taken as random (Dehejia and Wahba, 2002).

Establishing the impact of foreign acquisitions on firm performance requires knowledge about the counterfactual outcome of the treated unit; i.e. what would the outcome have been for a certain unit had it not been acquired? This counterfactual outcome cannot possibly be observed, but in a controlled experiment the control group can substitute for the treated units in the alternative state of the world. This substitution works because it is ensured that there is no

systematic difference between the treatment and control group by randomizing the treatment. A successfully executed PSM method creates an experiment-like setting by replicating the conditions of a controlled experiment (Dehejia and Wahba, 2002).

The notation in the following is inspired by Dehejia and Wahba (2002) and Rosenbaum and Rubin (1983). Let ROA_{i1}denote the outcome for an acquired firm, and let ROA_{io}denote the outcome for a firm that is not acquired. Let $Change2F_i$ represent the treatment and let $Change2F_i = 1$if a firm is acquired and $Change2F_i = 0$ if it is not acquired. In order to estimate the average treatment effect on the treated (henceforth, ATT), that is when $Change2F_i = 1$, one would *ideally* like to estimate the following equation:

$$ATT = E(ROA_{i1}|Change2F_i = 1) - E(ROA_{io}|Change2F_i = 1)$$

That is, to estimate this equation, one would need to observe the counterfactual outcome of a treated firm as if it had not been acquired. However, it is clearly impossible to observe $ROA_{io}$when $Change2F_i = 1$. Randomization ensures that the outcome and treatment assignment are independent which makes treatment assignment ignorable. The ATT can then be estimated by comparing the responses of the treatment group and a control group. In a non-experimental setting, treatment assignment is usually not ignorable, because certain variables (X) may impact the probability of being assigned to the treatment. However, if the researcher can observe these variables and sample a control group with the same pretreatment characteristics, the outcome and treatment assignment are conditionally independent given the pretreatment characteristics (Rosenbaum & Rubin, 1983).

When using PSM, one matches units based on the probability that they would be assigned to the treatment group, where the probability can be estimated based on the observable covariates, X, using for example a probit model. In other words, matching on the propensity scores is equivalent to matching on the pretreatment characteristics. Treatment assignment and the outcomes are thus conditionally independent $(\perp)$ given the propensity score and the ATT can be estimated as follows (Rosenbaum & Rubin, 1983):

if $(ROA_{i1}, ROA_{i0}) \perp Change2F_i \mid p(X_i)$, then

$ATT = E_{p(x)}[E(ROA_{i1} \mid p(X_i), Change2F_i = 1) - E(ROA_{i0} \mid p(X_i), Change2F_i = 0)]$, or

$ATT = E_{p(x)}[E(ROA_{i1} \mid p(X_i)) - E(ROA_{i0} \mid p(X_i))] = E(ROA_{i1}) - E(ROA_{i0})$

That is, the expected difference in the responses of treatment and control units with the same propensity score is an unbiased estimate of the ATT (Rosenbaum & Rubin, 1983). Since there are reasons to suspect that firms acquired by foreign entities differ systematically from the average domestic firm, self-selection causes estimates to be biased if the control group is sampled randomly from the population of domestic companies. To ensure greater similarity between the treatment and control group, treated firms are matched with domestic control units exhibiting similar pretreatment characteristics, which is estimated using a probit model discussed in the following subsection.

4.3.2 Probit model

To estimate the propensity scores, a probit model is used, following the examples of many previous studies in the field (e.g. Bandick, 2011; Karpaty, 2007; Mattes, 2010; Weche Geluebcke, 2015). The Probit Model serves several purposes: First, $Change2F$ is a binary dependent variable and a probit model makes sure that the response probability takes on values between 0 and 1 (Wooldridge, 2018, pp.560-561). Second, the Probit Model is used to generate the propensity score function that is used to match treated firms with control units exhibiting similar characteristics (Lindemanis et al., 2019).

$$P(Change2F_t = 1 | X_t, Year, Industry) = \Phi(\alpha + \beta X_t + \gamma Year + \psi Industry)$$

The dependent variable $Change2F$ is a dummy variable that takes on the value 1 in the year when a firm is acquired by a foreign investor and 0 otherwise. Φ denotes the cumulative normal distribution. $Year$ and $Industry$ are controls for year and industry fixed effects. Lastly, X_t is a vector of variables that are discussed below. For detailed descriptions of the variables, please see Table B in Appendix 2.

In this study, the variables ROA_{t-1}, $FirmSize_{t-1}$, and $Leverage_{t-1}$ are included following the study of Lindemanis et al. (2019). They find that ownership changes from foreign to domestic

are more likely in larger and less profitable firms. The expectation of the signs of the coefficients are based on their findings, please see Table B in Appendix 2. The variable $Productivity_{t-1}$is included based on the evidence that foreign firms tend to acquire the most productive firms (e.g. Bandick, 2011; Guadalupe et al., 2012; Weche Geluebcke, 2015). Moreover, one additional independent variable $Asset\_intangibility_{t-1}$ is introduced in order to control for different R&D intensities and the importance of valuable assets such as patents (see Section 4.1.2). Lastly, $Growth_t$ is included as it is one of the variables used by Guadalupe et al. (2012) when they calculate propensity scores for firms in their study. The expected sign of $Growth$ is not predicted here due to conflicting theories (see Section 2.2.3).

4.3.3 The matching process explained

Following Lindemanis et al. (2019), the Probit Model described above is first estimated to find the firm characteristics that significantly impact the probability of being acquired. Variables that are found to be significant are then employed in a second Probit Model for the purpose of estimating propensity scores which are used to match the acquired units with a control group exhibiting similar pretreatment characteristics. Treated firms are matched year by year with a domestic firm from the pool of potential control firms using 1:1 nearest PSM without replacement. Every treated firm is matched with a control unit. After the matching process each year, the domestic firms that were matched are excluded from the pool of potential control units so that they cannot be matched more than once. Each treated firm is thus matched once, based on the propensity score in the year it was acquired.

4.4 Model II

Following some recent studies in related fields (Bandick, 2011, Bandick & Karpaty, 2011; Karpaty, 2007; Lindemanis et al., 2019; Weche Geluebcke, 2015;), the second model uses a dynamic approach. To examine the effect of a foreign acquisition, a DiD Model is used to compare the average within firm difference in ROA before and after the acquisition relative to the control group which acts as the counterfactual. Based on the matched sample, the DiD estimator can be obtained with the following regression model:

$$ROA_{it} = \alpha + \delta_1 dT_i + \delta_2 dAfter_{it} + \delta_3 (dT_i \times dAfter_{it}) + \beta X_{it} + \gamma Year + \psi Industry + a_i + u_{it}$$

Where the dependent variable is the ROA of firm i in year t. dT_i is a dummy variable that takes on the value 1 in all years for treated firms and 0 for the control group. The coefficient $\delta_1$captures any constant profitability differences between the treatment and control group (Karpaty, 2007). $dAfter_{it}$ is a dummy variable which equals 1 in all periods upon and after the year of the acquisition for both the treated unit and matched control unit. The coefficient δ_2 captures aggregate time effects that impact the performance of treated and control firms equally (Bandick, 2011). The interaction variable $dT_i \times dAfter_{it}$ takes on the value 1 for treated firms in post acquisition years and 0 otherwise. The coefficient δ_3 is the DiD estimator, which is described below. The vector X_{it} and the variables $Year$ and $Industry$ are the same as in Model I and controls for other firm specific characteristics as well as year and industry fixed effects, that may impact the ROA of a given firm (Bandick, 2011; Karpaty, 2007; Kausar et al., 2016). Furthermore, the model is estimated using firm fixed effects in order to control for firm-specific and time-invariant characteristics (Kausar et al. 2016). In this model, the variable of interest is the interaction term $dT_i \times dAfter_{it}$ and the most important coefficient is the DiD estimator which is the average difference between the changes in ROA following acquisition between the treatment and control group (Bandick, 2011). The equations and Exhibit 2 below are inspired by Bandick (2011), Bandick and Karpaty (2011) and Wooldridge (2018, pp.434-435).

$$\delta_3 = (\overline{ROA}_{After,treated} - \overline{ROA}_{Before,treated}) - (\overline{ROA}_{After,control} - \overline{ROA}_{Before,control}), \text{ or}$$

$$\delta_3 = (\overline{ROA}_{After,treated} - \overline{ROA}_{After,control}) - (\overline{ROA}_{Before,treated} - \overline{ROA}_{Before,control})$$

Exhibit 2. Explanation of the DiD estimator δ_3

	Before	After	After-Before
Control	α	$\alpha + \delta_2$	δ_2
Treated	$\alpha + \delta_1$	$\alpha + \delta_1 + \delta_2 + \delta_3$	$\delta_2 + \delta_3$
Treated-Control	δ_1	$\delta_1 + \delta_3$	δ_3

5. Results and analysis

In this section, the results of the regression models are presented respectively. Descriptive statistics, correlations for the main variables and the results of the regressions are presented in each subsection together with analyses of the results for the hypotheses.

5.1 Hypothesis 1: Foreign ownership and firm performance

Hypothesis I concerns the relationship between foreign ownership and firm performance. A static approach is used to investigate whether the firm performance between these two groups are different, and to what extent this depends on them having different owner types. The Full Sample is used in this model.

5.1.1 Descriptive statistics and correlation

As described in Section 3.2, the Full Sample consists of 258 939 firm-year observations. Table 1 below provides descriptive statistics for the main variables used in Model I.

Table 1. Descriptive statistics for Model I

Domestic						
Variable	Obs	Mean	Std.Dev.	Min	Median	Max
ROA	207 233	0.103	0.213	-0.834	0.099	0.709
Leverage	207 233	0.756	0.182	0.197	0.784	1.119
Firm_size	207 233	9.755	1.308	2.079	9.613	17.753
Growth	207 233	0.177	0.655	-0.588	0.052	5.000
Productivity	207 233	7.308	0.799	0.000	7.226	14.138
Asset_intangibility	207 233	0.013	0.052	0.000	0.000	0.376
Foreign						
Variable	Obs	Mean	Std.Dev.	Min	Median	Max
ROA	51 706	0.059	0.230	-0.834	0.071	0.709
Leverage	51 706	0.721	0.214	0.197	0.755	1.119
Firm_size	51 706	10.844	1.577	3.970	10.675	19.494
Growth	51 706	0.185	0.727	-0.588	0.046	5.000
Productivity	51 706	7.769	0.963	0.000	7.698	13.347
Asset_intangibility	51 706	0.021	0.065	0.000	0.000	0.376

Notes: *ROA* is the adjusted operating profit/loss after financial income divided by total assets. *Leverage* is the ratio of total debt to total assets. *Firm_size* is the natural logarithm of total assets. *Growth* is the growth rate of revenues. *Productivity* is the natural logarithm of sales per employee. *Asset_intangibility* is the ratio of intangible fixed assets to total assets. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile.

Comparing the mean ROA for domestic and foreign firms, it can be observed that domestic firms appear to be more profitable, which provide some support that there is disparity in performance between foreign and domestic firms. However, the difference of means of other variables are not as obvious. Comparing the means of other variables between the two groups,

foreign firms are larger in terms of total assets, have lower leverage, experience higher growth in revenues, are more productive and exhibit a higher intangible assets ratio.

Two-way T-tests are performed to examine whether there is a difference between the two groups regarding the variables. Results are reported in Table 2 below. There is a substantial difference between the two groups in *ROA*, while disparity in all other variables is significant although less pronounced. The difference in the variables *ROA*, *Firm_size*, *Leverage*, *Productivity* and *Asset_intangibility* are significant at the 0.1% level, while the difference in *Growth* is significant at the 5% level. The results indicate that the ownership structure (foreign or domestic) can play a role in determining the firm performance.

Table 2. T-test result of variables between two groups in Model I

H_0 : *there is no difference between the two groups.*

	Domestic	Foreign	Difference (Domestic-Foreign)	Std.err	T-stat	P
ROA	0.103	0.059	0.044	0.001	41.027***	0.000
Firm_size	9.755	10.844	-1.089	0.007	-162.203***	0.000
Leverage	0.756	0.721	0.035	0.001	37.412***	0.000
Growth	0.177	0.185	-0.082	0.003	-2.498*	0.013
Productivity	7.308	7.769	-0.461	0.004	-112.445***	0.000
Asset_intang	0.013	0.021	-0.008	0.000	-29.868***	0.000

Note: *ROA* is the adjusted operating profit/loss after financial income divided by total assets. *Leverage* is the ratio of total debt to total assets. *Firm_size* is the natural logarithm of total assets. *Growth* is the growth rate of revenues. *Productivity* is the natural logarithm of sales per employee. *Asset_intangibility* is the ratio of intangible fixed assets to total assets. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile. * p<0.05, ** p<0.01, *** p<0.001

Table 3 displayed below, presents the Pearson correlation coefficients between all the variables used in the regression model. Consistent with the theories and previous findings that motivated the choice of the control variables in this study (Section 4.1.2), they are significantly related to ROA. Noticeably, ROA has a negative correlation (-0.080) with *Foreign* that is significant at the 0.1 % level. This finding is in line with Hypothesis 1b, that foreign ownership is negatively related to profitability. However, one must bear in mind that correlation does not imply causality which will be discussed later in the analysis of the results. All variables are, furthermore, significantly correlated with each other. The highest correlation is found between *Productivity* and *Firm_size*, with a correlation coefficient of 0.526. The other coefficients are,

although statistically significant, closer to zero. A VIF-test is conducted as a robustness check for multicollinearity (see Section 6.1).

Table 3. Pearson Correlation of variables in Model I

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ROA	1.000						
(2) foreign	-0.080***	1.000					
(3) Leverage	-0.219***	-0.073***	1.000				
(4) Firm_size	0.016***	0.304***	-0.066***	1.000			
(5) Growth	-0.009***	0.005***	0.119***	-0.030***	1.000		
(6) Productivity	0.148***	0.216***	-0.054***	0.526***	-0.031***	1.000	
(7) Asset_intang	-0.115***	0.586***	0.069***	0.070***	0.093***	-0.023***	1.000

Notes: *ROA* is the adjusted operating profit/loss after financial income divided by total assets. *Leverage* is the ratio of total debt to total assets. *Firm_size* is the natural logarithm of total assets. *Growth* is the growth rate of revenues. *Productivity* is the natural logarithm of sales per employee. *Asset_intangibility* is the ratio of intangible fixed assets to total assets. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile. * p<0.05, ** p<0.01, *** p<0.001

5.1.2 Test results and analysis of hypothesis I

The first hypothesis inquires whether ROA is positively or negatively related to foreign ownership. Table 4 presents the results when ROA is regressed on the independent variable of interest, $Foreign$, using different control variables and fixed effects.

Four configurations of Model I are estimated. In versions (1)-(3), the ROA differences between the two categories, domestic and foreign are examined. In all versions, industry and year fixed effects are included to control for any time-varying trends affecting all firms equally and industry-specific factors. In version (1), ROA is regressed on the independent variable of interest, *Foreign*. In version (2), three control variables which are commonly used in research on the owner type's impact on firm performance are included. In version (3), two additional control variables are added. In version (4), which is the main model, the regression equation is estimated using fixed effects, where the panel variable is the organization number of the firm. This is to control for unobserved and time-invariant firm heterogeneities to better isolate the relationship between foreign ownership and ROA. This version uses within-firm variation and thus compares the levels of ROA within firms in years with foreign ownership with the levels of ROA within firms in years with domestic ownership (Wooldridge, 2018, pp.462-464).

Table 4. Regression results of Model I

ROA	(1)	(2)	(3)	(4)
Foreign	-0.041***	-0.057***	-0.064***	-0.025***
	(0.002)	(0.002)	(0.002)	(0.004)
Leverage		-0.257***	-0.247***	-0.290***
		(0.005)	(0.005)	(0.006)
Firm_size		0.007***	-0.007***	0.030***
		(0.001)	(0.001)	(0.002)
Growth		0.005***	0.008***	0.014***
		(0.001)	(0.001)	(0.001)
Productivity			0.054***	0.106***
			(0.002)	(0.004)
Asset_intangibility			-0.351***	-0.231***
			(0.016)	(0.017)
Constant	0.074***	0.211***	-0.054***	-0.686***
	(0.005)	(0.010)	(0.013)	(0.027)
Industry FE	YES	YES	YES	NO
Year FE	YES	YES	YES	YES
Firm FE	NO	NO	NO	YES
Method	OLS	OLS	OLS	FE
N	258939	258939	258939	258939
F	73.14	142.0	202.7	249.8
Adjusted R2	0.021	0.071	0.109	0.119

Notes: *ROA* is the adjusted operating profit/loss after financial income divided by total assets. *Leverage* is the ratio of total debt to total assets. *Firm_size* is the natural logarithm of total assets. *Growth* is the growth rate of revenues. *Productivity* is the natural logarithm of sales per employee. *Asset_intangibility* is the ratio of intangible fixed assets to total assets. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile. Standards errors are clustered at the firm level. Standard errors in parentheses.
* p<0.05, ** p<0.01, *** p<0.001

In versions (1)-(3), the coefficients for the independent variable of interest (*Foreign*) carry negative signs and are significant at the 0.1% level. All the control variables are also significant at the 0.1% level. As more variables are controlled for, the difference becomes more negative. The results indicate that foreign owned firms are less profitable than domestic firms, holding the control variables fixed, and foreign ownership is significant in explaining variation in performance in terms of ROA at the 0.1% level. The results are in line with previous findings for the German services sector (Weche Geluebcke, 2013a). Based on the results, the null hypothesis that there is no relationship between foreign ownership and ROA is rejected. Hence, Hypothesis 1b can be supported. It indicates that the performance of foreign subsidiaries is different from domestic subsidiaries in terms of operational profitability. They tend to be less profitable than domestic counterparts among private limited liability firms in Sweden. However, it cannot be inferred from this result that the relationship is causal. In version (4), the

coefficient for the variable $Foreign$ is still negative and significant at 0.1% level. However, it is observed that it becomes less negative. It indicates that the negative difference can be partly explained by the unobserved firm specific factors. Thus, some of the negative relationship between foreign ownership and ROA that was found in versions (1)-(3) of model I is not in fact due to the firms being controlled by a foreign entity, but due to confounding variables. There are factors in versions (1)-(3) that have not been controlled for that inflate the coefficient of $Foreign$, and thus overestimate the negative impact of foreign ownership on ROA.

5.2 Hypothesis 2: Foreign acquisition and firm performance

In the Model II, a dynamic approach is taken. To test the hypothesis, the Matched Sample is used. First, the results of the matching process are displayed. The PSM method is a two-step procedure presented in Section 4.3. In the first step, the Probit Model is estimated to evaluate what firm characteristics are significant determinants of foreign acquisitions, solely for the purpose of choosing the variables for the matching process. In the second step, PSM is performed and the matching results are displayed. Lastly, the results of the DiD regression are analyzed.

5.2.1 Results of the propensity score matching (PSM) process

Before matching, the Probit Model is estimated to evaluate what firm characteristics are significant determinants of the probability of a firm being acquired. Table 5 presented below reports the results of the probit model where the dependent variable, $Change2F,$ is regressed on the independent variables and controls for year and industry fixed effects in steps. The Probit Sample is used in this model.

Four configurations are estimated. Version (1) uses the independent variables lag_ROA, lag_Firm_size, $lag\_Leverage$. In versions (2) - (4), one-year lags of the variables *Productivity, Asset_intangibility* and *Growth* are added in three consecutive steps. Firm and industry fixed effects are controlled for in all versions. There are three variables that are statistically significant in all models: lag_Firm_size, $lag\_Productivity$ and $lag\_Asset\_intangibility$. lag_Firm_size and $lag\_Productivity$ are significant at the 0.1% level while $lag\_Asset\_intangibility$ is significant at the 1% level.

Table 5. Regression results of the Probit Model

Change2F	(1)	(2)	(3)	(4)	(5)
lag_ROA	0.078	0.040	0.057	0.057	
	(0.052)	(0.053)	(0.054)	(0.062)	
lag_Firm_size	0.114***	0.098***	0.096***	0.096***	0.095***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
lag_Leverage	0.026	0.024	0.016	0.015	
	(0.058)	(0.059)	(0.059)	(0.059)	
lag_Productivity		0.062***	0.063***	0.063***	0.066***
		(0.016)	(0.016)	(0.016)	(0.015)
lag_Asset_intangibility			0.501**	0.498**	0.480**
			(0.171)	(0.171)	(0.169)
Growth				0.009	
				(0.031)	
Constant	-3.292***	-3.583***	-3.563***	-3.566***	-3.557***
	(0.127)	(0.147)	(0.147)	(0.147)	(0.137)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	167061	167061	167061	167061	167061
ll	-7701.2	-7693.3	-7689.2	-7689.2	-7689.8
chi2	842.0	857.7	865.8	865.9	864.7
r2_p	0.052	0.053	0.053	0.053	0.053

Notes: The table reports the results of a probit regression where the dependent variable, *Change2F,* is a dummy variable equal to one when a foreign investor acquires a controlling stake of a domestic firm and zero otherwise. *lag_ROA* is the adjusted operating profit/loss after financial income divided by total assets. *lag_Firm_size* is the natural logarithm of total assets. *lag_Leverage* is the ratio of total debt to total assets. *lag_Productivity* is the natural logarithm of sales per employee. *lag_Asset_intangibility* is the ratio of intangible fixed assets to total assets. All of the independent variables above are included as one-year lags. *Growth* is the growth rate of revenues. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Probit estimates can be difficult to interpret because the coefficients do not correspond to the marginal effects (Wooldridge, 2018, p.562). However, the positive signs of these three variables indicate that foreign investors tend to acquire firms that are larger in size, higher in productivity and have a higher intangible assets ratio. Thus, these results are in line with the 'cherry-picking' theory that foreign entities tend to acquire firms that perform better than the average domestic firm.

Surprisingly, the variable lag_ROA is found to be statistically insignificant in all models, which is inconsistent with the findings in Lindemanis et al., (2019) where the coefficient is positive

and significant. Tests if lag_ROA is jointly significant with $lag\_Leverage$ and $Growth$ are performed, but joint significance is rejected both in the Likelihood-ratio test and the Wald test (the tests are not reported here). The result that $lag\_ROA, lag\_Leverage$ and $Growth$ are not significant in any of the models and are not jointly significant, indicates that they are not determinant firm characteristics for foreign acquisitions. Thus, they are excluded from the probit model used to estimate propensity scores. Version (5) of the Probit Model in Table 5 includes all the significant variables.

Based on the results in the first step, three variables are proven to be significant determinants of foreign acquisitions: $lag\_Firm\_size, lag\_Productivity$ and $lag\_Asset\_intangibility$. These three variables are used in the PSM process. To obtain the Matched Sample, the treated firms are matched year by year with a domestic firm from the Sample Pool. For each firm a propensity score is estimated, which is the probability of being acquired by a foreign investor using the variables in version (5) of the Probit Model in Table 5.

The resulting sample consists of 1 325 pairs of treated and domestic firms. See distribution of matched sample by year in Table A. Appendix 3. Table 6 below presents the results of a series of t-tests for different means between the treatment and control group. They show that the matching process has been successful; there are no statistically significant differences between the two groups in any of the variables.

Table 6. T-tests for variables in the year before the ownership change

H_0 : *there is no difference between the treatment group and control group.*

	Control	Treated	Difference (Treat- Control)	Std. Err	T-stat	P
lag_ROA	0.107	0.113	-0.006	0.008	-0.668	0.504
lag_Firm_size	10.340	10.354	-0.015	0.055	-0.270	0.787
lag_Leverage	0.774	0.766	0.008	0.007	1.130	0.259
lag_Productivity	7.476	7.496	-0.020	0.033	-0.626	0.532
lag_Asset_intang	0.021	0.020	0.001	0.003	0.360	0.719
Growth	0.077	0.080	-0.003	0.015	-0.201	0.840

Notes: *lag_ROA* is the adjusted operating profit/loss after financial income divided by total assets. *lag_Firm_size* is the natural logarithm of total assets. *lag_ Leverage* is the ratio of total debt to total assets. *lag_Productivity* is the natural logarithm of sales per employee. *lag_Asset_intangibility* is the ratio of intangible fixed assets to total assets. All of the independent variables above are included as one-year lags. *Growth* is the growth rate of revenues. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile.
* p<0.05, ** p<0.01, *** p<0.001

5.2.2 Hypothesis II. Foreign acquisition and firm performance

Table 7 reports the results of regressing ROA on the treatment variable T_i, the variable indicating the post-treatment period $After_{it}$, the interaction variable $T_i \times After_{it}$, along with the control variables, industry, year and firm fixed effects.

Table 7. Regression results of Model II

ROA	(1)	(2)	(3)	(4)	(5)
T	0.006	0.003	0.001		
	(0.007)	(0.007)	(0.007)		
After	-0.022***	-0.019**	-0.021***	-0.001	0.000
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
T×After	-0.026**	-0.025**	-0.022**	-0.032***	-0.030***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Firm_size		-0.002	-0.010***		0.015**
		(0.002)	(0.002)		(0.005)
Leverage		-0.168***	-0.161***		-0.212***
		(0.016)	(0.016)		(0.017)
Growth		0.066***	0.063***		0.040***
		(0.008)	(0.008)		(0.006)
Productivity			0.042***		0.103***
			(0.004)		(0.010)
Asset_intang			-0.346***		-0.214***
			(0.049)		(0.043)
Constant	0.096***	0.253***	0.008	0.123***	-0.618***
	(0.017)	(0.034)	(0.043)	(0.005)	(0.082)
Industry FE	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	Yes
Method	OLS	OLS	OLS	FE	FE
N	25986	25986	25986	25986	25986
F	8.786	13.47	18.60	12.46	27.84
Adj. R2	0.018	0.052	0.083	0.014	0.106

Notes: *ROA* is the adjusted operating profit/loss after financial income divided by total assets. *T* is a dummy variable that is equal to 1 in all years for treated firms and 0 otherwise. *After* is a dummy variable that takes on the value 1 in all years from the acquisition and onwards, for both the treated and control unit. $T \times After$ is an interaction term that is equal to 1 for treated firms in all years from the acquisition and onwards, and 0 otherwise. *Firm_size* is the natural logarithm of total assets. *Leverage* is the ratio of total debt to total assets. *Growth* is the growth rate of revenues. *Productivity* is the natural logarithm of sales per employee. *Asset_intangibility* is the ratio of intangible fixed assets to total assets. *ROA, Leverage, Growth* and *Asset_intangibility* are winsorized at the 1st and 99th percentile. Standards errors are clustered at the firm level. Standard errors in parentheses.
* p<0.05, ** p<0.01, *** p<0.001

In configuration (1), ROA is regressed over T_i, $After_{it}$ and the interaction term $T_i \times After_{it}$. The coefficient of the interaction term is negative, indicating that companies that experienced a change in ownership structure, on average, have lower ROA growth compared to their

counterparts that remained domestic. This result does not change considerably when the control variables, $Firm\_size$, $Leverage$ and $Growth$, are included in version (2), nor when $Productivity$ and $Asset\_intangibility$ are controlled for in version (3). Industry and year fixed effects are controlled for in all three versions. The results are significant at the 1% level. However, when firm fixed effects are included in versions (4) and (5), the DiD coefficient is even more negative when firm specific unobserved effects are controlled for, indicating even lower growth in ROA relative to domestic firms. Results are significant at the 0.1% level.

In the complete version (5), all the control variables are included and firm fixed effects are controlled for. The DiD estimator suggests that firms that were acquired experienced a lower growth in ROA relative to the control group by 3 percentage points. The result is significant at the 0.1% level. Thus, the null hypothesis is rejected in favor of the alternative, H2b, that foreign acquisitions lead to lower growth in profitability. The finding that foreign acquisition has a negative effect on firm's profitability supports the finding in Model I that foreign ownership is negatively correlated with firm performance.

Regarding the explanatory power of Model II, it is noticed that the adjusted R2 is quite low. Indeed, it is lower compared to other studies that use PSM and DiD (Bandick, 2011; Karpaty, 2007). However, these studies use other dependent variables and samples of manufacturing firms and are therefore not directly comparable. Furthermore, it may be that ROA is noisy and therefore difficult to predict. Lastly, obtaining a high goodness of fit measure is not the purpose of this study. By applying PSM and DiD, it is attempted to approach the causal relationship between foreign takeovers and firm performance and a high R2 is not a requirement to identify ceteris paribus effects (Wooldridge, 2018, pp.76-79).

5.3 Analysis of the results

In this section the hypotheses are discussed, the results of the two models are analyzed and possible explanations are provided for the results.

5.3.1 Comprehensive analysis of the results

The results of both models are consistent in that they provide evidence that foreign affiliates exhibit lower profitability than domestic counterparts among private firms in Sweden. In Model

I, a disparity in operating profitability between foreign affiliates and domestic affiliates is detected. Foreign owned firms tend to show inferior performance compared to domestic owned firms measured as ROA. However, the direction of the relationship cannot be inferred. As the lemon grabbing theory claims, less profitable firms are more likely subject to foreign acquisition. If so, the inferior performance of target firms before the acquisition could be the cause of foreign ownership, rather than the effect being brought about by the foreign ownership structure. Then, the Probit Model is estimated to find the firm characteristics that determine the probability of being a target of a foreign acquisition. The results indicate that ROA is not a significant characteristic for foreign investors. More specifically, foreign acquirers do not systematically acquire less profitable firms ('lemons'), which indicates that lower ROA is not a cause of acquisitions. To test whether lower ROA is a result of a foreign acquisition, a dynamic approach is taken to test the within firm performance change after foreign acquisitions in Model II. The results indicate that the event of a foreign acquisition (change in ownership from domestic to foreign) exerts a negative impact on the growth of ROA. Thus, these findings deepen our understanding of the negative relationship between foreign control and firm performance. Taken together, the results suggest that foreign acquisitions lead to lower ROA and not the other way around.

These results corroborate the findings in the study of foreign acquisitions in Europe (Lindemanis et al., 2019), where a negative effect of foreign acquisitions is found for the group of countries that became EU member states before 2004 (old EU nations), and Sweden is one of them. In the study by Lindmanis et al. (2019), they separate the long-term effect on profitability from the short-term effect. In this study, a DiD approach is used, thus no long-term or short-term effect can be isolated, and results cannot be directly compared. Results are also in line with previous studies on the effect of foreign ownership conducted in the service sector in Germany (Weche Geluebcke, 2013a) that foreign affiliates show inferior performance measured as profitability.

5.3.2 Potential explanations

This result that foreign affiliates are less profitable than domestic affiliates is contradictory to the MNE theory. In what follows, some explanations are elaborated as an analysis of the results.

Liability of foreignness One potential explanation for the negative relationship is that foreign firms suffer from information asymmetry and are subject to certain 'foreign liabilities'. It is possible that foreign control comes with certain extra costs, be it extra monitoring costs due to physical and cultural distance or extra costs of running a business in a foreign country due to coordination issues (see e.g. Buckley, 1997, pp.200-211; Johanson & Vahlne, 2009; Petersen & Pedersen, 2002; Zaheer, 1995). These extra costs are likely to influence the operating performance which cause the inferior profitability compared to their domestic counterparts. However, there are many other potential explanations to this result.

Motivations behind foreign acquisitions Foreign acquisitions can be categorized into horizontal and vertical, and the motivations behind them are different. A vertical acquisition happens when a foreign parent acquires a domestic business operating at a different stage of the value chain. The motivations can be to improve efficiency and profitability. In a horizontal acquisition, on the other hand, a foreign owner takes over a domestic entity that operates at the same level of the value chain in an industry. The main motivation is revenue oriented, such as expansion into a new foreign market and diversification of product lines (Bandick, 2011). The relationship between foreign acquisition and growth has not been examined in this study, but the results in Lindemanis et al. (2019) suggest that foreign acquisition leads to higher revenue growth which indicates that foreign firms may concentrate more on market expansion as a long-term strategic concern while profitability is sacrificed, especially in horizontal acquisitions.

Governance level The other explanation is the relative standing in terms of the governance level between the target and acquirer. Lindemanis et al. (2019) show that targets from countries with poorer governance practices benefit more from acquisitions by foreign entities in countries with better governance practices. Sweden consistently ranks high in governance according to the statistics from the Worldwide Governance Indicators (The World Bank, 2019). In this respect, it is hard for Swedish firms to benefit from a large improvement in corporate governance from an acquirer of even higher governance level.

Non-linearity relationship In this study, foreign ownership is only observed if a foreign entity controls more than 50 % of the votes. In some previous studies, an inverse U shaped relationship between firm performance and foreign ownership has been detected (Ferris and Park, 2005;

Gurbuz & Aybars, 2010; Hintošová & Kubíková, 2016). More specifically, firm performance may improve with the increase of foreign ownership to a certain extent and reach the ideal ownership structure. Then, further increase in foreign ownership is sometimes accompanied with extra costs that makes performance get worse when it reaches a certain threshold. Thus, the regressions in this study might only pick up the negative relationship that exists after that threshold and not the overall relationship between foreign ownership and ROA.

Tax avoidance One explanation of the lower profitability is the profit shifting strategy of MNEs for tax motivated reasons. The nature of multinational firms means that transfer pricing can be deployed among affiliated firms in MNEs to shift costs and profits so that it is most favorable in terms of taxes for the MNE as a whole (Henn, 2013, pp. 2-5). Then, the reported accounting number of an affiliate may not necessarily reflect the true picture of profitability. This could be a possible explanation; however, it is harder for MNEs to implement such tax avoidance strategies nowadays due to stricter tax legislation.

6. Discussions

In this section, robustness tests are performed to test for multicollinearity. Then, the validity of the study is discussed. In particular the assumptions of the models are examined. Lastly, the reliability is reviewed.

6.1 Robustness tests

Multicollinearity is caused when independent variables are highly correlated. It can make it hard to distinguish the effect of one variable from another. A test for multicollinearity is conducted (see Exhibit A. in Appendix 4.) and the results reveal that the highest (lowest) Variance Inflation Factors (Tolerance) is observed for *Productivity* and *Firm_size*. The VIFs for all variables are, however, below 1.5 and therefore, multicollinearity is not a concern in this study (Wooldridge, 2018, pp.89-92). Control variables are correlated with key independent variables except leverage and growth.

6.2 Validity

PSM and the DiD regression design are applied in model II to validate the findings in the first model. The PSM method is applied to reduce the bias in the DiD estimator by ensuring greater

comparability between the firms in the treatment and control group thus making the control firms a more likely counterfactual (McKenzie, 2020). Furthermore, by including control variables and fixed effects, other confounding factors have been differenced away, that otherwise might have led to an inflated or deflated DiD estimator (Kausar et al., 2016).

6.2.1 Control Variables

Including control variables, though, can sometimes cause a bias due to over controlling rather than mitigate omitted variable bias (Wooldridge, 2018, pp.199-200). For example, if foreign owners differ in how risk averse they are compared to domestic owners and therefore change the leverage of the firms they acquire, $Leverage$ would be an example of a mediator variable. Then, part of the effect on ROA caused by the change to foreign ownership can no longer be observed if $Leverage$ is controlled for. However, if leverage changes due to some exogenous shock that disproportionately affects one of the groups, say a change in tax rules, controlling for this variable would be appropriate as it otherwise would confound the relationship between foreign ownership and ROA. Since the results do not change significantly when different controls are added, it does not seem to be a big concern that the control variables would introduce substantial bias; the signs of the coefficient for the variables of interest ($Foreign$ and $T_i \times After_{it}$) are negative and significant in all models which adds validity to the result. See a list of all control variables and descriptions in Appendix 2.

6.2.2 The conditional independence assumption

In order to get an unbiased estimate of the ATT using PSM, it is essential that the conditional independence assumption, or ignorability assumption, is fulfilled. Treatment assignment is only ignorable when all variables that are relevant for the takeover decision can be observed and controlled for. This implies that unobserved effects should not be crucial factors in this decision (Dehejia & Wahba, 2002). In this study, a probit model is used to find the key characteristics that impact the likelihood that a firm is acquired and subsequently to estimate the propensity score for each firm. As described in Section 4.3.1, matching on the propensity score is equivalent to matching on the observed pretreatment characteristics of firms. Thus, if treatment assignment is ignorable when matching is done based on the pretreatment characteristics, it is ignorable when matching is done based on the propensity scores (Rosenbaum & Rubin, 1983).

However, it may be unreasonable to assume that unobservable variables play no role in the investment decision. It may also be the case that all the criteria that investors are able to observe are not observable to outsiders. In this study, where a rather small number of variables are used in the matching process, assuming conditional independence might be a longshot. Nonetheless, the use of PSM has ensured that there are no significant differences between the treatment and control units in the year before the acquisition with respect to some of the variables that are important for the investment decision. Although it is not enough to conclude that the relationship estimated in this study is causal, the use of PSM is an attempt to move one step closer to it by mitigating the self-selection bias.

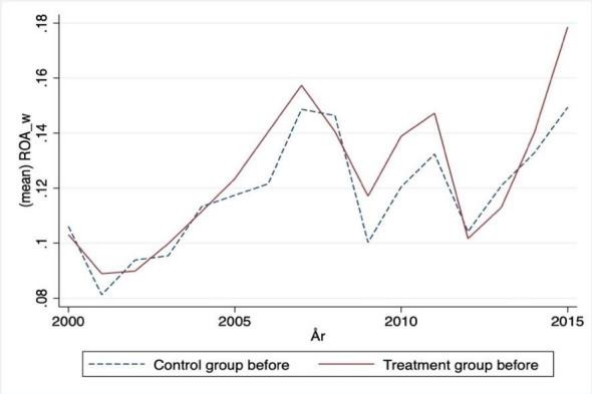
6.2.3 The parallel trends assumption

In order to get an unbiased estimate from the DiD regression, the parallel trends assumption needs to hold (Wooldridge, 2018, p.436). For this study, the identifying assumption implies that the treatment and control group would have had parallel trends in ROA, had it not been for the acquisition (Kausar et al., 2016). By using PSM, it is ensured that there are no systematic differences between the treatment and control group in the year before the acquisition with regards to the covariates that are determinant of the acquisition and may at the same time be correlated with ROA. Although it is not necessary that trends be parallel before the treatment for DiD to give an unbiased estimate, it is useful to see if there are any significant differences; if there are, one needs to think about why the trends would not continue to be different post-treatment (Egami & Yamauchi, 2019; Kahn-Lang & Lang, 2019; McKenzie, 2020).

To examine the pre-treatment differences, the level of the mean ROA for firm-years in the pre-treatment period are plotted for each group separately in Exhibit 3A. The graph shows that there are not any large differences in the level of ROA between the treatment and control group before the treatment. This is confirmed by the t-tests reported in Table B in Appendix 4. The table reports the results of testing the null hypothesis, year by year, that there is no difference in mean ROA for firm-years in the pre-treatment period between the treatment and control group. The differences are insignificant for all years. Drawing on Kausar et al. (2016), additional t-tests are performed based on the change in ROA (ROA growth) leading up to the acquisition to validate the parallel trends assumption. The null hypothesis of parallel trends is tested based on the change in ROA from 1, 2 and 3 years before the acquisition (see also Egami & Yamauchi,

2019). As the results in Exhibit 3B show, there are no significant differences in the pre-treatment trends for the two groups, which are consistent with the interpretation of the graph. These results validate the assumption that there is no significant difference in ROA development in the pre-treatment period between the treatment and control group.

Exhibit 3A. Graph of pretreatment parallel trend.



Note: The graph displays the mean ROA for firm-years in pre-treatment periods. The means are plotted separately for the treatment group and the control group. ROA is winsorized at the 1 st and 99 th percentile.

Exhibit 3B. T-tests for the pre-treatment parallel trends assumption

	$\overline{\Delta ROA}$ Control	$\overline{\Delta ROA}$ Treat	Diff. (Control- treat)	Std. Err.	T	P
$ROA_{i,t-1} - ROA_{i,t-2}$	0.003	-0.007	0.009	0.007	1.227	0.220
$ROA_{i,t-1} - ROA_{i,t-3}$	0.003	0.003	-0.000	0.010	-0.025	0.980
$ROA_{i,t-1} - ROA_{i,t-4}$	0.007	0.008	-0.002	0.011	-0.143	0.887

The table reports results for a series of t-tests for the pre-treatment trends in ROA between the treatment group and control group. The changes in ROA are calculated as the average change in ROA from 1, 2 and 3 years before the acquisition for the firms in the respective group. * p<0.05, ** p<0.01, *** p<0.001

However, the necessary assumption is that trends would have been parallel in the post-treatment period in the absence of the treatment. Failure to reject parallel trends in the pre-treatment period does not prove that this would be the case, but only suggests so (Kahn-Lang & Lang, 2019; McKenzie, 2020). Although it is impossible to test the validity of the post-treatment parallel trends assumption because it would require that the counterfactual outcome could be observed (Egami & Yamauchi, 2019), a number of measures are taken to make it more likely that the assumption holds. Drawing on Kausar et al. (2016), industry and year fixed effects are included to control for time varying trends in ROA at the industry level. Other firm level characteristics that are correlated with ROA (such as $Firm\_size$, $Leverage$ and

$Productivity$) are included in the model so that changes in these variables do not confound the relationship between the ownership change and post-acquisition performance. Furthermore, the model is estimated using firm fixed effects in order to control for firm-specific and time-invariant characteristics that may lead the trends in ROA to diverge (Kausar et al. 2016).

6.3 Reliability

The data used in this study is almost exclusively retrieved from the Serrano Database, which uses information from trusted organizations and authorities, and ensures that the data is of high quality. Retrieving information from mostly a single database allows one to avoid inconsistencies in the data from different providers. It is an established source for all companies registered in Sweden during 1998 and 2017. The sample selection procedure and the methods used have been outlined in detail to make this study replicable.

7. Limitations and suggestions for future research

Admittedly, this study is subject to several limitations, some regarding methods and others regarding results. They are presented here together with suggestions for future research.

Causality is a persistent concern in the study of ownership structure. In this study, PSM is applied to reduce the self-selection bias. It is combined with a DiD regression design to mitigate endogeneity due to unobserved effects. Despite these attempts, endogeneity cannot be assumed to have been eliminated. It is encouraged that future research further investigates the relationship by making use of natural experiments if possible, or other methods that deal with the endogeneity problem.

Regarding the findings of this study, one limitation is that the findings are only confined to private firms. Foreign ownership has drawn increasing attention from different fields since the trend of globalization. However, research has been largely concentrated on foreign shares in listed firms. To the best of our knowledge, little has been conducted on private firms partly due to the availability of data. The effect of ownership structure on firm performance in private firms can be largely different from public firms, thus more research on private firms is invited.

The other limitation is the choice of the performance measure. Operating profitability is proxied by ROA in this study as the main measurement of firm performance due to the limited scope of the study. However, there are other financial ratios to evaluate firm performance, such as efficiency, solvency and liquidity (Robinson et al., 2015, pp.313- 341). In the study of foreign ownership, other examples of performance measures that have been used are productivity and innovation (e.g. Bandick, 2011; Guadalupe et al., 2012; Karpaty, 2007). It is realized that a comprehensive evaluation of performance cannot rely on the simple mechanical interpretation of any single performance measure, such as ROA. Thus, it is suggested that future studies examine other measures of firm performance to provide a more comprehensive picture.

Finally, generalizability of the finding is another concern. The study is conducted on private firms in Sweden. It provides evidence that foreign ownership has an impact on firm performance in a specific country. However, the mixed empirical results outlined in the literature review section suggest that the effect of foreign ownership on firm performance can be country specific. Thus, one should be careful to generalize the findings to other countries.

8. Conclusion

Sweden is one of the countries where globalization has made its most pronounced mark (Jakobsson, 2007). Increased efforts to attract more FDI stems from the belief that it benefits the economy in general (De Mello, 1997; De Mello, 1999) and brings about positive effects on firm performance in terms of increased revenue and higher profitability (Business Sweden, 2019. p.4). This study investigates the impact of foreign ownership on firm performance. Abounding research explores the relationship between foreign ownership and firm performance, the firm characteristics that attract FDI and the effects of foreign acquisitions. However, different theories predict contradicting results and empirical findings are ambiguous.

In this study, two models are applied to data on Swedish private firms during the period 1998-2017. A static model is first used to test whether there is any difference between foreign owned firms and domestic firms in terms of profitability, and to what extent this relationship is due to different owner types. The results suggest a statistically significant, negative relationship between foreign ownership and firm performance. Following the examples of some recent studies (e.g. Bandick, 2011; Lindemanis et al., 2019; Weche Geluebcke, 2015), a more dynamic

approach is adopted to complement the understanding of the relationship. A PSM method and a DiD regression design are combined to study the change in firm performance following a foreign acquisition. The findings indicate that the key characteristics among target firms that attract foreign acquirers are firm size, productivity and asset intangibility. As to the post-acquisition performance, the results suggest that foreign acquisitions have a negative effect on a firm's profitability.

The results corroborate the previous findings from recent research on European firms where a negative effect is found (Lindemanis et al., 2019; Weche Geluebcke, 2013a). However, the findings are contradictory to previous research on Swedish manufacturing firms that mainly find positive or insignificant effects of foreign acquisitions on productivity (Bandick, 2011; Karpaty, 2007) and employment (Bandick & Karpaty, 2011). Thus, this study provides additional evidence on the impact of foreign acquisitions on target firms in Sweden and contributes to a deeper understanding of the implications of M&A FDI, which is of vital significance to policy makers and investors.

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Appendix

Appendix 1. Sample selection

Table A: Sample selection - Full Sample

Criteria	Effects	Sample size firm-year observations
Raw data from Serrano∗		11 285 261
Limited liability companies (aktiebolag)	-3 141 543	8 143 718
Less micro firms	-7 495 604	648 114
Less financial or real estate industry	-27 221	620 893
Less Missing industry code	-2450	618 443
Less listed firms∗∗	-2 842	615 601
Less tax-haven	-4 197	611 404
Less parent unknown state	-2 713	608 691
Less independent firms	-226 492	382 199
Less Swedish parent firms	-62 182	320 017
Less firms report consolidated∗∗∗	-43 791	276 226
Less missing financial information	-17 287	258 939
Total		258 939

Notes: ∗All data is retrieved from a single source: the Serrano database, except the information of listed firms. Serrano data is based on the company's own financial statement instead of the consolidated financial statement of the group. ∗∗ Information on listed firms is retrieved from Nasdaq OMX Stockholm. The information is used to eliminate listed firms from the sample. ∗∗∗ Information about which firms that at any point report consolidated financial statements is obtained from the dataset "bokslut.dta" in the Serrano database.

Table B: Sample selection - Sample pool

	Firm - year observations		Firms	
	Effect	Number	Effect	Number
Full sample		258 939		38 863
Less firms that change back to domestic	-10 384	248 555	-944	37 919
Less firms lack lagging financial data	-42 236	206 319	-6 159	31 760
Sample pool	- 52 620	206 319	-7 103	31 760
Treatment group		12 255		1 407

Table C. Sample selection - Probit Sample

Criteria	Effect	Firm-year observations
Sample pool		206 319
Less foreign firm-year observations*	-39 258	167 061
Probit sample		167 061

Note: *Except the year of the acquisition

Table D. Sample selection - Matched Sample

Criteria	Effect	Sample (firms)
Treatment group		1 407
Less firms acquired in 2017	-82	1 325
Control group ∗		1 325
Matched sample		2 650

Note: ∗Control group consists of domestic firms from the Sample pool that are matched to the treatment using the propensity score matching, with no replacement.

Appendix 2. Variable Definition

Table A. Variable definitions - Main Regression models

Variable	Description	Expected sign
ROA_t	Return on assets calculated as adjusted operating profit/loss after financial income divided by total assets.	
$Foreign$	Equals 1 for firm-years with controlling foreign owners and 0 otherwise.	+/-
$Change2F$	Equals 1 in the year when a firm is acquired by a foreign investor and 0 otherwise	+/-
$Firm\_size$	Natural logarithm of total assets. $ln(assets)$	+
$Leverage$	Total debt divided by total assets. $total\ debt/total\ assets$	+
$Productivity$	Natural logarithm of sales divided by number of employees. $ln(sales/n\ of\ employees)$	+
$Growth$	The revenues divided by the one year lag revenue. $revenue/revenue$	+/-
$Asset\_Intangibility$	Intangible fixed assets divided by total assets. $Intangible\ fixed\ assets/total\ assets$.	+

Notes: ROA ,Leverage, Growth, Asset_intangibility are winsorized at the 1st and 99th percentile. Firm_size is calculated as ln (assets+1) as natural logarithm needs to be positive and Productivity is calculated as ln(sales/n of employees +1) for the same reason.

Table B. Variable definitions - Probit model

Variable	Description	Expected sign
ROA_{t-1}	One-year lag of return on assets (adjusted operating profit/loss after financial income divided by total assets)	-
$Firm\_size_{t-1}$	One-year lag of the natural logarithm of total assets. $ln(assets)_{t-1}$	+
$Leverage_{t-1}$	One-year lag of total debt divided by total assets. $total\ debt_{t-1}/total\ assets_{t-1}$	+
$Productivity_{t-1}$	One-year lag of the natural logarithm of sales divided by number of employees. $ln(sales/n\ of\ employees)_{t-1}$	+
$Growth_t$	The revenues divided by the one year lag $revenue_t/revenue_{t-1}$	+/-
$Asset\_Intangibility_{t-1}$	One year lag of intangible fixed assets divided by total assets. $Intangible\ fixed\ assets_{t-1}/total\ assets_{t-1}$.	+

Note: ROA, Leverage, Growth, Asset_intangibility are winsorized at the 1st and 99th percentile. Firm_size is calculated as ln (assets+1) as natural logarithm needs to be positive and Productivity is calculated as ln(sales/n of employees +1) for the same reason.

Appendix 3. Sample distribution

Table A. Distribution of Matched Sample by year

Year	Frequency			Percent	Cum. Percent
	Firm sample	Treatment	Control		
2000	338	169	169	12.75	12.75
2001	188	94	94	7.09	19.85
2002	188	94	94	7.09	26.94
2003	84	42	42	3.17	30.11
2004	130	65	65	4.91	35.02
2005	100	50	50	3.77	38.79
2006	170	85	85	6.42	45.21
2007	230	115	115	8.68	53.89
2008	196	98	98	7.40	61.28
2009	70	35	35	2.64	63.92
2010	128	64	64	4.83	68.75
2011	120	60	60	4.53	73.28
2012	142	71	71	5.36	78.64
2013	66	33	33	2.49	81.13
2014	140	70	70	5.28	86.42
2015	166	83	83	6.26	92.68
2016	194	97	97	7.32	100.00
Total	2650	1325	1325	100	100.00

Note: The table shows the distribution of the firm sample that was used in regression model 2. The firm sample consists of a treatment group and a control group. The treated group are firms that switch to foreign owners, while control group are firms that remains to be domestic. Firms in the control group are matched using the nearest propensity score.

Appendix 4. Validity

Table A. VIF tests for multicollinearity of variables in model I.

Variables	VIF	SQRT-VIF	Tolerance	R-Squared
(1) Foreign	1.11	1.06	0.898	0.102
(2) Leverage	1.03	1.01	0.974	0.026
(3) Firm_size	1.47	1.21	0.679	0.321
(4) Growth	1.02	1.01	0.977	0.023
(5) Productivity	1.40	1.18	0.715	0.285
(6) Asset_intang	1.03	1.01	0.975	0.025
Mean VIF	1.18			

Note: Leverage, Growth, Asset_intang are winsorized at the 1st and 99th percentile.

Table B. T-tests of ROA for parallel trend assumption

Year	Diff ROA (control-treatment)	T	N
2000	0.003	(0.27)	949
2001	-0.008	(-0.61)	895
2002	0.004	(0.31)	852
2003	-0.004	(-0.36)	858
2004	0.002	(0.15)	821
2005	-0.006	(-0.51)	817
2006	-0.019	(-1.41)	777
2007	-0.009	(-0.64)	658
2008	0.006	(0.39)	561
2009	-0.017	(-1.02)	561
2010	-0.018	(-1.15)	504
2011	-0.015	(-0.88)	469
2012	0.003	(0.12)	400
2013	0.008	(0.36)	389
2014	-0.007	(-0.30)	299
2015	-0.029	(-0.86)	171

Notes: The table reports results for a series of t-tests for the difference in ROA between the treatment group and control group. The difference is calculated based on the average ROA for all firm-years that are in the pre-treatment period.
t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001