The effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure.

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Author: J.P. Voorburgh (375413)
Supervisor: Dr. V. Volosovych
Second Assessor: D.S. Bansraj
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Abstract

Multinational corporations use pyramidal ownership structures to enter new countries. The academic debate regarding these entries focuses on independent research of pyramidal ownership structures and cross-border ownership. I combine these two subjects and test the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure. Firstly, I focus on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company through an acquisition. The methodology of Arnold & Javorcik (2009) is used in which the propensity score matching procedure is combined with the difference-in-difference technique. I find no statistically significant difference in the performance measures: return on assets, profit margin, operating revenue and total of assets. Secondly, I compare the development in performance measures of domestic pyramidal owned companies with that of matching cross-border pyramidal owned companies. The propensity score matching procedure and the difference-in-difference technique are employed again. I find statistically significantly lower return on assets, lower profit margins and higher operating revenues in cross-border pyramidal owned companies. The total of assets and the number of employees are only statistically significantly higher in the long-term. The results show the different effects of foreign ownership on the company performance of pyramidal owned companies and the importance for multinational corporations to think about the way they enter new countries.

Keywords: Foreign ownership, Pyramidal ownership structures
JEL Classification: G32, G34

Preface and acknowledgements

During my first four years at the Erasmus School of Economics I combined the bachelor's degrees Economics & Business Economics and Fiscal Economics. I wrote a combined thesis for both specializations and challenged myself by using Matlab which I had not used before. The satisfaction after completing this challenge was the reason to write again about a challenging subject with a data-intensive interdisciplinary research and complicated empirical strategy. In addition, I wanted a subject that has not been researched much. I choose to test the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure. Measuring this effect and writing the thesis was a process of continuously improving myself, working hard and independently and demanding the most of myself. The findings of my thesis hopefully add new insights to the academic debates about the pyramidal ownership structure, cross-border ownership and the combination of the pyramidal ownership structure and cross-border ownership. Furthermore, the answer on the research question may be useful for multinational corporations in their decision how to enter new countries.

I want to thank several people for their help and faith in me during the writing process of my thesis.

Firstly, I would like to thank my supervisor Dr. Volosovych for his help and feedback regarding my master thesis.

Secondly, I would like to thank Dr. Javorcik, writer of Arnold & Javorcik (2009), who helped me with the construction of the improved version of the psmatch2 command. This command is very important in my empirical strategy.

Lastly, my gratitude goes to my family and especially to my parents. They always supported me in the decisions that I made during my time at the university. I am grateful for all the opportunities which they have offered me.

Jesse Voorburgh
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1. Introduction

In the last decades, the power and influence of multinational corporations on international and domestic trade has grown (Helpman, 1984). Multinational corporations grow through acquisitions in new countries and new markets. These acquisitions can be done: (i) directly by acquiring the majority of ownership or (ii) indirectly via a pyramidal ownership structure (Navaretti, Venables & Barry, 2004). The pyramidal ownership structure results in several benefits and costs for the company, the controlling shareholders and the minority shareholders in comparison with directly owned companies. Almeida & Wolfenzon (2006a) and Bena & Ortiz-Molina (2013) found evidence that the pyramidal ownership structure has an advantage in financing. The access to more capital increases the number of investments and has a positive effect on the company performance of the affiliate companies (Masulis, Pham & Zein, 2009). On the other hand, the agency costs increase due to a separation of ownership rights and control rights (Jensen & Meckling, 1976). In addition, there is a lack of effective external monitoring and less feedback regarding new investments (Mørck, Wolfenzon & Yeung, 2005). The agency costs, lack of effective external monitoring and less feedback regarding new investments negatively affect the company performance. The overall impact of the pyramidal ownership structure on the company performance remains a matter of academic debate without a clear answer. Multinational corporations combine the pyramidal ownership structure with foreign ownership. Foreign ownership may affect the company performance of the acquired companies. Arnold & Javorcik (2009) found significant improvements in productivity, number of investments, employment rate and wages after a change of ownership from domestic to foreign. However, Fons-Rosen, Kalemli-Ozcan, Sørensen, Villegas-Sanchez & Volosovych (2013) found no total productivity improvements from foreign direct investments. They do not rule out other positive effects of foreign direct investments such as supply of capital and improve risk-sharing. The combination of the pyramidal ownership structure and cross-border ownership is widely used by multinational corporations, because they can control companies with relatively low cash-flow rights due to a separation in control rights and cash-flow rights (Claessens, Djankov, Fan & Lang, 2002).

The research question of the study is based on the combination of the pyramidal ownership structure and cross-border ownership. Despite the fact that this combination is used more and more by multinational corporations, not much research has been done

yet. Furthermore, the independent effects of the pyramidal ownership structure and cross-border ownership on the company performance are not entirely clear. The research question of my thesis is therefore as follows:

What is the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure?

The research question is focused on corporate companies (multinational corporations) which are located in the European Union. The companies meet at least one of the following criteria: operating turnover equal or more than one million euros, total of assets equal or more than two million euros or number of employees equal or more than fifteen. In total five performance measures are tested as indicators of company performance: (i) return on assets, (ii) profit margin, (iii) operating revenue, (iv) total of assets and (v) number of employees. The latter four performance measures are tested to explain the possible difference in return on assets between companies with a domestic pyramidal ownership structure and companies with a cross-border pyramidal ownership structure. The answer to the research question hopefully adds new insights to the academic debates about the pyramidal ownership structure, cross-border ownership and the combination of the pyramidal ownership structure and cross-border ownership. In addition, the answer on the research question may be useful for multinational corporations in their decision how to enter new countries.

To answer the research question, I construct two empirical models. Firstly, I focus on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company. The methodology of Arnold & Javorcik (2009) is employed in which the propensity score matching procedure is combined with the difference-in-difference technique. The model is based on the difference in performance measures between companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal through an acquisition and the same companies if they had not experienced this change in ownership. The propensity score matching procedure is employed to create this latter group by finding a group of domestic pyramidal owned companies with the same observable characteristics as the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal. The dataset includes 53 companies which experienced a change of ownership from

domestic pyramidal to cross-border pyramidal and 7,306 companies with a domestic pyramidal ownership structure. After the matching procedure, the difference-in-difference technique is used to make the comparison between the performance measures of the cross-border pyramidal owned companies and the performance measures of the matching domestic pyramidal owned companies. In this empirical model four performance measures are tested: (i) return on assets, (ii) profit margin, (iii) operating revenue and (iv) total of assets. These variables are tested in the acquisition year, the year after the acquisition and two years after the acquisition. The performance measure number of employees is not tested, because there are too few companies which reported their number of employees. I find no statistically significant difference in return on assets, profit margin, operating revenue and total of assets between the cross-border pyramidal owned companies and the domestic pyramidal owned companies in the three time periods.

Secondly, I focus on a comparison between the development of the performance measures of domestic pyramidal owned companies and the development of the performance measures of cross-border pyramidal owned companies. In this second empirical model, the propensity score matching procedure is combined with the difference-in-difference technique. The propensity score matching procedure is used to match the domestic pyramidal owned companies with cross-border pyramidal owned companies. The dataset includes 3,496 companies with a domestic pyramidal ownership structure and 8,070 companies with a cross-border pyramidal ownership structure. After this, the difference-in-difference technique is employed in which five performance measures are tested: (i) return on assets, (ii) profit margin, (iii) operating revenue, (iv) total of assets and (v) number of employees. In this empirical model, a base year has been chosen, because there is not a 'real' treatment, unlike the acquisitions in the first empirical model. The base year is 2009 and in total eight time periods from 2008 to 2016 are tested. I find statistically significantly lower return on assets and lower profit margins in companies owned by a cross-border pyramidal ownership structure than in companies owned by a domestic pyramidal ownership structure. This is in contrast with operating revenue which is statistically significantly higher in cross-border pyramidal owned companies than in domestic pyramidal owned companies. The total of assets and number of employees do not statistically significantly differ in the short-term, but are statistically significantly higher in cross-border pyramidal owned companies in the long-

term. The results of the second empirical model are tested on validity by a robustness check with two subsamples: (i) Great Britain and (ii) Spain. The results of the subsample Great Britain are partly in line with the results of the second empirical model. However, the results of the subsample Spain contradict the results of the second empirical model.

The thesis partially fills the gap in academic literature about the combined effect of the pyramidal ownership structure and cross-border ownership on the company performance. The findings are also important for multinational corporations in their decision how to enter a new country. When multinational corporations enter a new country by a pyramidal ownership structure, they now know the possible effects on the several performances measures.

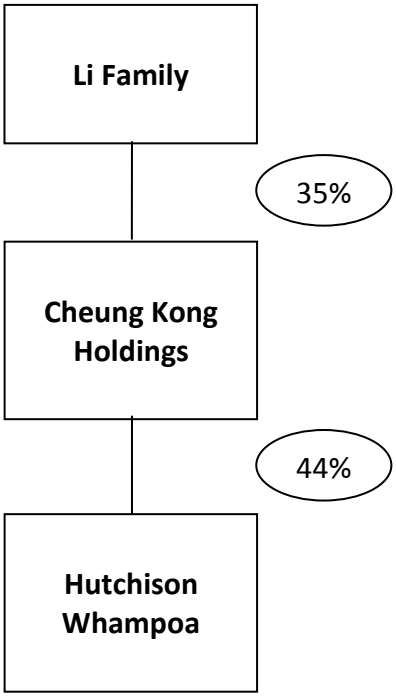
The structure of the thesis is divided into six chapters. In chapter two, the existing literature about pyramidal ownership structures and cross-border ownership is discussed. The following chapter explains the empirical model of acquired cross-border pyramidal owned companies and the empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies. In addition, the hypotheses regarding these models are formulated based on theories and existing empirical research. In chapter four, the data, time period and variables are described. The results of the two empirical models are presented in chapter five. I also perform a robustness check with two subsamples in this chapter. The last chapter consists of the summary, the conclusion, the implications, the limitations and the recommendations for further research.

2. Existing literature

Existing literature relating to the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure is based on independent research of the pyramidal ownership structure and cross-border ownership. La Porta, Lopez-de-Silanes & Shleifer (1999) describes the ownership structure of a company as a pyramid if: (i) the company has an ultimate owner, (ii) there is a publicly traded company (intermediate company) between the ultimate owner and the company and (iii) the company is owned by at least 20 percent of the voting rights. The ultimate owner controls the company with relatively low cash-flow rights due to a separation in control rights and cash-flow rights (Claessens, Djankov, Fan & Lang, 2002).

The following figure (Figure 1) is an example of a pyramidal ownership structure in Hong Kong (La Porta, Lopez-de-Silanes & Shleifer, 1999):

Figure 1 (La Porta, Lopez-de-Silanes & Shleifer, 1999)



The Li Family is the ultimate owner of both Cheung Kong Holdings and Hutchison Whampoa, but only Hutchison Whampoa is owned by a pyramidal ownership structure. The Li Family owns 15.4% ($35\% * 44\%$) of the cash-flow rights and 44% of the voting rights in Hutchison Whampoa. The voting rights are based on the significant level of voting rights (35%) in Cheung Kong Holdings. The Li Family has enough power with these voting rights to decide on the entire 44% voting rights in Hutchison Whampoa. Pyramidal ownership structures like this result in several benefits and costs for the company, the controlling shareholders and the minority shareholders.

Almeida & Wolfenzon (2006a) showed a relationship between the level of investor protection in a country and the choice for a pyramidal ownership structure. The pyramidal ownership structure is chosen in countries with poor investor protection. The pyramidal ownership structure is then more attractive, because of a pay-off advantage and a financing advantage (Almeida & Wolfenzon, 2006a). The pay-off advantage is higher in a pyramidal ownership structure due to shared security benefits between the controlling shareholders and the minority shareholders (Almeida & Wolfenzon, 2006a).

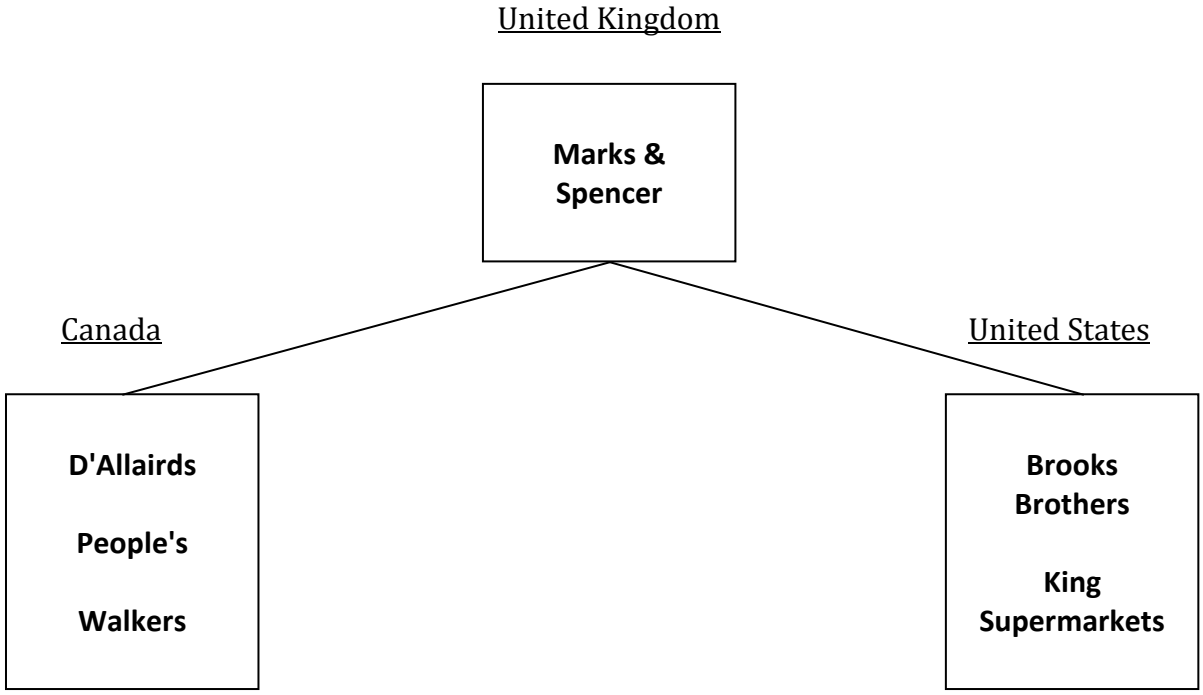
In addition, the controlling shareholders can use the complete retained earnings as internal funding for acquisitions and setting up new firms (financing advantage) (Almeida & Wolfenzon, 2006a). This study is supported by Bena & Ortiz-Molina (2013) who also showed that the pyramidal ownership structure has an advantage in terms of financing. The ultimate owners supply inside funds to their affiliates which have external financing constraints. Almeida & Wolfenzon (2006b) found that capital is even allocated internally when other projects outside the business group have higher productivity levels. The access to capital in a pyramidal ownership structure increases the number of investments and the company performance of the affiliate companies (Masulis, Pham & Zein, 2009). According to Gopalan, Nanda & Seru (2007), the internal capital markets in pyramidal ownership structures also facilitate risk-sharing and intra-group financial support. This avoids external capital constraints and financial distress risk. Furthermore, the company value of a company with a pyramidal ownership structure increases if the controlling shareholder has higher cash-flow rights (Claessens, Djankov, Fan & Lang, 2002).

On the other hand, the company value decreases when the control rights exceed the cash-flow rights of the controlling shareholder (Claessens, Djankov, Fan & Lang, 2002). This decline in value can be explained by the agency costs of a pyramidal ownership structure. The level of agency costs depends on the separation of ownership rights (cash-flow rights) and control rights of a company (Jensen & Meckling, 1976). The separation of ownership and control causes a potential conflict between the controlling shareholders and the minority shareholders (Mørck, Wolfenzon & Yeung, 2005). An example of such a conflict is the acquisition of a company. The stock price of the acquirer normally decreases in this case due to paying a premium for the company. This is a negative effect for the minority shareholders yet the controlling shareholders can profit from the acquisition due to value enhancements in the ultimate owner (Bae, Kang & Kim, 2002). The pyramidal ownership structure may also contribute towards the entrenchment of poor managers (Mørck, Wolfenzon & Yeung, 2005). In the pyramidal ownership structure, there is a lack of effective external monitoring of these managers and less feedback regarding new investments (Mørck, Wolfenzon & Yeung, 2005). In case of weak governance, poor managers may reduce the investment efficiency and company value of companies with a pyramidal ownership structure via favoritism (Duchin & Sosyura, 2013). In addition, Riyanto & Toolsema (2008) relates the pyramidal

ownership structure with tunneling which refers to a relocation of capital from companies at the end of the chain to the parent company. This tunneling hurts the minority shareholders and benefits the controlling shareholders. The agency costs, lack of effective external monitoring, less feedback regarding new investments and tunneling negatively affect the company performance.

The cross-border pyramidal ownership structure is affected by both the pyramidal ownership structure and cross-border ownership. Multinational corporations are companies which have ownership in at least one cross-border company (Navaretti, Venables & Barry, 2004). Multinational corporations can acquire these cross-border companies directly or indirectly via a pyramidal ownership structure. Navaratti, Venables & Barry (2004) distinguishes three types of cross-border ownership: (i) a foreign direct investment (FDI), (ii) a foreign affiliate and (iii) a foreign subsidiary. Cross-border ownership is a foreign direct investment if: (i) the acquiring company owns at least 10% of the ordinary shares and (ii) it has the intention to create a long-term relationship. A company is a foreign affiliate if the parent company directly or indirectly owns between 10 percent and 50 percent of the voting rights in the company. If the voting rights exceed the 50 percent level, the company is a foreign subsidiary. The following figure (Figure 2) is an example of the multinational corporation Marks & Spencer which entered the Canadian market by the cross-border acquisitions of D'Allairds, People's and Walkers in 1972 and the US market by acquisitions of Brooks Brothers and King Supermarkets in 1988 (Burt, Mellahi, Jackson & Sparks, 2002):

Figure 2 (Burt, Mellahi, Jackson & Sparks, 2002)



Marks & Spencer owns more than 50% of the voting rights in the daughter companies which means that the daughter companies are foreign subsidiaries of Marks & Spencer.

Cross-border ownership may affect the company performance of the parent company and the daughter companies. Arnold & Javorcik (2009) showed that foreign ownership leads to significant productivity improvements in the subsidiaries. In addition, they found a positive effect on the number of investments, the employment rate and the wages in the cross-border subsidiaries. The study is supported by Helpman, Melitz & Yeaple (2004) whose model predicts that the most productive companies participate in foreign direct investments. Their results are contradicted by Fons-Rosen, Kalemli-Ozcan, Sørensen, Villegas-Sanchez & Volosovych (2013) who did not find evidence that foreign direct investments lead to total productivity improvements. They do not rule out that foreign direct investments supply capital and improve risk-sharing. The possible outperformance in productivity can be explained by the transfer of superior technologies from the ultimate owner to its cross-border subsidiaries (Teece, 2008). This is supported by Chhibber & Majumdar (1999) who found evidence that the stake of foreign ownership is positively related to technology transfers. Another explanation for the outperformance of the cross-border subsidiaries is the selection of well performing acquisition targets (Guadalupe, Kuzmina & Thomas, 2012). Most entries

in new countries are through acquisitions which explains why the daughter companies are outperforming in terms of productivity.

My study contributes to the existing literature by combining the pyramidal ownership structure with cross-border ownership. Limited research has been done on this combination yet. The findings in my thesis hopefully fill this gap in the academic debate. The effect of foreign ownership in pyramidal ownership structures on several performance measures will be tested by two empirical models. In the following chapter, I will explain the two empirical models that are employed to test the research question. The methodology of Arnold & Javorcik (2009) is used in both empirical models. The first empirical model is based on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company through an acquisition. The second empirical model is based on a comparison of the development in performance measures between the domestic pyramidal owned companies and that of matching cross-border pyramidal owned companies. In addition, I will formulate the hypotheses based on theories and existing empirical research regarding the performance measures.

3. Empirical strategy

This chapter explains the methods that are employed in order to answer the research question. The empirical strategy relies on two pillars. Firstly, I focus on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company. This change of ownership takes place through an acquisition. The acquired company is matched with a domestic pyramidal owned company by using the propensity score matching procedure. After this, the difference-in-difference technique is employed to measure the effect on the performance measures. The change in the performance measures before and after the acquisition of the acquired company is compared with the change in the performance measures of the matching domestic pyramidal owned company in the same time period. The difference between the two above mentioned changes in performance measures is the effect of a change of ownership from domestic pyramidal to cross-border pyramidal within the same company on the performance measures. The methodology of Arnold & Javorcik (2009) is employed in the first empirical model. Secondly, I focus on a comparison between the development of the performance measures of domestic pyramidal owned companies and the development of the performance measures of cross-border pyramidal owned

companies. Propensity score matching is used to match the domestic pyramidal owned companies with cross-border pyramidal owned companies. After this, the difference-in-difference technique is employed to compare the development of the performance measures of the two groups over several time periods. This second empirical model has a larger dataset than the first empirical model. The reason for this is, that all cross-border pyramidal owned companies are included instead of only companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal.

3.1. Pyramidal ownership structures

Before constructing the empirical models, I will explain the input of the models. The first step is to separate the companies with a pyramidal ownership structure from the companies with a different ownership structure. I define the ownership structure of a company as a pyramid if: (i) it has an ultimate owner based on a benchmark of 25.01 percent, and (ii) there is at least one intermediate company in the control chain between the ultimate owner and the company (Köke, 1999; La Porta, Lopez-de-Silanes & Shleifer, 1999). An ultimate owner is the top of the chain and is itself not controlled by a controlling shareholder (Köke, 1999). In the pyramidal ownership structure the ultimate owner has control over the company, despite the fact that the ultimate owner may have a minority of the cash-flow rights. The chain of a pyramidal ownership structure is at least three companies; the ultimate owner, an intermediate company and a second-tier or lower subsidiary. In the simplest pyramidal ownership structure, the ultimate owner is the parent company, the intermediate company is the daughter company and the second-tier subsidiary is the granddaughter company.

The second step is to divide these pyramidal owned companies into two groups: (i) the domestic pyramidal owned companies, and (ii) the cross-border pyramidal owned companies. The pyramidal ownership structure is domestic if the ultimate owner and the second-tier subsidiary are located in the same country. Similarly, the pyramidal ownership structure is cross-border if the country of the ultimate owner differs from the country of the second-tier subsidiary. The location of the intermediate company has no influence on the type of pyramidal ownership structure.

3.2. Empirical model of acquired cross-border pyramidal owned companies

Two empirical models are employed to answer the research question. The first empirical model focuses on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company. This empirical model is based on three elements: (i) an acquisition which causes a change of ownership from domestic pyramidal to cross-border pyramidal, (ii) the difference-in-difference technique, and (iii) the propensity score matching procedure. The advantage of focusing on a comparison of the performance measures before and after a change of ownership within the same company is that a non-random treatment is used. The non-random treatment is the acquisition which causes a change of ownership from domestic pyramidal to cross-border pyramidal. A disadvantage of using this method is the reduction of the number of observations. Only a few companies with a cross-border pyramidal ownership have been formed through an acquisition.

3.2.1 Cross-border pyramidal acquisitions

The first element of the empirical model are acquisitions that caused a change in ownership from domestic pyramidal to cross-border pyramidal. In these acquisitions, the lowest level subsidiary has to be located in the same country as the vendor (ultimate owner) and in a different country than the acquirer (ultimate owner). The ultimate owner will change due to a stock transaction with a share change from below 25.01% to above 25.01%. Only acquisitions with an ultimate owner which is not a government or a person are relevant for my research.

3.2.2. Difference-in-difference technique

The second element is to employ the difference-in-difference technique to measure the causal effect (E) of a change in ownership from domestic pyramidal to cross-border pyramidal (CBPO) within the same company on the performance measure (PMI). This causal effect is defined as (Arnold & Javorcik, 2009):

$$E(PMI_1 - PMI_0 \mid_{CBPO=1}) = E(PMI_1 \mid_{CBPO=1}) - E(PMI_0 \mid_{CBPO=1}) \quad (1)$$

The equation (1) is based on the difference between the performance measure of the companies which experienced a change of ownership from domestic pyramidal to cross-

border pyramidal (PMI_1) and the performance measure of the same companies if they had not experienced this change in ownership (PMI_0) . The performance measure of a company has been measured in the acquisition case or in the non-acquisition case. It is impossible to measure both cases of the same company at the same moment in time. This makes the latter performance measure an unobserved counterfactual (Arnold & Javorcik, 2009). The propensity score matching procedure has been employed to create this missing counterfactual by finding a group of domestic pyramidal owned companies with the same observable characteristics (X) as the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal (Arnold & Javorcik, 2009). An important assumption of this method is that the observable characteristics, the performance measure of the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal and the performance measure of the domestic pyramidal owned companies are orthogonal to the change of ownership, given the observable covariates (Arnold & Javorcik, 2009):

$$(PMI_o, PMI_1) \perp CBPO \mid X \tag{2}$$

Equation (2) implies that both the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal and the domestic pyramidal owned companies perform similarly under equal circumstances (Arnold & Javorcik, 2009):

$$E\left(PMI_1 - PMI_0 \mid_{CBPO=1,X}\right) = \left(E\left(PMI_1 \mid_{CBPO=1,X}\right) - E\left(PMI_0 \mid_{CBPO=0,X}\right)\right) - \left(E\left(PMI_0 \mid_{CBPO=1,X}\right) - E\left(PMI_0 \mid_{CBPO=0,X}\right)\right) \tag{3}$$

This third equation is called the difference-in-difference (DiD) technique. The DiD technique consists of four groups and one treatment (Lechner, 2011). This treatment divides the observations into two groups: companies which are affected by the treatment (treated companies), and companies which are not affected by the treatment (non-treated companies or control group). The time period of the observations also divides the observations into two groups: before the treatment (pre-treatment), and after the treatment (post-treatment) (Lechner, 2011). These two splits create four groups in total: (i) post-treatment treated companies ($PMI_1 \mid_{CBPO=1,X}$), (ii) pre-

treatment treated companies ($PMI_0 \mid_{CBPO=0,X}$), (iii) post-treatment non-treated companies ($PMI_0 \mid_{CBPO=1,X}$), and (iv) pre-treatment non-treated companies ($PMI_0 \mid_{CBPO=0,X}$). The second group, pre-treatment treated companies, and the fourth group, pre-treatment non-treated companies, are companies which are almost the same in terms of observable characteristics, because of that they have the same notation. The DiD technique is based on the idea that an estimate of the effect of the treatment can be measured if the two groups of treated companies and the two groups of non-treated companies are subjected to the same time period (Lechner, 2011). The mean change of the performance measure for the non-treated companies in a certain time period is the normal effect and is compared with the change in the performance measure of the treated companies in exactly the same time period (Lechner, 2011). The difference between the changes of the performance measures is the causal effect of the treatment.

The DiD technique in this empirical model is based on four groups: (i) the companies after the change in ownership from domestic pyramidal to cross-border pyramidal (post-treatment treated companies), (ii) the same companies before the change in ownership from domestic pyramidal to cross-border pyramidal (pre-treatment treated companies), (iii) the domestic pyramidal owned companies after the change of ownership of the treated companies (post-treatment control group), and (iv) the domestic pyramidal owned companies before the change of ownership of the treated companies (pre-treatment control group) (Lechner, 2011). The treatment in this research is the change of ownership from domestic pyramidal to cross-border pyramidal through an acquisition.

3.2.3. Propensity score matching procedure

The third element of the empirical model is the propensity score matching procedure which is used to solve the problems of non-random sample selection in the DiD technique (Arnold & Javorcik, 2009). The propensity score matching procedure creates the missing counterfactual by selecting companies with similar observable characteristics as the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal. The matching procedure is based on the propensity score of a probit model. The selected companies form pairs with one of the companies which experienced a change of ownership from domestic pyramidal to cross-border pyramidal. These pairs are the input of the DiD technique. In the research, I use

an improved version[1] of the psmatch2 command of Leuven & Sianesi (2003) as propensity score matching procedure. This improved version first selects companies with the same financial year and with the same NACE Rev. 2. code before matching the companies based on the propensity score.

A probit model has been employed to determine the propensity score which is the input for the propensity score matching procedure. I construct a probit model of the binary outcome of a company being acquired by an ultimate owner with a cross-border pyramidal ownership structure. The observable characteristics age, return on assets (ROA), profit margin (PM), operating revenue (OR) and total of assets (TOA) are the starting point of the probit model. The variables ROA, PM, OR and TOA are based on one year before the acquisition, because the acquirer has only financial data of the year before the acquisition. The acquirer is mainly focused on a specific sector in a specific financial year. He makes the decision to acquire one company of all companies in this specific sector. Therefore, only domestic pyramidal owned companies with the same NACE Rev. 2. code and the same financial year as one of the companies which experienced a change of ownership are relevant for the probit model. The precision of the probit model increases by including only these companies.

3.2.4. Performance measures and hypotheses

The combination of the propensity score matching procedure and the difference-in-difference technique has been employed to test the hypotheses regarding the first empirical model. In this model, I will test four performance measures. These four performance measures are: return on assets (ROA), profit margin (PM), operating revenue (OR) and total of assets (TOA). The latter three performance measures will be tested to explain the possible effect of a change in ownership from domestic pyramidal to cross-border pyramidal on the return on assets. The performance measure number of employees is not tested, because there are too few companies which reported their number of employees. The effect on the performance measures is tested in three years: (i) year of the acquisition (t=0), (ii) one year after the acquisition (t=1), and (iii) two years after the acquisition (t=2). The performance measures in these years are compared with the performance measures in the year before the acquisition (t=-1) in

[1] Beata S. Javorcik, writer of Arnold & Javorcik (2009), helped me with the construction of this improved version of the psmatch2 command.

which the characteristics of the company are observable. The hypotheses regarding the four performance measures are based on theories and existing empirical research about foreign ownership, foreign direct investments and pyramidal ownership structures.

The internalization theory of Caves (1996) suggests that the higher costs which are involved by operating in other countries are compensated by the transfer of superior knowledge. The transfer of knowledge may lead to higher productivity and profitability in cross-border companies (Caves, 1996). The theory is supported by Goethals & Ooghe (1997) who found a significantly higher ROA after a foreign take-over than after a national take-over in Belgium. The first hypothesis is based on this finding and the theory of Caves (1996):

Hypothesis 1: The return on assets is significantly higher after a change of ownership from domestic pyramidal to cross-border pyramidal within the same company.

The internalization theory is contradicted by Aydin, Sayim & Yalama (2007). Aydin, Sayim & Yalama (2007) tested whether cross-border owned companies perform better in terms of profit margin than domestic owned companies in Turkey. They did not find significant evidence for this statement. The second hypothesis is based on this finding:

Hypothesis 2a: The profit margin does not significantly differ after a change of ownership from domestic pyramidal to cross-border pyramidal within the same company.

The productivity improvements due to the transfer of knowledge will lead to a higher revenue in cross-border companies. This is supported by Hu & Jefferson (2002) who found that multinational corporations which received a foreign direct investment (FDI) have higher sales revenues than domestic companies. The following hypothesis is based on this evidence and the theory of Caves (1996):

Hypothesis 2b: The operating revenue is significantly higher after a change of ownership from domestic pyramidal to cross-border pyramidal within the same company.

Arnold & Javorcik (2009) found that foreign acquisitions lead to significantly higher total investments and higher investments in machinery. These two findings will lead to a

higher total of assets in companies which are acquired by a cross-border company. The last hypothesis of the first empirical model is based on these two findings:

Hypothesis 2c: The total of assets is significantly higher after a change of ownership from domestic pyramidal to cross-border pyramidal within the same company.

I have chosen to test the hypotheses separately, even though they are more or less in line with each other. I made this choice, because foreign ownership may have different effects on the several performance measures.

3.3. Empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies

The second empirical model focuses on the comparison between the development of the performance measures of domestic pyramidal owned companies and the development of the performance measures of cross-border pyramidal owned companies. This empirical model is based on three elements: (i) the difference-in-difference technique, (ii) the propensity score matching procedure, and (iii) a base year which is the starting point of the comparison. The advantage of using this empirical model is the large dataset. This dataset is larger than the dataset of the first empirical model, because all cross-border pyramidal owned companies are included instead of only companies with a change of ownership from domestic pyramidal to cross-border pyramidal. A disadvantage of this empirical model is the randomly chosen time periods of the comparisons. The second empirical model does not have a 'real' treatment, unlike the acquisitions in the first empirical model.

3.3.1. Difference-in-difference technique

The first element is to employ the difference-in-difference (DiD) technique to measure the difference between the development of the performance measure of domestic pyramidal owned companies and the development of the performance measure of cross-border pyramidal owned companies. The DiD technique in this empirical model differs from the one of the first empirical model, because a comparison is made between two groups instead of comparing the performance measure before and after a treatment within the same company. The propensity score matching is used to

match the domestic pyramidal owned companies with cross-border pyramidal owned companies. This propensity score matching is based on observable characteristics (X) at the year before the base year. The DiD technique is defined as:

$$E\left(PMI_1 \mid_{DPO=1,X} - PMI_1 \mid_{DPO=0,X}\right) - E\left(PMI_0 \mid_{CBPO=1,X} - PMI_0 \mid_{CBPO=0,X}\right) =$$
$$\left(E\left(PMI_1 \mid_{DPO=1,X}\right) - E\left(PMI_1 \mid_{DPO=0,X}\right)\right) - \left(E\left(PMI_0 \mid_{CBPO=1,X}\right) - E\left(PMI_0 \mid_{CBPO=0,X}\right)\right) \qquad (4)$$

The DiD technique in this empirical model is based on four groups: (i) the companies with a domestic pyramidal ownership structure in time period 1 (post-treatment treated companies), (ii) the same companies with a domestic pyramidal ownership structure in time period 0 (pre-treatment treated companies), (iii) the companies with a cross-border pyramidal ownership structure in time period 1 (post-treatment control group), and (iv) the same companies with a domestic ownership structure in time period 0 (pre-treatment control group).

3.3.2. Propensity score matching procedure

The second element of the empirical model is the propensity score matching procedure which is used to solve the problems of non-random sample selection in the DiD technique (Arnold & Javorcik, 2009). The propensity score matching procedure matches the domestic pyramidal owned companies with cross-border pyramidal owned companies based on observable characteristics in time period 0. The matching procedure is based on the propensity score of a probit model. The selected cross-border pyramidal owned companies form pairs with the domestic pyramidal owned companies and are the input of the DiD technique. In this empirical model, I use again the improved version of the psmatch2 command of Leuven & Sianesi (2003) as propensity score matching procedure.

A probit model has been employed to determine the propensity score which is the input for the propensity score matching procedure. I construct a probit model of the binary outcome of being a domestic pyramidal owned company. The observable characteristics age, return on assets (ROA), profit margin (PM), operating revenue (OR), total of assets (TOA) and number of employees (EMP) are the starting point of the probit model. The variables ROA, PM, OR, TOA and EMP are based on one year before the base year, because I want to test the development of the performance measures from the

base year. The variable EMP has been included in this empirical model, because there are enough companies which reported their number of employees.

3.3.3. Base year

As mentioned before, this empirical model does not have a 'real' treatment. I have chosen financial year 2009 as base year for the comparison between the development of the performance measure of domestic pyramidal owned companies and the development of the performance measure of cross-border pyramidal owned companies. In the year before this base year, 2008, the companies are matched based on observable characteristics. Orbis is used to construct the datasets of the empirical models and provides information on company-level of the last ten financial closing dates. Most companies have 2016 or 2017 as last financial closing date. The companies with 2017 as last financial closing date have 2008 as first financial closing date. Therefore, the base year 2009 is chosen to have the maximum number of time periods.

3.3.4. Performance measures and hypotheses

The combination of the propensity score matching procedure and the difference-in-difference technique has been employed to test the hypotheses regarding the second empirical model. In this model, I will test the same performance measures as in the first empirical model. These four performance measures are return on assets (ROA), profit margin (PM), operating revenue (OR) and total of assets (TOA). I will also test the performance measure number of employees (EMP). The variables PM, OR, TOA and EMP are tested to explain the possible difference in return on assets between companies with a domestic pyramidal ownership structure and companies with a cross-border pyramidal ownership structure. The effect on the performance measures has been tested in eight time periods from 2008 to 2016 (t=-1 up to and including t=+7). The observable characteristics are based on one lagged year, 2008 (t=-1), which is the start of the eight time periods. The hypotheses regarding the five performance measures are based on theories and existing empirical research about foreign ownership, foreign direct investments and pyramidal ownership structures.

As mentioned in section 3.2.4., the internalization theory may explain why foreign subsidiaries of multinational corporations outperform in terms of productivity and profitability with respect to domestic companies (Caves, 1996). In 2007, Aydin, Sayim &

Yalama found evidence that cross-border owned companies perform better in terms of return on assets than domestic owned companies in Turkey. This is in line with the internationalization theory. The evidence is supported by Chhibber & Majumdar (1999) who found that the return on assets is higher under a higher level of foreign ownership, in India. My third hypothesis is based on these findings and the theory of Caves (1996):

Hypothesis 3: The return on assets is significantly higher in companies with a cross-border pyramidal ownership structure than in companies with a domestic pyramidal ownership structure.

The internalization theory is contradicted by Aydin, Sayim & Yalama (2007). Aydin, Sayim & Yalama (2007) also tested the influence of foreign ownership on the profit margin. They did not find any evidence that foreign ownership leads to significant higher profit margins. Hypothesis 4a is based on this finding:

Hypothesis 4a: The profit margin of companies with a cross-border pyramidal ownership does not significantly differ from the profit margin of companies with a domestic pyramidal ownership structure.

The internalization theory suggests a higher productivity in foreign owned companies. A higher productivity will lead to higher operating revenues. Hu & Jefferson (2002) found empirical evidence that multinational corporations which received a foreign direct investment (FDI) have higher sales revenues than domestic companies. The following hypothesis is based on this evidence and the theory of Caves (1996):

Hypothesis 4b: The operating revenue is significantly higher in companies with a cross-border pyramidal ownership structure than in companies with a domestic pyramidal ownership structure.

Arnold & Javorcik (2009) found evidence that foreign acquisitions lead to significantly higher total investments and higher investments in machinery. These two findings will lead to a higher total of assets in cross-border owned companies. The following hypothesis is based on these two findings:

Hypothesis 4c: The total of assets are significantly higher in companies with a cross-border pyramidal ownership structure than in companies with a domestic pyramidal ownership structure.

The last hypothesis is also based on research by Arnold & Javorcik (2009). They found evidence that foreign ownership increases the number of employees::

Hypothesis 4d: Companies with a cross-border pyramidal ownership structure have significantly more employees than companies with a domestic pyramidal ownership structure.

4. Data

This chapter presents the datasets which have been used as input for the empirical models. The datasets are panel data consisting of several companies with observations over multiple time periods. The companies in the datasets are corporate companies and are located in the European Union. The datasets have been constructed using the maximum number of available financial years of the companies on Orbis. These companies have an ultimate owner, domestic or foreign, with at least one company between the ultimate owner and themselves. As explained in chapter three, a combination of the propensity score matching procedure and the difference-in-difference technique is used to test the hypotheses. The most important variables to test these hypotheses are return on assets (ROA), profit margin (PM), total of assets (TOA), operating revenue (OR) and number of employees (EMP).

4.1. Location, sector and size

I focus on a homogeneous sample of 28 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. The European Union has a decent level of pyramidal ownership and is therefore a good starting point to test my hypotheses (Faccio & Lang, 2002).

In the research, I concentrate on multinational corporations and exclude banks, financial companies, insurance companies and other investment-related companies. The companies and ultimate owners in the dataset are corporate companies. These companies are sorted by sectors of NACE Rev. 2. code which is a statistical classification of economic activities in the European Union (European Commission, 2006). The datasets include 19 sectors of the NACE Rev.2. code. The sector is the only categorical variable in the datasets.

The companies in the dataset are medium, large or very large companies. Companies get the above mentioned classification in Orbis if they meet at least one of the following criteria: operating turnover equal to or above one million euros, total of assets equal to or above two million euros or number of employees equal to or above fifteen.

4.2. Time period

Orbis provides information on company-level of the last ten financial closing dates. These financial closing dates vary per company. The datasets contain the maximum number of available financial years per company on Orbis. The time period in the dataset for the empirical model of acquired cross-border pyramidal owned companies spans from 1993 to 2017. The time period in the dataset for the empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies spans from 2008 to 2016 with financial year 2009 as the base year. Companies without consecutive years have been excluded from the datasets.

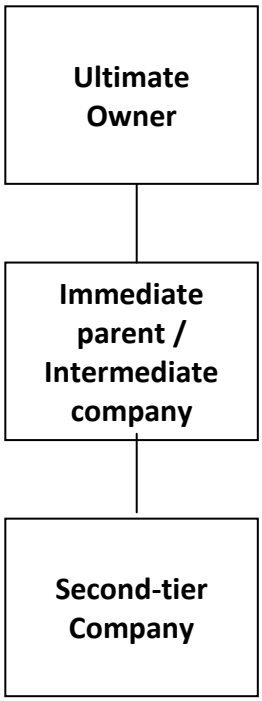
4.3. Ownership

The companies in the datasets are owned by a global ultimate owner (GUO) which has at least 25.01 percent of the shares. A company is an ultimate owner if it has no identified shareholders or its shareholders' percentages are not known on Orbis. Governments, individual persons or families have been excluded as ultimate owners, because I focus on multinational corporations. The exact value of the 25.01 percent threshold does not matter much, because in 87 percent of the domestic pyramidal ownership structures the share is more than 75 percent, in 77 percent of the domestic pyramidal ownership structures the share is more than 95 percent and in 73 percent of the cases the share is at least 99 percent. Similarly for the cross-border pyramidal

ownership structures, in 93 percent of the cases the share is more than 75 percent, in 88 percent of the cases the share is more than 95 percent and in 86 percent of the cases the share is above 99 percent.

The pyramidal ownership structures are characterized by an immediate parent (ISH) of the second-tier company which is not the same company as the ultimate owner (Figure 3).

Figure 3



The companies with an unknown immediate parent have been excluded from the datasets. In double pyramidal ownership structures, the immediate parent is also owned by a pyramidal ownership structure. In these cases only the company with the lowest level in the chain of the pyramidal ownership structure has been included in the datasets to avoid double counting.

The cross-border pyramidal ownership structures have been checked for changes in ownership over time. Zephyr has been used to find acquisitions which causes a change of ownership from domestic pyramidal to cross-border pyramidal. These acquisitions are the input of the first empirical model.

4.4. Variables

The variables return on assets (ROA), profit margin (PM), total of assets (TOA), operating revenue (OR) and number of employees (EMP) have been used in the propensity score matching procedure and the difference-in-difference technique. The variables ROA and PM have been winsorized at a 1%-level to limit the extreme values. The natural logarithm of TOA, OR and EMP has been taken to make ratios of them. In total, there are 7,306 companies with a domestic pyramidal ownership structure and 12,659 companies with a cross-border pyramidal ownership structure in the European Union.

4.4.1. Empirical model of acquired cross-border pyramidal owned companies

In this empirical model two types of companies are distinguished: (i) domestic pyramidal owned companies and (ii) companies which have undergone a change of ownership from domestic pyramidal to cross-border pyramidal through an acquisition. Only companies which have undergone a change in ultimate ownership from domestic pyramidal to cross-border pyramidal which took place between 2009 and 2016 and have at least one observable year (0, +1 or +2) plus the lagged year (-1) have been taken into account. The 53 cross-border pyramidal owned companies that meet the requirements have been matched with one of the 7,306 companies with a domestic pyramidal ownership structure.

The descriptive statistics of the first empirical model are presented in Table 1. The number of matched pairs per outcome variable varies between 40 matched pairs to 51 matched pairs due to missing observations in the acquisitions cases. Only domestic pyramidal owned companies with a matching NACE Rev. 2. code and matching financial year with one of the 53 cross-border pyramidal owned companies have been included in the probit model.

4.4.2. Empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies

In the dataset of the second empirical model, two types of companies are distinguished: (i) domestic pyramidal owned companies and (ii) cross-border pyramidal owned companies. Only observations with 2009 as base year (t=0) and complete information from 2008 to 2016 (t=-1, t=0, t=+1, t=+2, t=+3, t=+4, t=+5, t=+6, t=+7) have

been taken into account. In total, 3,496 domestic pyramidal owned companies and 8,070 cross-border pyramidal owned companies are left in the dataset.

The descriptive statistics of the second empirical model are presented in Table 2. The domestic pyramidal owned companies serve as the treatment group and the cross-border pyramidal owned companies serve as the control group. I have matched the domestic pyramidal owned companies with cross-border pyramidal owned companies, because there are more cross-border pyramidal owned companies in the dataset.

5. Results

This chapter presents the findings of the empirical models of chapter three. The chapter has been divided into two sections. In the first section, I show the results of the empirical model of acquired cross-border pyramidal owned companies. The results are explained by existing literature. In addition, I will confirm or reject the hypotheses regarding this empirical model. In the second section, I show the results of the empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies. These results are also explained by existing literature. Furthermore, I either confirm or reject the hypotheses which are based on the second empirical model.

5.1.Results empirical model of acquired cross-border pyramidal owned companies

The results of the probit model of predicting a cross-border pyramidal acquisition indicate that companies acquired by an ultimate owner with a cross-border pyramidal ownership structure differ from companies with a domestic pyramidal ownership structure (Table 3). Firstly, the probit model suggests that companies with a lower return on assets are more likely to be acquired by an ultimate owner with a cross-border pyramidal ownership structure. The coefficient on this variable is not statistically significant. Secondly, companies with a lower profit margin are more attractive for ultimate owners with a cross-border pyramidal ownership structure. The coefficient of this variable is not statistically significant either. Furthermore, the probit model indicates that companies which are younger and larger in terms of assets have a higher chance of being acquired by an ultimate owner with a cross-border pyramidal

ownership structure. The coefficients of both age and total of assets are statistically significant (age under the 10%-level and total of assets under the 1%-level). In the variable total of assets are some large companies such as Tesco (Histogram 1). I have also tested a nonlinear effect of age, but this effect is not statistically significant. The last variable in the probit model is operating revenue, which shows that companies with a lower operating revenue are more likely to be acquired by an ultimate owner with a cross-border pyramidal ownership structure. The coefficient of this variable is not statistically significant.

The results of the probit model are the input for the propensity score matching procedure. In this matching procedure, one-to-one nearest neighbor matching is employed in which the cross-border pyramidal owned companies are matched with domestic pyramidal owned companies. In the following section, I will show the average difference in propensity score between the cross-border pyramidal owned companies and the domestic pyramidal owned companies within the matched pairs. The closer this number is to zero, the better the pairs are matched. After this, the difference-in-difference method is used to measure the difference in return on assets, profit margin, operating revenue and total of assets between the cross-border pyramidal owned companies and the domestic pyramidal owned companies. A z-test has been employed to test whether the differences between the cross-border pyramidal owned companies and the domestic pyramidal owned companies differ significantly from zero. The statistics in the difference-in-difference technique are bootstrapped with ten replications to validate the stability of the findings.

5.1.1. Return on assets

The first variable is return on assets, which is presented in Table 4. In the acquisition year, 51 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies are formed with a mean difference in propensity score of 0.0055 percentage point. The average return on assets of the cross-border pyramidal owned companies decreases from 2.45% in the pre-acquisition year to 0.71% in the acquisition year. The matching domestic pyramidal owned companies experience an increase in return on assets from 1.78% to 2.32% in the same time period. The average treatment effect on the treated company (ATT) is therefore -2.27 percentage point. The treatment effect is defined as:

$$TE = (ROA_{CBPO=1} - ROA_{CBPO=0}) - (ROA_{DPO=1} - ROA_{DPO=0}) \quad (5)$$

The return on assets of the companies which have undergone a change in ownership from domestic pyramidal to cross-border pyramidal would be 2.27 percentage point higher if they had retained the domestic pyramidal ownership structure.

One year after the acquisition, 48 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies are formed with a mean difference in propensity score of 0.0045 percentage point. The number of matched pairs is different than in the acquisition year due to a lower number of companies with available data in the year after the acquisition. The average return on assets of the cross-border pyramidal owned companies decreases from 1.73% in the pre-acquisition year to 0.92% in the year after the acquisition. In the same time period, the return on assets of the matching domestic pyramidal owned companies increases from 1.97% to 2.89%. The average treatment effect on the treated company (ATT) is -1.73 percentage point.

Two years after the acquisition, 41 cross-border pyramidal owned companies have been matched with domestic pyramidal owned companies. These matching pairs have a mean difference in propensity score matching of 0.0056 percentage point. The average return on assets of the cross-border pyramidal owned companies increases from 1.19% in the pre-acquisition year to 4.26% two years after the acquisition. The matching domestic pyramidal owned companies also experience an increase in return on assets ranging from 1.64% to 4.35% in the same time period. The average treatment effect on the treated company (ATT) is 0.36 percentage point.

A possible explanation for the negative treatment effects on the treated company in the acquisition year and one year later is the restructuring of the company after an acquisition. Arnold & Javorcik (2009) found evidence that plants acquired by foreign investors undergo a deep restructuring process. This restructuring process costs a lot and needs time before it positively affects the return on assets.

The treatment effects in the acquisition year, one year after the acquisition year and two years after the acquisition are not statistically significant. There is not a statistically significant difference in return on assets after the change of ownership from domestic pyramidal to cross-border pyramidal within the same company. Therefore, the first hypothesis of the research must be rejected.

5.1.2. Profit margin

The second variable is profit margin which is shown in Table 5. In total, 50 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies are formed in the acquisition year. These matching pairs have a mean difference in propensity score of 0.0054 percentage point. The cross-border pyramidal owned companies experience an increase in profit margin ranging from 2.17% in the pre-acquisition year to 2.99% in the acquisition year. In the same time period, the profit margin of the matching domestic pyramidal owned companies decreases from 1.57% to 1.19%. Therefore, the average treatment effect on the treated company (ATT) is 0.45 percentage point in the acquisition year.

One year after the acquisition, 47 cross-border pyramidal owned companies have been matched with domestic pyramidal owned companies. The mean difference in propensity score of these pairs is 0.0044 percentage point. The profit margin of the cross-border pyramidal owned companies decreases from 1.18% in the pre-acquisition year to 0.29% one year after the acquisition year. The matching domestic pyramidal owned companies experience an increase in profit margin of 1.57% to 3.49%. The average treatment effect on the treated company (ATT) is -2.80 percentage point in this time period.

Two years after the acquisition, 40 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies have been formed with a mean difference in propensity score of 0.0057 percentage point. The profit margin of the cross-border pyramidal owned companies rises from 1.07% in the pre-acquisition year to 4.60% two years after the acquisition year. In the same time span, the profit margin of the domestic pyramidal owned companies increases from 1.12% to 4.62%. The average treatment effect on the treated company (ATT) is 0.04 percentage point two years after the acquisition.

A possible explanation for the negative treatment effect in the first year after the acquisition is the increase in employment level and the increase in average wage level (Arnold & Javorcik, 2009). Arnold & Javorcik (2009) found evidence that plants acquired by foreign owners hire more employees and increase the average wage level during the first two years after the acquisition. Both the increase in employment level and the increase in average wage put the profit margin under pressure.

The treatment effects in the three years are not statistically significant. This means that there is not a statistically significant difference in profit margin after a change of ownership from domestic pyramidal to cross-border pyramidal within the same company. For that reason, hypothesis 2a of the research is supported.

5.1.3. Operating revenue

The third variable is operating revenue, presented in Table 6. The same number of companies is matched as with the variable return on assets. These 51 matched pairs have a mean difference in propensity score of 0.0055 percentage point. The operating revenue of the cross-border pyramidal owned companies decreases with 2% between the pre-acquisition year and the acquisition year. In the same time period, the operating revenue of the domestic pyramidal owned companies increases by 2.8%. The average treatment effect on the treated company (ATT) is -4.7%.

One year after the acquisition, 47 cross-border pyramidal owned companies have been matched with domestic pyramidal owned companies. These pairs have a mean difference in propensity score of 0.0044 percentage point. The cross-border pyramidal owned companies experience a decline in operating revenue of 4.3% during the period between the pre-acquisition year and one year after the acquisition. The operating revenue of the domestic pyramidal owned companies increases by 14.5% in the same time period. Therefore, the average treatment effect on the treated company (ATT) is -18.7%.

Two years after the acquisition, 41 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies have been formed with a mean difference in propensity score of 0.0056 percentage point. The cross-border pyramidal owned companies experience an increase in operating revenue of 4.2% between the pre-acquisition year and two years after the acquisition. In the same time period, the operating revenue of the domestic pyramidal owned company rises with 17.3%. The average treatment effect on the treated company (ATT) is - 13.0% in this time period.

The treatment effects on the treated company are negative in all three years. This negative effect decreases from the first year after the acquisition to the second year after the acquisition. A possible explanation for this is the restructuring of the company by the acquirer (Arnold & Javorcik, 2009). During the first two years after the acquisition, the acquirer focuses on the restructuring process instead of the operating revenue. This

empirical model contains too few observations to test a longer time span. In the second empirical model, I will test a longer time period to show the effects on the operating revenue in the long-term.

The treatment effects in the acquisition year, one year after the acquisition year and two years after the acquisition are not statistically significant. The difference in operating revenue between the cross-border pyramidal owned companies and the domestic pyramidal owned companies is not statistically significant. Therefore, hypothesis 2b of the research must be rejected.

5.1.4. Total of assets

The last variable is total of assets which is presented in Table 7. In the acquisition year, 51 matching pairs of cross-border pyramidal owned companies and domestic pyramidal owned companies are formed with a mean difference in propensity score of 0.0055 percentage point. The total of assets of the cross-border pyramidal owned companies decreases with 2.1% in the acquisition year. In the same year, the domestic pyramidal owned companies experience a decrease in total of assets of 1.6%. The average treatment effect on the treated company (ATT) is -0.6%.

One year after the acquisition, 48 cross-border pyramidal owned companies have been matched with domestic pyramidal owned companies. These matching pairs have a mean difference in propensity score of 0.0045 percentage point. The total of assets of the cross-border pyramidal owned companies increases with 8.4% between the pre-acquisition year and one year after the acquisition. The domestic pyramidal owned companies also experience an increase in total of assets with 4.9%. The average treatment effect on the treated company (ATT) is 3.5%.

Two years after the acquisition, 41 matching pairs have been formed with a mean difference in propensity score of 0.0056 percentage point. The total of assets of the cross-border pyramidal owned companies increases with 11.0% from the pre-acquisition year till two years after the acquisition. In the same time period, the total of assets of the domestic pyramidal owned companies increases with 4.2%. The average treatment effect on the treated company (ATT) is 6.8%.

The average treatment effect on the treated company increases through the years. A possible explanation for this is the increase in investments in machinery and other investments after a cross-border acquisition (Arnold & Javorcik, 2009). These two

findings of Arnold & Javorcik (2009) lead to a higher total of assets after a change of ownership from domestic pyramidal to cross-border pyramidal.

However, the three average treatment effects are not statistically significant. There is not a statistically significant difference in total of assets between the cross-border pyramidal owned companies and the domestic pyramidal owned companies. Hypothesis 2c of the research must be rejected therefore.

All the tested performance measures of the first empirical model are not statistically significant. In the probit model, I have mainly used variables which are also outcome variables in the difference-in-difference technique. The reason to include these variables is the importance to match well and the low number of other available variables on Orbis. The coefficients of the variables are not statistically significant in the probit model except for the variable total of assets. This may explain the statistically insignificant outcomes of the difference-in-difference technique. In addition, the dataset contains a low number of matched pairs, because of too few acquisitions with a change of ownership from domestic pyramidal to cross-border pyramidal. One outlier within the matched pairs can strongly affect the average treatment effect on the treated company. The second empirical model is employed to test the same performance measures within another empirical model and with a larger dataset. This empirical model tests the robustness of the findings of the first empirical model.

5.2. Results empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies

The second empirical model focuses on a comparison between the development of the performance measures of domestic pyramidal owned companies and the development of the performance measures of cross-border pyramidal owned companies. The results of the probit model of being a domestic pyramidal owned company are the input for the propensity score matching procedure and are presented in Table 8. The probit model suggests that companies with a higher return on assets are more likely to be a domestic pyramidal owned company than a cross-border pyramidal owned company. The coefficient on this variable is statistically significant under the 20%-level. Secondly, the probit model predicts that companies with a lower profit margin have a higher chance to be a domestic pyramidal owned company. The coefficient of profit margin is not statistically significant. Thirdly, companies which are

smaller in terms of total assets, larger in terms of employees and older are more likely to be a domestic pyramidal owned company. The coefficients of the variables total of assets and number of employees are statistically significant under the 1%-level and the coefficient of age is statistically significant under the 5%-level. In the variables total of assets and number of employees are some large companies such as Anheuser-Busch InBev (Histogram 2 & Histogram 3). I also used the variable age squared in the probit model to test whether age as nonlinear variable has explaining value. This variable is not statistically significant. The last variable in the probit model is operating revenue. The model suggests that companies with a higher operating revenue are more likely to be a domestic pyramidal owned company. Also the coefficient of operating revenue is not statistically significant.

The same methodology as in the first empirical model is employed. In the first empirical model, the company was treated with a change of ownership from domestic pyramidal to cross-border pyramidal through an acquisition. In the second empirical model, I compare the development of the performance measures of domestic pyramidal owned companies with the development of the performance measures of cross-border pyramidal owned companies after the base year.

5.2.1. Return on assets

The first tested variable of the second empirical model is return on assets, presented in Table 9. The difference in development of return on assets between the domestic pyramidal owned companies and the cross-border pyramidal owned companies is tested in eight time periods. In the first time period from 2008 to 2009, 3,486 matching pairs have been formed with a mean difference in propensity score of 0.08 percentage point. In the last time period from 2008 to 2016, 2,967 matching pairs have been formed with a mean difference in propensity score of 0.10 percentage point. The number of matching pairs in the other time periods are between 2,967 and 3,486 with a mean difference in propensity score of between 0.08 and 0.10 percentage point.

The findings show that domestic pyramidal owned companies have higher return on assets in all eight time periods. All time periods are statistically significant except for the fourth time period. In the first time period, the treatment effect on the treated company is 0.84 percentage point. This means that the return on assets is 0.84 percentage point higher in companies with a domestic pyramidal ownership structure than in matching

companies with a cross-border pyramidal ownership structure. The effect decreases from 0.84 to 0.23 percentage point during the first four years. In the last four years the effect increases again with a treatment effect of 0.64 percentage point in the last time period. In both, the short-term and the long-term, the return on assets is statistically significantly higher in companies with a domestic pyramidal ownership structure than in companies with a cross-border pyramidal ownership structure. The third hypothesis must be rejected therefore.

In the pyramidal ownership structure, the monitoring of managers and agency costs due to a separation in cash-flow rights and control rights are important for the return on assets. Douma, George & Kabir (2006) suggests that companies with a domestic corporate ownership have high monitoring incentives and the skills to act as good monitors. The parent companies in domestic pyramidal ownership structures are closer located to their granddaughter companies than the parent companies in cross-border pyramidal ownership structures. This affects the monitoring of the granddaughter companies and may explain the higher return on assets of domestic pyramidal owned companies.

5.2.2. Profit margin

The second tested variable is profit margin which is presented in Table 10. The number of matched pairs in the eight time periods varies from 3,486 in the first time period to 2,967 in the last time period. The matching pairs have a mean difference in propensity score of between 0.08 percentage point and 0.10 percentage point.

The results show that domestic pyramidal owned companies have higher profit margins than cross-border pyramidal owned companies except for the fourth time period. In the short term, the profit margins are 0.62, 0.35 and 0.93 percentage point higher in the time periods of 2008 till 2009, 2008 till 2010 and 2008 till 2011. These results are statistically significant. In the long-term, only the sixth and seventh time period are statistically significant. In these time periods, the profit margin is 0.54 percentage point and 0.50 percentage point higher in domestic pyramidal owned companies than in cross-border pyramidal owned companies. Hypothesis 4a is therefore rejected, because the profit margin is statistically significantly higher in domestic pyramidal owned companies than in cross-border pyramidal owned companies.

As explained in the previous section, the domestic pyramidal owned companies have high monitoring incentives and the skills to act as good monitors (Douma, George & Kabir, 2006). This will positively affect the profit margin and outweigh the positive effects of foreign ownership.

5.2.3. Operating revenue

The third variable is operating revenue, presented in Table 11. In the first time period between 2008 and 2009, 3,486 matching pairs of domestic pyramidal owned companies and cross-border pyramidal owned companies have been formed with a mean difference in propensity score of 0.08 percentage point. In the last time period from 2008 to 2016, 2,967 matching pairs have been formed with a mean difference in propensity score of 0.10 percentage point. The number of matched pairs and corresponding mean difference in propensity score of the other time periods are between the above mentioned numbers.

The operating revenue of domestic pyramidal owned companies is 0.2% lower than the operating revenue of cross-border pyramidal owned companies during the first time period. This difference in operating revenue is not statistically significant. The difference in operating revenue decreases from -2.0% in the second time period to -8.7% in the last time period. These findings are statistically significant. There is a small difference in operating revenue between the domestic pyramidal owned companies and the cross-border pyramidal owned companies in the short-term, but this difference increases over the years. Hypothesis 4b is supported by these findings.

Arnold & Javorcik (2009) found evidence that foreign ownership increases the total investments, the investments in machinery and the group of employees. These three points positively affect the operating revenue of cross-border pyramidal owned companies. The investments increase in the long-term and may explain why the difference in operating revenue increases to 8.7%.

5.2.4. Total of assets

The fourth variable is total of assets which is presented in Table 12. The number of matched pairs also varies from 3,486 in the first time period to 2,967 in the eight time period. The matching pairs have a mean difference in propensity score between 0.08 percentage point and 0.10 percentage point.

The time periods 2008-2009, 2008-2010 and 2008-2011 show a negative difference in total of assets between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. The difference varies between 0.9% and 1.6% which means that domestic pyramidal owned companies have a lower total of assets in the first three years. These results are not statistically significant. In the long-term the difference increases from 2.6% in the fourth time period to 10.2% in the last time period. These findings are statistically significant which indicate that cross-border pyramidal owned companies are larger in terms of total assets in the long-term. Hypothesis 4c is therefore supported.

A possible explanation for this are the higher total investments and more investments in machinery by foreign owners (Arnold & Javorcik, 2009). Arnold & Javorcik (2009) found evidence that foreign owners invest more than domestic owners. These findings can explain the higher total of assets in the long-term.

5.2.5. Number of employees

The last variable is the number of employees, presented in Table 13. In the first time period, 3,485 domestic pyramidal owned companies have been matched with cross-border pyramidal owned companies. The pairs have a mean difference in propensity score of 0.08 percentage point. In the last time period, 2,965 matching pairs are formed with a mean difference in propensity score of 0.10 percentage point. The number of matched pairs and the mean difference in propensity score of the other time periods vary between the above mentioned numbers.

In the first four time periods, there is not a statistically significant difference in number of employees between the domestic pyramidal owned companies and the cross-border pyramidal owned companies except for the third time period. This is in contrast with the long-term in which a difference is found between the number of employees in domestic pyramidal owned companies and the number of employees in cross-border pyramidal owned companies. The difference increases from 2.0% in the fifth time period to 6.9% in the last time period. The results show that the number of employees is statistically significantly higher in cross-border pyramidal owned companies than in domestic pyramidal owned companies in the long-term. Hypothesis 4d is therefore supported.

Arnold & Javorcik (2009) found evidence that plants acquired by foreign owners hire more employees and increase the average wage level. Arnold & Javorcik (2009) only tests the first two years, but this effect might be increasing through the years. I also find a higher operating revenue in cross-border pyramidal owned companies than in domestic pyramidal owned companies. A higher operating revenue can be achieved by hiring more employees which may explain the findings.

5.3. Robustness checks

In this section, I perform one robustness check with two subsamples to test the validity of the results of the second empirical model. The datasets of the empirical models include 28 countries. The countries with the most companies in the datasets are Great Britain and Spain. In the datasets, 2,996 companies are located in Great Britain and 1,668 companies are located in Spain. I will execute the difference-in-difference technique in combination with the propensity score matching procedure to test the difference in performance measures between the domestic pyramidal owned companies and cross-border pyramidal owned companies in these countries. In the first subsample, I only include companies which are located in Great Britain. In the second subsample, I only include companies which are located in Spain. I use the two subsamples to test the robustness of the findings of the second empirical.

5.3.1. Subsample - Great Britain

The first subsample contains 851 domestic pyramidal owned companies and 2,145 cross-border pyramidal owned companies (Table 14). The probit model suggests that companies with a lower total of assets and a higher number of employees are more likely to be a domestic pyramidal owned company (Table 15). The coefficients of these variables are statistically significant under the 1%-level and are in line with the findings of the second empirical model. The coefficients of the other tested variables are not statistically significant.

In Great Britain, the return on assets is higher in companies with a domestic pyramidal ownership structure than in companies with a cross-border pyramidal ownership structure in the short-term and long-term (Table 16). However, these results are not statistically significant except for the third time period. The performance measure profit margin shows the same results as the performance measure return on

assets and is statistically significantly higher in the third and fourth time period (Table 17). The performance measure operating revenue is statistically significantly lower in domestic pyramidal owned companies than in cross-border pyramidal owned companies in the short-term and long-term (Table 18). This is the same for the performance measures total of assets (Table 19). However, the coefficient of total of assets is only statistically significant in the short-term. The last tested variable is number of employees which does not show any statistically significant difference between the domestic pyramidal owned companies and the cross-border pyramidal owned companies (Table 20).

The results of the first subsample partly confirm the results of the second empirical model. The results of the performance measures return on assets, profit margin, operating revenue and total of assets are in line with the results of the first empirical model, but not all the results are statistically significant. On the other hand, the results of the performance measure number of employees show different results than the second empirical model.

5.3.2. Subsample - Spain

The second subsample is Spain and contains 616 domestic pyramidal owned companies and 1,042 cross-border pyramidal owned companies (Table 21). The probit model shows different results than the second empirical model and the first subsample (Table 22). The probit model predicts that companies with a lower return on assets, a lower operating revenue and a higher profit margin are more likely to be a domestic pyramidal owned company. The coefficients on these variables are statistically significant. The results are the opposite of the results of the second empirical model.

In Spain, the return on assets is higher in domestic pyramidal owned companies than in cross-border pyramidal owned companies, but none of them are statistically significant (Table 23). The results show higher profit margins in domestic pyramidal owned companies than in cross-border pyramidal owned companies in the short-term (Table 24). The coefficient of profit margin is statistically significant in the first and third time period. In the long term, the profit margin is lower in companies with a domestic pyramidal ownership structure than in companies with a cross-border pyramidal ownership structure, but these results are not statistically significant. The third performance measure, operating revenue, shows no statistically significant difference

between the two groups (Table 25). The performance measure total of assets is higher in domestic pyramidal owned companies than in cross-border owned companies in the short-term (Table 26). Only the third time period is statistically significant. In the long-term, the total of assets is lower in domestic pyramidal owned companies, but these results are not statistically significant. The last tested performance measure is number of employees which is higher in the domestic pyramidal owned companies than in the cross-border pyramidal owned companies except for the last time period (Table 27). The coefficients of the variable are not statistically significant except for the last time period.

The results of the second subsample contradict the results of the second empirical model and the first subsample. The country where the company is located may influence the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure.

6. Conclusion

Multinational corporations use pyramidal ownership structures to enter new countries. Despite the fact that the combination of pyramidal ownership structures and cross-border ownership is used more and more by multinational corporations, not much research has been done yet. Previous literature relating to this combination is based on independent research of the pyramidal ownership structure and cross-border ownership. The objective of my thesis is therefore to test the effect of foreign ownership on the company performance of companies with a pyramidal ownership structure. The findings are important for multinational corporations in the way they enter new countries. The objective has been tested in two ways.

Firstly, I have focused on a change of ownership from domestic pyramidal to cross-border pyramidal within the same company. The methodology of Arnold & Javorcik (2009) has been employed in which the propensity score matching procedure is combined with the difference-in-difference technique. Four performance measures have been tested in three time periods: (i) return on assets, (ii) profit margin, (iii) operating revenue and (iv) total of assets. The results of the variables return on assets, profit margin and operating revenue show negative treatment effects in several of the tested time periods. The negative treatment effects can be explained by the deep restructuring process, the increase in employment level and increase in average wage level after the

acquisition by a foreign owner (Arnold & Javorcik, 2009). However, the coefficients of the variables are not statistically significant. The findings of the variable total of assets show a positive treatment effect in all three time periods. A possible explanation for this is the increase in investments in machinery and other investments after a cross-border acquisition (Arnold & Javorcik, 2009). The coefficient of total of assets is also not statistically significant. In the first empirical model, no statistically significant differences have been found between the performance measures of a company which experienced a change of ownership from domestic pyramidal to cross-border pyramidal and the performance measures of a matching domestic pyramidal owned company. The dataset of the first empirical model contains a low number of matched pairs, because of too few acquisitions with a change of ownership from domestic pyramidal to cross-border pyramidal. The dataset of the second empirical model is larger and has a longer time period to test the same performance measures in another empirical strategy.

Secondly, I have focused on a comparison between the development of the performance measures of domestic pyramidal owned companies and the development of the performance measures of cross-border pyramidal owned companies. In this empirical model, the domestic pyramidal owned companies have been matched with cross-border pyramidal owned companies to measure the difference in performance measures between the two ownership structures over several time periods. I have employed the propensity score matching procedure in combination with the difference-in-difference technique. Five performance measures were tested: (i) return on assets, (ii) profit margin, (iii) operating revenue, (iv) total of assets and (v) number of employees. In this empirical model, a base year has been chosen, because there is not a 'real' treatment, unlike the acquisitions in the first empirical model. The base year in the empirical model is 2009 and in total eight time periods have been tested from 2008 to 2016. The first time period is from 2008 to 2009 and the last time period is from 2008 to 2016. The results of the variable return on assets show statistically significantly higher return on assets in companies with a domestic pyramidal ownership structure than in companies with a cross-border pyramidal ownership structure. The variable profit margin shows the same results as return on assets and is statistically significantly higher in companies with a domestic pyramidal ownership structure than in companies with a cross-border pyramidal ownership structure in the short-term and long-term. The results can be explained by the high monitoring incentives of domestic ownership

(Douma, George & Kabir, 2006). This may outweigh the positive effects of foreign ownership. The third tested variable is operating revenue which is statistically significantly higher in cross-border pyramidal owned companies after the first time period. The difference between the domestic pyramidal owned companies and the cross-border pyramidal owned companies increases through the years. In the long-term, the total of assets and number of employees are statistically significantly higher in cross-border pyramidal owned companies than in domestic pyramidal owned companies. A possible explanation for the results of the variables operating revenue, total of assets and number of employees are the higher total investments and the increase in workforce by foreign owners (Arnold & Javorcik, 2009).

Lastly, I performed one robustness check with two subsamples to test the validity of the results of the second empirical model. The subsamples are the countries with the most companies in the dataset: (i) Great Britain and (ii) Spain. The results of the subsample Great Britain are partly in line with the results of the second empirical model. The results of the subsample Spain contradict the results of the second empirical model. The country of the company may influence the effect of foreign ownership on the company performance of companies owned by a pyramidal ownership structure.

In conclusion, the results of the two empirical models show different effects of foreign ownership on the company performance of companies owned by a pyramidal ownership structure. In the first empirical model, there is not a statistically significant effect on the company performance. This is in contrast with the second empirical model which shows negative effects on the return on assets and the profit margin and positive effects on the operating revenue, total of assets and number of employees. The results are partly confirmed by the subsample Great Britain, but are contradicted by the subsample Spain. The thesis partially fills the gap in the academic literature about the combined effect of the pyramidal ownership structure and cross-border ownership on the company performance. The findings are also important for multinational corporations in their decision how to enter a new country. When multinational corporations enter a new country by a pyramidal ownership structure, it is important to know the possible effects on the several performance measures.

In my study there are several limitations which need to be mentioned. Firstly, the dataset of the first empirical model contains only 53 acquisitions. This small dataset may affect the statistical power of the first empirical model. Secondly, the base year in the

second empirical model has been randomly chosen and therefore the findings may be biased. Thirdly, the datasets of the empirical models only contain information about the last ten financial years. Orbis does not provide information for a longer time period. Furthermore, my findings may be biased due to the exclusion of companies with missing information in the last ten financial years. Lastly, the probit model is based on the variables return on assets, profit margin, operating revenue, total of assets, number of employees and age, because these variables are available on Orbis. Other variables such as number of investments and productivity are not included in the probit model. If these variables had been included, other pairs may have been matched.

In further research, the explanations of the results, which are now based on existing literature, could be examined. These variables are not available on Orbis, but maybe other resources could be used. In the robustness check, I found different effects of foreign ownership on the company performance of companies owned by a pyramidal ownership structure in Great Britain and Spain. Further research could examine the effect of a country on the company performance of cross-border pyramidal owned companies.

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8. Appendix

8.1. Descriptive statistics

Table 1: Descriptive statistics - Empirical model one

This table provides the descriptive statistics of 7,306 domestic pyramidal owned companies and 53 cross-border pyramidal owned companies.

	Observations	Mean	Std. dev	Minimum	Maximum
Return on Assets	73,521	5.66	12.20	-36.91	45.81
Profit margin	73,518	4.39	10.68	-35.57	41.72
ln(Total of Assets)	73,541	8.92	1.67	1.07	17.75
ln(Operating Revenue)	73,537	9.36	1.57	0.62	18.08
ln(Number of Employees)	73,184	3.75	1.50	0.00	13.03
Age	73,524	24	18	0	209
Financial year	73,544	2011	3	1993	2017
Total of Assets (in th $)	73,541	55,095	623,234	3	51,300,000
Operating Revenue (in th $)	73,537	63,986	789,398	2	71,400,000
Number of Employees	73,480	224	3,326	0	456,728

Table 2: Descriptive statistics - Empirical model two

This table provides the descriptive statistics of 3,496 domestic pyramidal owned companies and 8,070 cross-border pyramidal owned companies.

	Observations	Mean	Std. dev	Minimum	Maximum
Return on Assets	11,566	4.12	12.01	-37.75	40.83
Profit margin	11,566	3.59	10.57	-33.47	39.38
ln(Total of Assets)	11,566	10.16	1.36	2.96	18.54
ln(Operating Revenue)	11,566	10.61	1.22	2.31	17.80
ln(Number of Employees)	11,553	4.62	1.35	0	12.05
Age	11,565	24	20	0	287
Financial year	11,566	2009	0	2009	2009
Total of Assets (in th $)	11,566	99,618	1,162,056	19	113,000,000
Operating Revenue (in th $)	11,566	116,182	720,563	10	54,000,000
Number of Employees	11,566	314	2,148	0	171,163

8.2. Results - Empirical model of acquired cross-border pyramidal owned companies

Table 3: Probit model results of predicting a cross-border pyramidal acquisition

This table shows the results of the probit model of the binary outcome of a company being acquired by a cross-border pyramidal ownership structure. The coefficients of the variables indicate whether a company is more likely to be acquired by a cross-border pyramidal ownership structure. In addition, the table shows whether the variables significantly differ from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

	Coefficient	Standard Error	Z-score	Probability
Return on Assets$_{t-1}$	-0.0014	0.0063	-0.23	0.819
Profit Margin$_{t-1}$	-0.0049	0.0060	-0.82	0.414
ln(Total of Assets$_{t-1}$)	0.1786	0.0576	3.10	0.002****
ln(Operating Revenue$_{t-1}$)	-0.0670	0.0595	-1.13	0.260
ln(Age$_t$)	-0.5068	0.2597	-1.95	0.051**
(ln(Age$_t$))^2	0.0452	0.0470	0.96	0.337
Intercept	-2.8504	0.4342	-6.56	0.000****
No. of obs.	30,178			
Chi^2	34.88			
Prob > Chi^2	0.0000			
Pseudo R^2	0.0455			

Histogram 1: Frequency Total of Assets

The histogram displays the distribution of the variable Total of Assets.

Total of Assets (in th $)	Frequency
0	0
6,000,000	30,156
12,000,000	10
18,000,000	10
24,000,000	1
30,000,000	1
36,000,000	0
42,000,000	0
48,000,000	2
54,000,000	1

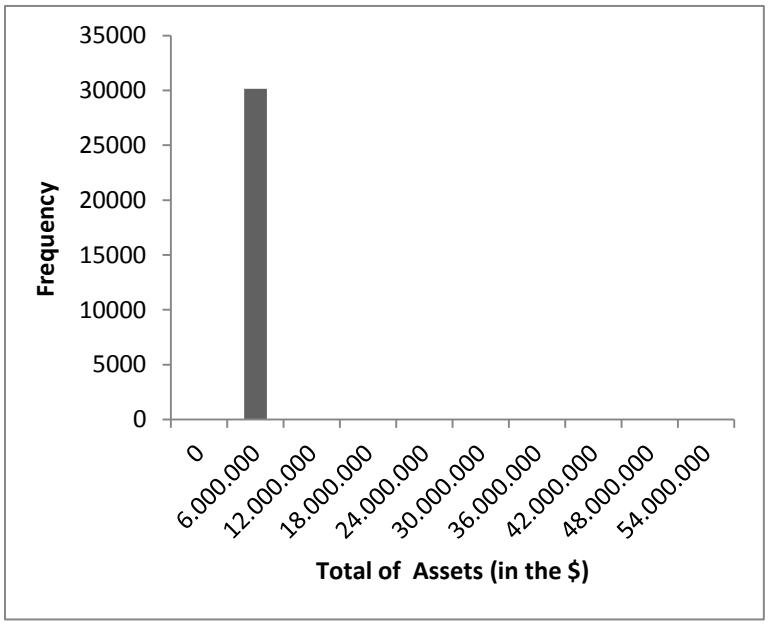


Table 4: Matching results for Return on Assets

This table shows the effect of a change of ownership from domestic pyramidal to cross-border pyramidal within the same company on the Return on Assets (ATT). A positive number indicates a positive effect on the return on assets after a change of ownership from domestic pyramidal to cross-border pyramidal. In addition, the table shows whether the effect significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Return on Assets	Pre-acquisition year	Acquisition Year
Cross-border pyramidal (Treatment)	2.445	0.710
Domestic pyramidal (Control)	1.784	2.317
ATT		**-2.268**
Z-score		-1.14
Probability		0.256
No. of matched pairs		51
Mean difference in propensity score		0.000055

Return on Assets	Pre-acquisition year	One year Later
Cross-border pyramidal (Treatment)	1.728	0.918
Domestic pyramidal (Control)	1.965	2.886
ATT		**-1.731**
Z-score		-0.80
Probability		0.422
No. of matched pairs		48
Mean difference in propensity score		0.000045

Return on Assets	Pre-acquisition year	Two years Later
Cross-border pyramidal (Treatment)	1.192	4.260
Domestic pyramidal (Control)	1.643	4.349
ATT		**0.362**
Z-score		0.10
Probability		0.919
No. of matched pairs		41
Mean difference in propensity score		0.000056

Table 5: Matching results for Profit Margin

This table shows the effect of a change of ownership from domestic pyramidal to cross-border pyramidal within the same company on the Profit Margin (ATT). A positive number indicates a positive effect on the profit margin after a change of ownership from domestic pyramidal to cross-border pyramidal. In addition, the table shows whether the effect significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Profit Margin	Pre-acquisition year	Acquisition year
Cross-border pyramidal (Treatment)	2.165	2.994
Domestic pyramidal (Control)	1.570	1.194
ATT		**0.453**
Z-score		0.23
Probability		0.821
No. of matched pairs		50
Mean difference in propensity score		0.000054

Profit Margin	Pre-acquisition year	One year later
Cross-border pyramidal (Treatment)	1.177	0.289
Domestic pyramidal (Control)	1.574	3.489
ATT		**-2.804**
Z-score		-0.66
Probability		0.510
No. of matched pairs		47
Mean difference in propensity score		0.000044

Profit Margin	Pre-acquisition year	Two years later
Cross-border pyramidal (Treatment)	1.065	4.603
Domestic pyramidal (Control)	1.123	4.620
ATT		**0.043**
Z-score		0.01
Probability		0.992
No. of matched pairs		40
Mean difference in propensity score		0.000057

Table 6: Matching results for Operating Revenue

This table shows the effect of a change of ownership from domestic pyramidal to cross-border pyramidal within the same company on the Operating Revenue (ATT). A positive number indicates a positive effect on the operating revenue after a change of ownership from domestic pyramidal to cross-border pyramidal. In addition, the table shows whether the effect significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Operating Revenue)	Pre-acquisition year	Acquisition year
Cross-border pyramidal (Treatment)	10.017	9.997
Domestic pyramidal (Control)	9.771	9.799
ATT		**-0.047**
Z-score		-0.93
Probability		0.352
No. of matched pairs		51
Mean difference in propensity score		0.000055

ln(Operating Revenue)	Pre-acquisition year	One year later
Cross-border pyramidal (Treatment)	10.028	9.985
Domestic pyramidal (Control)	9.535	9.680
ATT		**-0.187**
Z-score		-1.76
Probability		0.790
No. of matched pairs		47
Mean difference in propensity score		0.000044

ln(Operating Revenue)	Pre-acquisition year	Two years later
Cross-border pyramidal (Treatment)	9.992	10.034
Domestic pyramidal (Control)	9.634	9.807
ATT		**-0.130**
Z-score		-0.72
Probability		0.473
No. of matched pairs		41
Mean difference in propensity score		0.000056

Table 7: Matching results for Total of Assets

This table shows the effect of a change of ownership from domestic pyramidal to cross-border pyramidal within the same company on the Total of Assets (ATT). A positive number indicates a positive effect on the total of assets after a change of ownership from domestic pyramidal to cross-border pyramidal. In addition, the table shows whether the effect significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Total of Assets)	Pre-acquisition year	Acquisition year
Cross-border pyramidal (Treatment)	9.787	9.766
Domestic pyramidal (Control)	9.712	9.696
ATT		**-0.006**
Z-score		-0.08
Probability		0.934
No. of matched pairs		51
Mean difference in propensity score		0.000055

ln(Total of Assets)	Pre-acquisition year	One year later
Cross-border pyramidal (Treatment)	9.845	9.929
Domestic pyramidal (Control)	9.526	9.575
ATT		**0.035**
Z-score		0.48
Probability		0.632
No. of matched pairs		48
Mean difference in propensity score		0.000045

ln(Total of Assets)	Pre-acquisition year	Two years later
Cross-border pyramidal (Treatment)	9.935	10.045
Domestic pyramidal (Control)	9.655	9.697
ATT		**0.068**
Z-score		0.51
Probability		0.610
No. of matched pairs		41
Mean difference in propensity score		0.000056

8.3. Results - Empirical model of differences between domestic pyramidal owned companies and cross-border pyramidal owned companies

Table 8: Probit model results of being a domestic pyramidal owned company

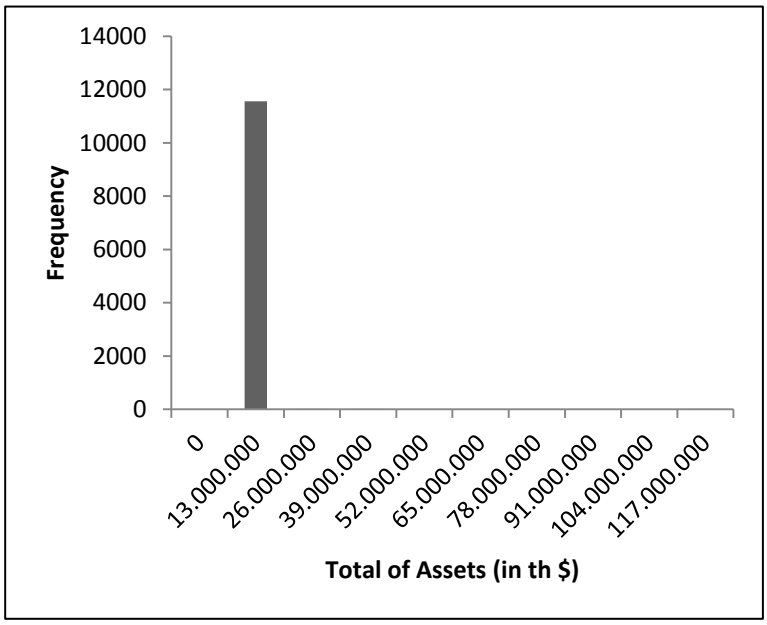
This table shows the results of the probit model of the binary outcome of a company being a domestic pyramidal owned company. The coefficients of the variables indicate whether a company is more likely to be a domestic pyramidal owned company. In addition, the table shows whether the variables significantly differ from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

	Coefficient	Standard Error	Z-score	Probability
Return on Assets$_{t-1}$	0.0024	0.0018	1.37	0.172*
Profit Margin$_{t-1}$	-0.0008	0.0021	-0.39	0.698
ln(Total of Assets$_{t-1}$)	-0.1505	0.0192	-7.84	0.000****
ln(Operating Revenue$_{t-1}$)	0.0178	0.0205	0.87	0.386
ln(Number of Employees$_{t-1}$)	0.0577	0.0119	4.85	0.000****
ln(Age$_t$)	0.1693	0.0848	2.00	0.046***
(ln(Age$_t$))^2	-0.0145	0.0147	-0.99	0.324
Intercept	0.1794	0.1604	1.12	0.263
No. of obs.	11,525			
Chi^2	171.98			
Prob > Chi^2	0.0000			
Pseudo R^2	0.0122			

Histogram 2: Frequency Total of Assets

The histogram displays the distribution of the variable Total of Assets.

Total of Assets (in th $)	Frequency
0	0
13,000,000	11,560
26,000,000	4
39,000,000	1
52,000,000	0
65,000,000	0
78,000,000	0
91,000,000	0
104,000,000	0
117,000,000	1



Histogram 3: Frequency Number of Employees

The histogram displays the distribution of the variable Number of Employees.

Number of Employees	Frequency
0	13
19,000	11,545
38,000	5
57,000	1
76,000	0
95,000	0
114,000	0
133,000	0
152,000	1
171,000	1

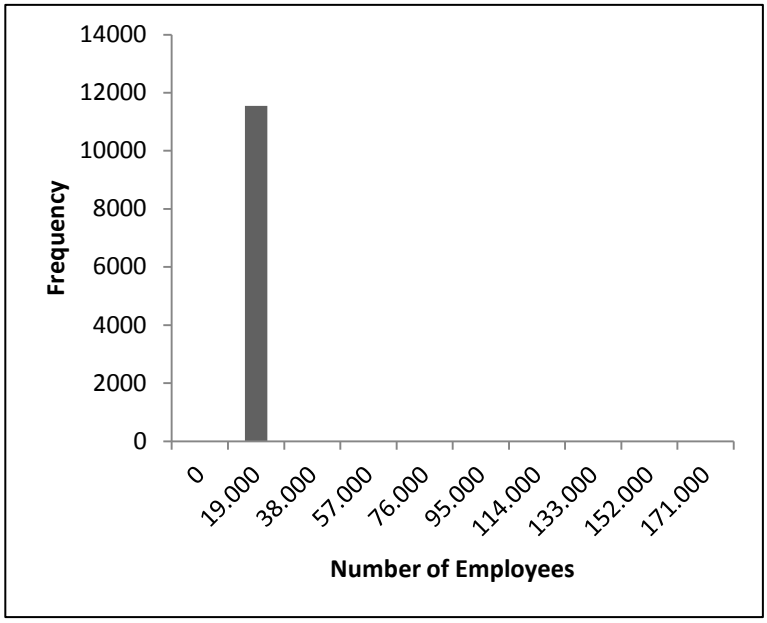


Table 9: Matching results for Return on Assets

This table shows the difference in Return on Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Return on Assets	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	6.069	5.056
Cross-border Pyramidal	6.433	4.580
ATT		**0.839**
Z-score		2.71
Probability		0.007****
No. of matched pairs		3486
Mean difference in propensity score		0.000804

Return on Assets	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	6.069	5.935
Cross-border Pyramidal	6.433	5.804
ATT		**0.494**
Z-score		1.46
Probability		0.145*
No. of matched pairs		3486
Mean difference in propensity score		0.000804

Return on Assets	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	6.072	5.839
Cross-border Pyramidal	6.426	5.712
ATT		**0.481**
Z-score		1.32
Probability		0.188*
No. of matched pairs		3484
Mean difference in propensity score		0.000804

Return on Assets	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	6.070	5.016
Cross-border Pyramidal	6.437	5.151
ATT		**0.231**
Z-score		0.70
Probability		0.483
No. of matched pairs		3480
Mean difference in propensity score		0.000805

Return on Assets	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	6.056	5.090
Cross-border Pyramidal	6.433	4.774
ATT		**0.693**
Z-score		1.69
Probability		0.092**
No. of matched pairs		3474
Mean difference in propensity score		0.000805

Return on Assets	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	6.079	5.955
Cross-border Pyramidal	6.467	5.563
ATT		**0.781**
Z-score		2.39
Probability		0.017***
No. of matched pairs		3461
Mean difference in propensity score		0.000814

Return on Assets	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	6.081	6.425
Cross-border Pyramidal	6.517	5.875
ATT		**0.986**
Z-score		2.80
Probability		0.005****
No. of matched pairs		3424
Mean difference in propensity score		0.000819

Return on Assets	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	6.436	6.602
Cross-border Pyramidal	6.625	6.153
ATT		**0.639**
Z-score		1.85
Probability		0.064**
No. of matched pairs		2967
Mean difference in propensity score		0.001008

Table 10: Matching results for Profit Margin

This table shows the difference in Profit Margin (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Profit Margin	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	4.707	3.901
Cross-border Pyramidal	5.274	3.851
ATT		**0.618**
Z-score		1.70
Probability		0.088**
No. of matched pairs		3486
Mean difference in propensity score		0.000804

Profit Margin	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	4.707	4.749
Cross-border Pyramidal	5.274	4.972
ATT		**0.345**
Z-score		1.52
Probability		0.128*
No. of matched pairs		3486
Mean difference in propensity score		0.000804

Profit Margin	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	4.709	4.767
Cross-border Pyramidal	5.266	4.393
ATT		**0.931**
Z-score		2.71
Probability		0.007****
No. of matched pairs		3484
Mean difference in propensity score		0.000804

Profit Margin	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	4.706	4.172
Cross-border Pyramidal	5.283	4.969
ATT		**-0.220**
Z-score		-0.64
Probability		0.524
No. of matched pairs		3480
Mean difference in propensity score		0.000805

Profit Margin	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	4.701	4.152
Cross-border Pyramidal	5.250	4.428
ATT		**0.273**
Z-score		1.01
Probability		0.312
No. of matched pairs		3474
Mean difference in propensity score		0.000805

Profit Margin	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	4.714	4.757
Cross-border Pyramidal	5.259	4.759
ATT		**0.544**
Z-score		3.25
Probability		0.001****
No. of matched pairs		3461
Mean difference in propensity score		0.000814

Profit Margin	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	4.706	5.127
Cross-border Pyramidal	5.256	5.175
ATT		**0.503**
Z-score		1.95
Probability		0.051**
No. of matched pairs		3424
Mean difference in propensity score		0.000819

Profit Margin	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	4.922	5.108
Cross-border Pyramidal	5.319	5.393
ATT		**0.112**
Z-score		0.32
Probability		0.750
No. of matched pairs		2967
Mean difference in propensity score		0.001008

Table 11: Matching results for Operating Revenue

This table shows the difference in Operating Revenue (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Operating Revenue)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	10.545	10.497
Cross-border Pyramidal	10.465	10.420
ATT		**-0.002**
Z-score		-0.25
Probability		0.802
No. of matched pairs		3486
Mean difference in propensity score		0.000804

ln(Operating Revenue)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	10.545	10.530
Cross-border Pyramidal	10.465	10.470
ATT		**-0.020**
Z-score		-2.50
Probability		0.012***
No. of matched pairs		3486
Mean difference in propensity score		0.000804

ln(Operating Revenue)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	10.545	10.597
Cross-border Pyramidal	10.466	10.544
ATT		**-0.026**
Z-score		-1.59
Probability		0.112*
No. of matched pairs		3484
Mean difference in propensity score		0.000804

ln(Operating Revenue)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	10.544	10.621
Cross-border Pyramidal	10.466	10.585
ATT		**-0.042**
Z-score		-4.07
Probability		0.000****
No. of matched pairs		3480
Mean difference in propensity score		0.000805

ln(Operating Revenue)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	10.543	10.669
Cross-border Pyramidal	10.467	10.650
ATT		**-0.057**
Z-score		-4.11
Probability		0.000****
No. of matched pairs		3474
Mean difference in propensity score		0.000805

ln(Operating Revenue)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	10.544	10.625
Cross-border Pyramidal	10.473	10.605
ATT		**-0.052**
Z-score		-2.91
Probability		0.004****
No. of matched pairs		3461
Mean difference in propensity score		0.000814

ln(Operating Revenue)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	10.544	10.568
Cross-border Pyramidal	10.468	10.563
ATT		**-0.070**
Z-score		-3.23
Probability		0.001****
No. of matched pairs		3424
Mean difference in propensity score		0.000819

ln(Operating Revenue)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	10.544	10.550
Cross-border Pyramidal	10.441	10.534
ATT		**-0.087**
Z-score		-2.70
Probability		0.007****
No. of matched pairs		2967
Mean difference in propensity score		0.001008

Table 12: Matching results for Total of Assets

This table shows the difference in Total of Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Total of Assets)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	9.965	9.974
Cross-border Pyramidal	9.924	9.941
ATT		**-0.009**
Z-score		-0.83
Probability		0.405
No. of matched pairs		3486
Mean difference in propensity score		0.000804

ln(Total of Assets)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	9.965	10.002
Cross-border Pyramidal	9.924	9.977
ATT		**-0.0155**
Z-score		-1.00
Probability		0.317
No. of matched pairs		3486
Mean difference in propensity score		0.000804

ln(Total of Assets)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	9.964	10.064
Cross-border Pyramidal	9.924	10.036
ATT		**-0.0125**
Z-score		-1.21
Probability		0.227
No. of matched pairs		3484
Mean difference in propensity score		0.000804

ln(Total of Assets)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	9.964	10.092
Cross-border Pyramidal	9.924	10.079
ATT		**-0.026**
Z-score		-1.93
Probability		0.053**
No. of matched pairs		3480
Mean difference in propensity score		0.000805

ln(Total of Assets)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	9.964	10.144
Cross-border Pyramidal	9.924	10.143
ATT		**-0.039**
Z-score		-2.55
Probability		0.011***
No. of matched pairs		3474
Mean difference in propensity score		0.000805

ln(Total of Assets)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	9.965	10.100
Cross-border Pyramidal	9.929	10.105
ATT		**-0.042**
Z-score		-2.60
Probability		0.009****
No. of matched pairs		3461
Mean difference in propensity score		0.000814

ln(Total of Assets)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	9.964	10.042
Cross-border Pyramidal	9.924	10.068
ATT		**-0.066**
Z-score		-5.18
Probability		0.000****
No. of matched pairs		3424
Mean difference in propensity score		0.000819

ln(Total of Assets)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	9.931	10.004
Cross-border Pyramidal	9.879	10.054
ATT		**-0.102**
Z-score		-6.70
Probability		0.000****
No. of matched pairs		2967
Mean difference in propensity score		0.001008

Table 13: Matching results for Number of Employees

This table shows the difference in Number of Employees (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Number of Employees)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	4.585	4.589
Cross-border Pyramidal	4.523	4.525
ATT		**0.001**
Z-score		0.20
Probability		0.845
No. of matched pairs		3485
Mean difference in propensity score		0.000804

ln(Number of Employees)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	4.585	4.607
Cross-border Pyramidal	4.523	4.545
ATT		**0.000**
Z-score		0.02
Probability		0.987
No. of matched pairs		3485
Mean difference in propensity score		0.000804

ln(Number of Employees)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	4.585	4.637
Cross-border Pyramidal	4.524	4.596
ATT		**-0.020**
Z-score		-1.55
Probability		0.122*
No. of matched pairs		3480
Mean difference in propensity score		0.000805

ln(Number of Employees)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	4.584	4.653
Cross-border Pyramidal	4.523	4.618
ATT		**-0.026**
Z-score		-1.06
Probability		0.287
No. of matched pairs		3478
Mean difference in propensity score		0.000806

ln(Number of Employees)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	4.585	4.667
Cross-border Pyramidal	4.524	4.626
ATT		**-0.020**
Z-score		-2.20
Probability		0.028***
No. of matched pairs		3472
Mean difference in propensity score		0.000806

ln(Number of Employees)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	4.585	4.680
Cross-border Pyramidal	4.527	4.651
ATT		**-0.029**
Z-score		-1.15
Probability		0.250
No. of matched pairs		3458
Mean difference in propensity score		0.000818

ln(Number of Employees)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	4.590	4.704
Cross-border Pyramidal	4.522	4.676
ATT		**-0.040**
Z-score		-2.48
Probability		0.013***
No. of matched pairs		3422
Mean difference in propensity score		0.000818

ln(Number of Employees)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	4.580	4.709
Cross-border Pyramidal	4.490	4.688
ATT		**-0.069**
Z-score		-5.38
Probability		0.000****
No. of matched pairs		2965
Mean difference in propensity score		0.001000

8.4. Results - Subsample Great Britain

Table 14: Descriptive statistics - Subsample Great Britain

This table provides the descriptive statistics of 851 domestic pyramidal owned companies and 2,145 cross-border pyramidal owned companies.

	Observations	Mean	Std. dev	Minimum	Maximum
Return on Assets	2,996	5.02	12.55	-38.70	41.07
Profit margin	2,996	4.73	11.92	-36.14	46.83
ln(Total of Assets)	2,996	10.42	1.38	6.10	17.22
ln(Operating Revenue)	2,996	10.83	1.27	6.75	17.80
ln(Number of Employees)	2,996	5.02	1.39	0	12.05
Age	2,996	27	23	2	135
Financial year	2,996	2009	0	2009	2009
Total of Assets (in th $)	2,996	140,127	807,021	448	30,100,000
Operating Revenue (in th $)	2,996	173,391	1,157,735	854	54,000,000
Number of Employees	2,996	543	3,526	1	171,163

Table 15: Probit model results of being a domestic pyramidal owned company

This table shows the results of the probit model of the binary outcome of a company being a domestic pyramidal owned company. The coefficients of the variables indicate whether a company is more likely to be a domestic pyramidal owned company. In addition, the table shows whether the variables significantly differ from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

	Coefficient	Standard Error	Z-score	Probability
Return on $Assets_{t-1}$	0.0036	0.0033	1.09	0.274
Profit $Margin_{t-1}$	0.0023	0.0037	0.61	0.539
ln(Total of $Assets_{t-1}$)	-0.1092	0.0373	-2.93	0.003****
ln(Operating $Revenue_{t-1}$)	0.0345	0.0401	0.86	0.390
ln(Number of $Employees_{t-1}$)	0.1969	0.0245	8.04	0.000****
ln(Age_t)	-0.1927	0.1684	-1.14	0.253
$(ln(Age_t))^2$	0.0293	0.0282	1.04	0.299
Intercept	-0.5538	0.3309	-1.67	0.094**
No. of obs.	2,996			
Chi^2	94.55			
Prob > Chi^2	0.0000			
Pseudo R^2	0.0265			

Table 16: Matching results for Return on Assets

This table shows the difference in Return on Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Return on Assets	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	6.962	6.298
Cross-border Pyramidal	7.349	6.265
ATT		**0.421**
Z-score		0.60
Probability		0.549
No. of matched pairs		849
Mean difference in propensity score		0.00446057

Return on Assets	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	6.962	6.680
Cross-border Pyramidal	7.349	7.121
ATT		**-0.054**
Z-score		-0.11
Probability		0.915
No. of matched pairs		849
Mean difference in propensity score		0.00446057

Return on Assets	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	6.967	7.194
Cross-border Pyramidal	7.347	6.348
ATT		**1.225**
Z-score		1.49
Probability		0.135*
No. of matched pairs		848
Mean difference in propensity score		0.00446142

Return on Assets	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	6.965	6.654
Cross-border Pyramidal	7.373	6.355
ATT		**0.71**
Z-score		0.82
Probability		0.412
No. of matched pairs		847
Mean difference in propensity score		0.00446464

Return on Assets	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	6.965	6.854
Cross-border Pyramidal	7.364	6.702
ATT		**0.551**
Z-score		0.94
Probability		0.350
No. of matched pairs		847
Mean difference in propensity score		0.00448536

Return on Assets	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	6.971	7.400
Cross-border Pyramidal	7.343	6.849
ATT		**0.923**
Z-score		0.86
Probability		0.388
No. of matched pairs		846
Mean difference in propensity score		0.00449031

Return on Assets	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	7.000	6.866
Cross-border Pyramidal	7.369	7.055
ATT		**0.181**
Z-score		0.27
Probability		0.786
No. of matched pairs		844
Mean difference in propensity score		0.00449955

Return on Assets	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	7.058	6.295
Cross-border Pyramidal	7.318	5.762
ATT		**0.793**
Z-score		0.55
Probability		0.585
No. of matched pairs		793
Mean difference in propensity score		0.00484881

Table 17: Matching results for Profit Margin

This table shows the difference in Profit Margin (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Profit Margin	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	6.245	5.519
Cross-border Pyramidal	6.222	5.502
ATT		**-0.006**
Z-score		-0.01
Probability		0.993
No. of matched pairs		849
Mean difference in propensity score		0.00446057

Profit Margin	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	6.245	6.408
Cross-border Pyramidal	6.222	6.088
ATT		**0.297**
Z-score		0.52
Probability		0.600
No. of matched pairs		849
Mean difference in propensity score		0.00446057

Profit Margin	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	6.248	7.184
Cross-border Pyramidal	6.220	6.122
ATT		**1.033**
Z-score		1.58
Probability		0.113*
No. of matched pairs		848
Mean difference in propensity score		0.00446142

Profit Margin	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	6.253	6.569
Cross-border Pyramidal	6.232	5.687
ATT		**0.862**
Z-score		1.61
Probability		0.108*
No. of matched pairs		847
Mean difference in propensity score		0.00446464

Profit Margin	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	6.253	6.693
Cross-border Pyramidal	6.208	5.932
ATT		**0.716**
Z-score		0.78
Probability		0.433
No. of matched pairs		847
Mean difference in propensity score		0.00448536

Profit Margin	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	6.259	7.040
Cross-border Pyramidal	6.201	5.967
ATT		**1.015**
Z-score		0.97
Probability		0.331
No. of matched pairs		846
Mean difference in propensity score		0.00449031

Profit Margin	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	6.282	6.818
Cross-border Pyramidal	6.224	6.214
ATT		**0.547**
Z-score		0.51
Probability		0.612
No. of matched pairs		844
Mean difference in propensity score		0.00449955

Profit Margin	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	6.436	6.708
Cross-border Pyramidal	6.145	5.784
ATT		**0.633**
Z-score		0.83
Probability		0.404
No. of matched pairs		793
Mean difference in propensity score		0.00485158

Table 18: Matching results for Operating Revenue

This table shows the difference in Operating Revenue (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Operating Revenue)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	11.039	10.969
Cross-border Pyramidal	11.080	11.052
ATT		**-0.041**
Z-score		-1.93
Probability		0.054**
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Operating Revenue)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	11.039	10.995
Cross-border Pyramidal	11.080	11.088
ATT		**-0.051**
Z-score		-2.41
Probability		0.016***
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Operating Revenue)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	11.038	11.077
Cross-border Pyramidal	11.079	11.161
ATT		**-0.042**
Z-score		-1.98
Probability		0.048***
No. of matched pairs		848
Mean difference in propensity score		0.00446142

ln(Operating Revenue)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	11.037	11.119
Cross-border Pyramidal	11.081	11.201
ATT		**-0.038**
Z-score		-1.04
Probability		0.299
No. of matched pairs		847
Mean difference in propensity score		0.00446464

ln(Operating Revenue)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	11.037	11.160
Cross-border Pyramidal	11.080	11.257
ATT		**-0.053**
Z-score		-1.71
Probability		0.086**
No. of matched pairs		847
Mean difference in propensity score		0.00448536

ln(Operating Revenue)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	11.038	11.218
Cross-border Pyramidal	11.082	11.281
ATT		**-0.019**
Z-score		-0.78
Probability		0.435
No. of matched pairs		846
Mean difference in propensity score		0.00449031

ln(Operating Revenue)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	11.037	11.152
Cross-border Pyramidal	11.083	11.241
ATT		**-0.042**
Z-score		-1.47
Probability		0.141*
No. of matched pairs		844
Mean difference in propensity score		0.00449955

ln(Operating Revenue)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	11.040	11.040
Cross-border Pyramidal	11.115	11.167
ATT		**-0.052**
Z-score		-1.28
Probability		0.200*
No. of matched pairs		793
Mean difference in propensity score		0.00485158

Table 19: Matching results for Total of Assets

This table shows the difference in Total of Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Total of Assets)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	10.551	10.503
Cross-border Pyramidal	10.594	10.591
ATT		**-0.045**
Z-score		-2.11
Probability		0.035***
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Total of Assets)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	10.551	10.555
Cross-border Pyramidal	10.594	10.654
ATT		**-0.056**
Z-score		-1.90
Probability		0.058**
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Total of Assets)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	10.551	10.668
Cross-border Pyramidal	10.592	10.744
ATT		**-0.034**
Z-score		-0.99
Probability		0.324
No. of matched pairs		848
Mean difference in propensity score		0.00446142

ln(Total of Assets)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	10.551	10.719
Cross-border Pyramidal	10.594	10.791
ATT		**-0.028**
Z-score		-0.98
Probability		0.326
No. of matched pairs		847
Mean difference in propensity score		0.00446464

ln(Total of Assets)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	10.551	10.779
Cross-border Pyramidal	10.595	10.871
ATT		**-0.048**
Z-score		-1.29
Probability		0.197*
No. of matched pairs		847
Mean difference in propensity score		0.00448536

ln(Total of Assets)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	10.552	10.866
Cross-border Pyramidal	10.597	10.914
ATT		**-0.003**
Z-score		-0.05
Probability		0.961
No. of matched pairs		846
Mean difference in propensity score		0.00449031

ln(Total of Assets)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	10.552	10.840
Cross-border Pyramidal	10.600	10.906
ATT		**-0.018**
Z-score		-0.43
Probability		0.667
No. of matched pairs		844
Mean difference in propensity score		0.00449955

ln(Total of Assets)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	10.556	10.754
Cross-border Pyramidal	10.638	10.878
ATT		**-0.042**
Z-score		-1.27
Probability		0.205
No. of matched pairs		793
Mean difference in propensity score		0.00484881

Table 20: Matching results for Number of Employees

This table shows the difference in Number of Employees (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Number of Employees)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	5.386	5.373
Cross-border Pyramidal	5.382	5.386
ATT		**-0.018**
Z-score		-1.03
Probability		0.302
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Number of Employees)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	5.386	5.371
Cross-border Pyramidal	5.382	5.391
ATT		**-0.025**
Z-score		-0.77
Probability		0.440
No. of matched pairs		849
Mean difference in propensity score		0.00446057

ln(Number of Employees)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	5.384	5.397
Cross-border Pyramidal	5.380	5.408
ATT		**-0.015**
Z-score		-0.98
Probability		0.325
No. of matched pairs		848
Mean difference in propensity score		0.00446142

ln(Number of Employees)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	5.388	5.418
Cross-border Pyramidal	5.383	5.425
ATT		**-0.012**
Z-score		-0.62
Probability		0.534
No. of matched pairs		847
Mean difference in propensity score		0.00446464

ln(Number of Employees)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	5.388	5.443
Cross-border Pyramidal	5.385	5.432
ATT		**0.008**
Z-score		0.26
Probability		0.796
No. of matched pairs		847
Mean difference in propensity score		0.00448536

ln(Number of Employees)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	5.388	5.458
Cross-border Pyramidal	5.386	5.448
ATT		**0.008**
Z-score		0.31
Probability		0.754
No. of matched pairs		846
Mean difference in propensity score		0.00449031

ln(Number of Employees)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	5.388	5.468
Cross-border Pyramidal	5.387	5.451
ATT		**0.016**
Z-score		0.45
Probability		0.652
No. of matched pairs		844
Mean difference in propensity score		0.00449955

ln(Number of Employees)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	5.382	5.465
Cross-border Pyramidal	5.403	5.493
ATT		**-0.007**
Z-score		-0.16
Probability		0.869
No. of matched pairs		793
Mean difference in propensity score		0.00484881

8.5. Results - Subsample Spain

Table 21: Descriptive statistics - Subsample Spain

This table provides the descriptive statistics of 616 domestic pyramidal owned companies and 1,042 cross-border pyramidal owned companies.

	Observations	Mean	Std. dev	Minimum	Maximum
Return on Assets	1,668	3.21	10.61	-32.62	34.11
Profit margin	1,668	3.20	11.62	-34.40	43.00
ln(Total of Assets)	1,668	10.26	1.32	5.23	16.81
ln(Operating Revenue)	1,668	10.56	1.16	5.85	15.12
ln(Number of Employees)	1,668	4.58	1.31	0	9.16
Age	1,668	23	16	2	109
Financial year	1,668	2009	0	2009	2009
Total of Assets (in th $)	1,668	105,724	682,263	187	20,000,000
Operating Revenue (in th $)	1,668	93,028	242,894	346	3,685,042
Number of Employees	1,668	245	602	1	9,546

Table 22: Probit model results of being a domestic pyramidal owned company

This table shows the results of the probit model of the binary outcome of a company becoming acquired by a cross-border pyramidal ownership structure. The coefficients of the variables indicate whether a company is more likely to be acquired by a cross-border pyramidal ownership structure. In addition, the table shows whether the variables significantly differ from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

	Coefficient	Standard Error	Z-score	Probability
Return on $Assets_{t-1}$	-0.0153	0.0052	-2.96	0.003****
Profit $Margin_{t-1}$	0.0082	0.0051	1.60	0.110*
ln(Total of $Assets_{t-1}$)	0.0429	0.0471	0.91	0.363
ln(Operating $Revenue_{t-1}$)	-0.1669	0.0513	-3.25	0.001****
ln(Number of $Employees_{t-1}$)	0.0219	0.0310	0.71	0.480
$ln(Age_t)$	0.1625	0.2531	0.64	0.521
$(ln(Age_t))^2$	-0.0272	0.0448	-0.61	0.543
Intercept	0.6996	0.4524	1.55	0.122*
No. of obs.	1,668			
Chi^2	32.64			
Prob > Chi^2	0.0000			
Pseudo R^2	0.0149			

Table 23: Matching results for Return on Assets

This table shows the difference in Return on Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Return on Assets	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	3.508	2.690
Cross-border Pyramidal	4.008	1.992
ATT		**1.199**
Z-score		1.25
Probability		0.212
No. of matched pairs		616
Mean difference in propensity score		0.00416321

Return on Assets	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	3.508	3.690
Cross-border Pyramidal	4.008	3.433
ATT		**0.758**
Z-score		1.27
Probability		0.202
No. of matched pairs		616
Mean difference in propensity score		0.00416321

Return on Assets	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	3.514	3.404
Cross-border Pyramidal	4.006	3.353
ATT		**0.543**
Z-score		0.79
Probability		0.432
No. of matched pairs		615
Mean difference in propensity score		0.00416873

Return on Assets	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	3.514	2.825
Cross-border Pyramidal	4.006	3.621
ATT		**-0.304**
Z-score		-0.45
Probability		0.654
No. of matched pairs		615
Mean difference in propensity score		0.00416873

Return on Assets	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	3.503	2.607
Cross-border Pyramidal	3.999	2.989
ATT		**0.114**
Z-score		0.16
Probability		0.869
No. of matched pairs		613
Mean difference in propensity score		0.00417685

Return on Assets	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	3.527	3.540
Cross-border Pyramidal	4.008	4.363
ATT		**-0.342**
Z-score		-0.35
Probability		0.726
No. of matched pairs		608
Mean difference in propensity score		0.00420771

Return on Assets	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	3.445	5.295
Cross-border Pyramidal	3.830	5.547
ATT		**0.133**
Z-score		0.24
Probability		0.811
No. of matched pairs		589
Mean difference in propensity score		0.00419056

Return on Assets	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	3.722	5.675
Cross-border Pyramidal	4.322	5.416
ATT		**0.860**
Z-score		0.98
Probability		0.328
No. of matched pairs		410
Mean difference in propensity score		0.0055406

Table 24: Matching results for Profit Margin

This table shows the difference in Profit Margin (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

Profit Margin	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	3.918	3.127
Cross-border Pyramidal	4.560	2.843
ATT		**0.965**
Z-score		1.51
Probability		0.130*
No. of matched pairs		616
Mean difference in propensity score		0.00416321

Profit Margin	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	3.918	4.263
Cross-border Pyramidal	4.600	4.187
ATT		**0.757**
Z-score		0.77
Probability		0.443
No. of matched pairs		616
Mean difference in propensity score		0.00416321

Profit Margin	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	3.927	4.203
Cross-border Pyramidal	4.592	3.707
ATT		**1.161**
Z-score		1.49
Probability		0.137*
No. of matched pairs		615
Mean difference in propensity score		0.00416873

Profit Margin	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	3.927	3.404
Cross-border Pyramidal	4.592	4.290
ATT		**-0.221**
Z-score		-0.28
Probability		0.779
No. of matched pairs		615
Mean difference in propensity score		0.00416873

Profit Margin	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	3.921	3.099
Cross-border Pyramidal	4.593	4.216
ATT		**-0.446**
Z-score		-0.74
Probability		0.457
No. of matched pairs		613
Mean difference in propensity score		0.00417685

Profit Margin	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	3.949	4.066
Cross-border Pyramidal	4.641	5.603
ATT		**-0.844**
Z-score		-0.84
Probability		0.401
No. of matched pairs		608
Mean difference in propensity score		0.00420771

Profit Margin	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	3.885	5.426
Cross-border Pyramidal	4.305	6.089
ATT		**-0.243**
Z-score		-0.32
Probability		0.752
No. of matched pairs		589
Mean difference in propensity score		0.00419056

Profit Margin	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	4.334	5.715
Cross-border Pyramidal	5.073	6.570
ATT		**-0.116**
Z-score		-0.11
Probability		0.913
No. of matched pairs		410
Mean difference in propensity score		0.0055406

Table 25: Matching results for Operating Revenue

This table shows the difference in Operating Revenue (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Operating Revenue)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	10.471	10.398
Cross-border Pyramidal	10.517	10.462
ATT		**-0.017**
Z-score		-0.91
Probability		0.363
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Operating Revenue)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	10.471	10.399
Cross-border Pyramidal	10.518	10.450
ATT		**-0.004**
Z-score		-0.15
Probability		0.885
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Operating Revenue)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	10.469	10.426
Cross-border Pyramidal	10.517	10.465
ATT		**0.009**
Z-score		0.35
Probability		0.727
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Operating Revenue)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	10.469	10.432
Cross-border Pyramidal	10.517	10.467
ATT		**0.013**
Z-score		0.34
Probability		0.732
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Operating Revenue)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	10.467	10.480
Cross-border Pyramidal	10.517	10.512
ATT		**0.018**
Z-score		0.48
Probability		0.632
No. of matched pairs		613
Mean difference in propensity score		0.00417685

ln(Operating Revenue)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	10.470	10.417
Cross-border Pyramidal	10.527	10.467
ATT		**0.006**
Z-score		0.15
Probability		0.878
No. of matched pairs		608
Mean difference in propensity score		0.00420771

ln(Operating Revenue)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	10.465	10.380
Cross-border Pyramidal	10.495	10.413
ATT		**-0.002**
Z-score		-0.05
Probability		0.960
No. of matched pairs		589
Mean difference in propensity score		0.00419056

ln(Operating Revenue)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	10.521	10.420
Cross-border Pyramidal	10.541	10.439
ATT		**0.000**
Z-score		0.00
Probability		0.997
No. of matched pairs		410
Mean difference in propensity score		0.0055406

Table 26: Matching results for Total of Assets

This table shows the difference in Total of Assets (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Total of Assets)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	10.142	10.170
Cross-border Pyramidal	10.241	10.272
ATT		**-0.004**
Z-score		-0.18
Probability		0.856
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Total of Assets)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	10.143	10.167
Cross-border Pyramidal	10.241	10.253
ATT		**0.012**
Z-score		0.64
Probability		0.523
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Total of Assets)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	10.141	10.183
Cross-border Pyramidal	10.241	10.243
ATT		**0.040**
Z-score		1.42
Probability		0.155*
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Total of Assets)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	10.141	10.173
Cross-border Pyramidal	10.241	10.242
ATT		**0.031**
Z-score		0.86
Probability		0.392
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Total of Assets)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	10.140	10.217
Cross-border Pyramidal	10.242	10.299
ATT		**0.021**
Z-score		0.46
Probability		0.645
No. of matched pairs		613
Mean difference in propensity score		0.00417685

ln(Total of Assets)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	10.144	10.122
Cross-border Pyramidal	10.256	10.269
ATT		**-0.034**
Z-score		-0.72
Probability		0.471
No. of matched pairs		608
Mean difference in propensity score		0.00420771

ln(Total of Assets)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	10.146	10.059
Cross-border Pyramidal	10.210	10.153
ATT		**-0.031**
Z-score		-0.58
Probability		0.560
No. of matched pairs		589
Mean difference in propensity score		0.00419056

ln(Total of Assets)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	10.197	10.072
Cross-border Pyramidal	10.295	10.190
ATT		**-0.020**
Z-score		-0.41
Probability		0.685
No. of matched pairs		410
Mean difference in propensity score		0.0055406

Table 27: Matching results for Number of Employees

This table shows the difference in Number of Employees (ATT) between the domestic pyramidal owned companies and the cross-border pyramidal owned companies. In addition, the table shows whether the difference significantly differs from zero. *,**,***,**** indicate the significance levels at 20%, 10%, 5% and 1%.

ln(Number of Employees)	2008 (pre-base year)	2009 (base year)
Domestic Pyramidal	4.520	4.510
Cross-border Pyramidal	4.590	4.582
ATT		**-0.003**
Z-score		-0.12
Probability		0.908
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Number of Employees)	2008 (pre-base year)	2010 (one year later)
Domestic Pyramidal	4.520	4.524
Cross-border Pyramidal	4.590	4.565
ATT		**0.028**
Z-score		1.01
Probability		0.311
No. of matched pairs		616
Mean difference in propensity score		0.00416321

ln(Number of Employees)	2008 (pre-base year)	2011 (two years later)
Domestic Pyramidal	4.518	4.541
Cross-border Pyramidal	4.588	4.584
ATT		**0.026**
Z-score		0.99
Probability		0.323
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Number of Employees)	2008 (pre-base year)	2012 (three years later)
Domestic Pyramidal	4.518	4.539
Cross-border Pyramidal	4.588	4.575
ATT		**0.033**
Z-score		0.64
Probability		0.519
No. of matched pairs		615
Mean difference in propensity score		0.00416873

ln(Number of Employees)	2008 (pre-base year)	2013 (four years later)
Domestic Pyramidal	4.515	4.539
Cross-border Pyramidal	4.595	4.589
ATT		**0.030**
Z-score		0.56
Probability		0.574
No. of matched pairs		613
Mean difference in propensity score		0.00417685

ln(Number of Employees)	2008 (pre-base year)	2014 (five years later)
Domestic Pyramidal	4.513	4.560
Cross-border Pyramidal	4.603	4.595
ATT		**0.054**
Z-score		1.23
Probability		0.218
No. of matched pairs		608
Mean difference in propensity score		0.00420771

ln(Number of Employees)	2008 (pre-base year)	2015 (six years later)
Domestic Pyramidal	4.527	4.608
Cross-border Pyramidal	4.578	4.639
ATT		**0.0188**
Z-score		0.39
Probability		0.695
No. of matched pairs		589
Mean difference in propensity score		0.00419056

ln(Number of Employees)	2008 (pre-base year)	2016 (seven years later)
Domestic Pyramidal	4.599	4.674
Cross-border Pyramidal	4.630	4.742
ATT		**-0.036**
Z-score		-1.37
Probability		0.170*
No. of matched pairs		410
Mean difference in propensity score		0.0055406