Foreign Private Equity Firms vs. Local Private Equity Firms

A comprehensive study analyzing deal-level operational value creation in private equity transactions worldwide, covering deals of all sizes and types from 1995-2012

By

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'Have not I commanded thee? Be strong and of a good courage; be not afraid, neither be thou dismayed: for the Lord thy God is with thee whithersoever thou goes'
Joshua 1:9

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Abstract

The recent collapse of V&D and the internationalization of the private equity industry led to fundamental questions about this industry. This thesis examines the possibility if there is a difference between foreign private equity firms and local private equity firms in value creation by increasing operational performance. A dataset of 324 portfolio companies from 1995 until 2012 is used together with an extraction of this dataset of 160 of the biggest portfolio companies. By the use of multiple regression analysis, I find strong evidence that on the long term, local private equity firms outperform foreign private equity firms based on operating performance. No evidence is found for the network theory and therefore this outperformance is explained by the information asymmetry theory. This means that the local private equity firms have a informational advantage over foreign private equity firms, which results in a better improvement of the operating performance of their portfolio companies.

Table of Contents

List of tables

List of figures

1. Introduction

Private equity investors are called the "secret multinationals of the new millennium." (Temple, 1999). Private equity firms are quite unknown firms with an extremely large amount of assets under management, these asset portfolios consist of companies and they are therefore called portfolio companies. Private equity is an asset class that consists of equity in companies that are not publicly traded.

The economic crisis from 2007 led to a huge global discussion about the financial sector, financial asset classes and incentives. Private equity firms came under a lot of public pressure, even from renowned magazines like Bloomberg and the Economist (Coy, 2012; Economist, 2012). Especially in the Netherlands, where over 10,000 people might lose their jobs because a big department store, V&D, was declared bankrupt. The owner of V&D was a private equity firm called Sun Capital from the United States (NOS, 2015). Also Bryan Burroughs famous book from the 1980's 'Barbarians at the gate' about the biggest leveraged buy-out (LBO) at the time, is often used in the discussions against private equity firms, their value creation and their 'greed'.

Despite all the critique, investors more than ever like to invest in private equity. The amounts private equity firms raised in the years 2013 until 2015 worldwide has been catching up with pre-crisis amounts. A big part of this development can be attributed to the decrease in interest rates by the US Federal Reserve and European Central Bank (Bain & Company, Inc., 2016). The low interest rates result in a search for return by investors. Looking to the Netherlands we see the same development, a record breaking amount of €3.5 billion of new capital was raised by Dutch private equity firms from their financial sponsors in 2015 (Brinker & Bosch, 2016). The total amount of new investments of private equity firms invested in the Netherlands in 2014 was €20.0 billion in 2,529 companies, from which €9.5 billion is invested by foreign private equity firms like in the case of V&D (NVP, 2015). This development isn't solely visible in the Netherlands but also in Europe. A report of Invest Europe shows that in Europe €31.0 billion of new investments locally and €13.1 billion of new investments cross-border were exercised by European private equity firms in 2015. Additionally, there was €3.3 billion of new investments in Europe by non-European private equity firms in 2015 (Europe Invest, 2016).

Private equity firms have a major influence on the economy, but there is an ongoing discussion about the value creation and incentives. Together with this discussion, a rise of private equity firms operating across borders is visible. In the academic literature there is no clarity about the difference between local private equity firms and foreign private equity firms. The research question of this thesis therefore is:

Do foreign private equity firms make a bigger impact on their portfolio companies than local private equity firms?

The remainder of the thesis is organized as follows. Section two discusses the academic literature. The third section introduces the hypotheses, followed by the fourth section with the construction of the variables and the estimation methods. The fifth section consists of the dataset and the sixth sections are the results and the discussion of these results and the seventh section will conclude this thesis.

2. Literature review

2.1 Private Equity Business

Private equity firms raise capital through a private equity fund. A private equity fund is raised among mostly institutional investors. Most of these funds are closed-end funds, investors commit their money for the entire life of the fund, usually ten years. In open-end funds there isn't a finite time period, these funds never close down. Investors therefore don't need to commit their money for the entire lifespan of the fund. Private equity firms have up to five years to invest the money and five to eight years to return the money from their investments to the investors (Kaplan & Strömberg, 2009). The size of the funds is massive, 175 funds were raised in 2015 with an average size of $900 million from which four funds were bigger than $5 billion (Bain & Company, Inc., 2016).

Private equity firms can use the funds for several investment strategies like venture capital, mezzanine capital and leveraged buyouts (LBO). A LBO is the most used strategy by private equity firms. This involves buying the majority of control of a company with a relatively small amount of equity and a relatively big amount of debt. The amount of equity, around 10 to 40 percent, is financed by a private equity fund. The remaining stake of around 60 to 90 percent, is financed trough debt from mainly banks. The debt almost always consists of both senior debt and junior debt like high-yield bonds (Kaplan & Strömberg, 2009). Investors are willing to take these risks by requiring a minimum internal rate of return (IRR) of 20%. The banks are willing to contribute the debt because the private equity firms have a big portfolio of different companies and therefore the risk is diversified. The private equity firms are paid in three ways. First, an annual management fee from around one percent of the total fund size is paid by the investors. Second, the private equity firm earns a share of the profits of the fund, called the 'carried interest' that almost always equals 20 percent of the total profit after exceeding a certain threshold, mostly 8 percent. Finally, the private equity firm can charge the portfolio company deal and monitoring fees (Kaplan & Strömberg, 2009).

The average holding period of the portfolio company varies between three and seven years, depending on the intention of the private equity firm and the market conditions. The key objectives of the private equity firm is to create value by increasing the cash generation to ensure debt service and improve profitability and enterprise value at the time of the exit (Bassoulet, 2015). The private equity firms can create value for the portfolio company in three ways, several authors such as Pindur (2007), Guo, Hotchkiss and Song (2011) and Achleitner, Braun and Engel (2011) support this. First, the private equity firms use the leverage effect: an increase in the amount of debt of the portfolio company relatively to the amount of equity. Second, private equity firms use multiple arbitrage: time the right moment of buying and selling of the portfolio company. Third, private equity firms use

operating improvements: improve the operating profitability and reduce working capital of the portfolio company.

Once the private equity firm has increased the value of the portfolio company and decided to sell, several ways are used to exit the company. Kaplan and Strömberg (2008) researched the exits from the period of 1970 to 2007 and found three ways that are commen to use. A sale to a strategic buyer, for example a competitor looking to expand it's marketshare, happens in 38% of the cases. A sale to another private equity firm, which is called a secondary LBO, is used in 24% of the exits. Finally, the shares are sold on the stockmarket through a initial public offering (IPO), which is used in 14% of the cases.

The private equity industry is heavily influenced by the fluctuations in the economy. Therefore, systematic patterns are recognizable in the private equity industry (Strömberg, 2008). Recent patterns are the years 1990 until 1994, this period starts with the junk bond crisis, the days of extreme use of leverage were over and the private equity industry had to invent new ways to create value. The years 1995 until 1999 is famous because of a massive increase in private equity activity, heavily influenced by the dotcom bubble. The years 2000 until 2004 is a period that starts with the collapse of the dotcom bubble. The private equity industry was hit hard but recovered relatively easy, mainly due to the low interest rates used by the FED. The golden years of 2005 until 2007 are famous because of the mega-LBO's induced by the housing bubble. The bubble burst in 2007 and resulted in a worldwide economic crisis. Since 2008, the private equity is recovering of this crisis and tried to made use of the favourable market conditions and the low interest rates to finance their portfolio companies.

The biggest private equity firms are established in the United States, where they also raise the most money (EY, 2014). The big names are Kohlberg, Kravis, Roberts & co (KKR), Blackstone Group and Carlyle Group. The US-based private equity companies have a dominant role in the private equity industry and the global industry has the majority of their funds invested in companies in the United States (EY, 2016).

The global private equity deal value equalled a value of $282 billion in 2015. Almost fifty percent of this happened in the US, this is proportionately higher than in Europe or the Asia-Pacific region. This difference reflects the stronger economic fundamentals in the US. Looking to the exits in 2015, the same pattern is recognizable. A total of 1,166 companies were exited for a total amount of $422 billion, $223 billion of these exits happened at the US market (Bain & Company, Inc., 2016).

2.2 Value Creation

The private equity firms have several targets in creating value: increase the cash generation of the company to pay off the debt and the increase in profitability and enterprise value at the end of

the holding period to increase the exit multiple. As earlier discussed in this thesis, there are three ways to create value: leverage, multiple arbitrage and operating improvements. In the next sections, every approach will be discussed in detail.

2.2.1 Leverage

A private equity firm buys the majority of the control over a company by using a LBO. A key characteristic of LBO's is the relatively large amount of debt used. Debt is very useful in increasing the pressure on managers, to reduce the free cash flow problem as described by Jensen (1986). The free cash flow problem arises in mature industries with weak corporate goverance where management waste cashflow instead of returning it to the investors. Through leverage these managers get restricted to pay back the debt, together with the interest. Guo et al. (2011) show a larger increase of debt results in a greater improvement of the cashflows, net of tax benefits.

A second benefit that results from leverage is a tax shield. Instead of paying a part of the profit to taxes, it is used for interest payments and paying back the debt. This tax reduction is a valuable gain and is called a tax shield. This tax shield boosts returns of the private equity firm by increasing the available cash flows to the providers of equity (Axelson, Strömberg, Jenkinson, & Weisbach, 2009; Guo et al., 2011). Especially nowadays, leverage can create a lot of value due to the historical low interest rates.

On the other side, a high amount of debt also has disadvantages: the inflexibility of the repayments increases the financial risk. This financial risk can be very costly and can result in higher interest rates or even bankruptcy. Leverage was widely used in the 1980's and was back then the main value driver (Jensen, 1989). Nowadays, it's widely used by the entire private equity industry and is therefore less of importance looking to the differences between local and foreign private equity firms.

2.2.2 Multiple Arbitrage

Multiple arbitrage is the improvement of the multiple between entry and exit. A multiple is a ratio used to express the value of the company. The EBITDA multiple is the enterprise value (EV) divided by the EBITDA and is the most important valuation ratio in the entire private equity industry. When the EBITDA is assumed constant between entry and exit, an increase in multiple leads to an increased enterprise value and assuming the net debt to remain constant leads to higher equity returns (Achleitner et al., 2011). Portfolio companies of private equity firms improve the valuation multiples more than regular companies, which are traded publicly (Acharya, Gottschalg, Hahn, &

Kehoe, 2013; Achleitner et al., 2011). On top of that, in public to private deals account changes in the EBITDA multiple for 18 percent of the returns to total pre-buyout capital (Guo et al., 2011)

Multiple arbitrage is the result of an increase in firm specific or industry valuation multiples. It's not clear which effect prevails. Therefore it isn't possible to distinguish between local and foreign private equity firms and their influence on multiple arbitrage.

2.2.3 Operating Improvements

Private equity firms use industry and operating knowledge, gained from previous portfolio companies, to identify attractive investments. An LBO is more likely to happen to companies that show potential to increase the cash flows (Kaplan S. , 1989; Smith, 1990; Lichtenberg & Siegel, 1990; Oliveira, 2013). After the LBO the private equity firms will develop value creation plans and implement these. A plan might include cost cutting opportunities, productivity improvements, strategy changes, acquisition opportunities, management changes or management upgrades (Gadiesh & MacArthur, 2008; Kaplan & Strömberg, 2009; Acharya et al., 2013). LBO's have a positive effect on the operational performance of companies (Kaplan S. , 1989; Jensen, 1989; Smith, 1990; Lichtenberg & Siegel, 1990; Achleitner et al., 2011; Guo et al., 2011; Pindur, 2007). Most private equity firms nowadays focus on one or at most just a few industries. Often, if the private equity firms need specific knowledge, they hire professionals with operating backgrounds from the industry or portfolio company they invest in or even hire industry specific consulting agencies (Kaplan & Strömberg, 2009). Operating improvements result in an increase in financial result in three possible ways: a profitability increase, a productivity increase or a sales increase. These improvements result in an increase of the enterprise value, when a constant debt ratio and a constant multiple are assumed (Bassoulet, 2015). Operating improvements are firm specific and quantifiable, therefore a good measure to verify any possible differences between local and foreign private equity firms.

This thesis will focus on the operating improvements because with these improvements private equity firms can change a company and make it more efficient. This is in contrast to the leverage effect, which is a change in capital structure and in contract to multiple arbitrage, which makes use of favourable market conditions.

2.3 Internationalization of Private Equity

The total private equity industry emerged in 1946, but till 1981 it consisted of small amounts and was not an important asset class. From 1982 till 1990 a boom occurred in the private equity industry due to the creation of the junk bond market, which accelerated the use of LBO's by the availability of cheap financing. The LBO's created mainly value through leverage, with debt levels

rising until 95 percent. The private equity industry was controversial in those days, associated with big layoffs, corporate raids and huge profits for the private equity firms and investors. The LBO'S were often hostile and focused on big conglomerates, which were ripped apart and sold in parts. On Friday 13 October 1989, the junk bond market collapsed and this resulted in a sharp decrease of LBO's, this endured till 1992. Debt became more expensive and private equity firms made less use of leverage. From 1992 till 2000, the private equity industry became more focused on the long term goals for their portfolio companies and acquired more portfolio companies in cooperation with the management. Induced by the dot com bubble and the renewed focus of the private equity firms, the private equity industry grew really hard in number of deals and in average deal value. The NASDAQ crashed in March 2000, which was a big shock for the private equity industry. In the next two years a lot of forced write-offs were made. From 2003 till 2007, the private equity industry profited from the cheap financing from the low interest rate used by the FED and the availability of syndicated bank debt traded in the secondary market. LBO's started to recur and new mega-buyouts like First Data bought for $29 billion and TXU corporation bought for $45 billion happened. These days, also the public offering of private equity funds is a development that started. Until July 2007, the turmoil on the mortgage markets started to spread through the entire financial system and infected the private equity industry through the secondary debt market. The private equity industry activity dropped and had a lot of forced write-offs again (Acharya, Franks, & Servaes, 2007). Nowadays, the financial markets trade at pre-crisis levels and the private equity funds are filled with investors' money. A lot of money is available but there are not a lot of investment opportunities , which leads to the massive amount of dry powder of $1.31 trillion in 2015. There is a lot of competition for the investment opportunities, also from deep pocketed strategic buyers after the recent M&A boom. This results in higher prices for portfolio companies and this has a negative impact on the IRR's the private equity firms can make (Bain & Company, Inc., 2016).

The cross-border private equity deals experienced a rapid growth worldwide (Baygan & Freudenberg, 2000; Wright, Pruthi, & Lockett, 2005; Aizenman & Kendall, 2012). Induced by the dotcom bubble, a great deal of growth in cross-border deals occurred starting in the late 1990s. Some was driven by an oversupply of funds to private equity firms from the US and went to look for other investment possibilities across the borders. US-based private equity firms went abroad but also a big amount of foreign private equity funds were invested in the US from foreign countries. When the dotcom bubble burst, the cross-border private equity activity decreased logically. But shortly after, cross-border private equity participation levels started to rise again (Aizenman & Kendall, 2012). From 1990 until 2007, the relative amount of cross-border deals increased. The cross-border participation increased from 15 percent in the early 1990's to over 40 percent in 2007 (Aizenman & Kendall, 2012; Europe Invest, 2016).

After the crisis of 2007, the amount of cross-border investments dropped, together with the total amount of private equity investments. Nowadays the relative amount of cross-border deals in Europe is back on pre-crisis levels. For the year 2015, the amount of new investments by local private equity firms was €31.0 billion in Europe. Additionally, an amount of €16.4 billion of new investments was invested by foreign private equity firms in Europe. This shows that local deals are favourable but one third of the investments is done by foreign private equity firms in Europe, which is historically relatively high (Europe Invest, 2016).

2.4 The Influence of Size

The cross-border deal size average and median varies widely through the years. For the years 1997 till 2014 the OECD shows that the average deal size varies from $66 million in 2003 till $147 million in 2007 worldwide (OECD, 2015). The local deals are on average smaller in value (Aizenman & Kendall, 2012). Looking from the diversification perspective, to show evidence for the difference in deal size between local and foreign private equity firms, the diversification aspect also explains a higher deal size. Larger deals need more diversification because a substantial share of the fund is placed in one company. Single private equity firms are therefore more willing to syndicate on cross-border deals because these are bigger in value. Four investment partners is the average for cross-border deals, which is more than the local deals with an average of two till three investment partners, based on US data. This shows that cross-border deals are on average larger in deal size than local deals (Lockett & Wright, 2001; Manigart, Lockett, Meuleman, Wright, Bruining, & Landström, 2006; Aizenman & Kendall, 2012).

The cause of this difference is the cost associated with cross-border deals, which will be explained in the next section. Important to know is that foreign private equity firms are only willing to invest when the information asymmetry is low. So, informational transparent companies are for foreign private equity firms more interesting. The information asymmetry is the lowest in the expansion stage or even later stages in comparison to the earlier stages. In the later stages the enterprise value is way higher than in the early stages and therefore foreign private equity firms participate in deals with relative high values (Schertler & Tykvová, 2011).

2.5 Academic Theories

Looking to the academic literature, several studies have exercised research on the difference between local deals and cross-border deals. These studies have found two conflicting theories, the information asymmetry theory and the network theory. Both will be explained in the next two sections.

2.5.1 The Information Asymmetry Theory

Since the 1970s the share of foreign assets in investment portfolios has always been substantially smaller than standard theories would predict, despite the potential gains from investing internationally. Strong evidence has been found for this home bias (e.g. Strong & Xu, 2003). Several barriers are distinguish such as language, regulatory differences and the cost of obtaining information about foreign markets (Tesar & Werner, 1995). Gehrig (1993) and Kang and Stulz (1997) and Brennan and Aranda (1999) recognize the barrieres and they reason that the home bias arises from asymmetric information between local and foreign investors. The local investors are beter informed about payoffs in their home market. This is illustrated in the Mexican crisis of 1994. The changes in the net asset value of Mexican closed end funds caused changes in the prices of funds on the NYSE, before international investors reacted on the information (Frankel & Schmukler, 1996). This implicates that the prices of the underlying shares of the fund are set by better informed locals. The information asymmetry was also present during the Korean valuta crisis of 1997, purchases of korean equities by foreigners are strongly related with lagged returns. This implicates that the foreigners acted later than the locals (Choe, Kho, & Stulz, 1999). The barriers can be decreased by telephone call traffic or when a country has mulinational bank branches. This is found by Portes and Rey (2005) for 14 countries in the period of 1989 to 1996 cross-border equity flows, these variables explained very good the cross border equity flows. All together a lot of evidence towards a difference in local investors and cross-border investors is present.

In the private equity industry this information asymmetry is also present. Private equity firms are not interested in taking permanent positions in their portfolio companies, three to seven years after they bought the portfolio company, it is sold (Cumming D. , 2008). The information asymmetry between the private equity firm and the portfolio companies are bigger when the portfolio company is located further away from the private equity firms. Therefore, private equity firms have often been regarded as purely local investors (Bengtsson & Ravid, 2009; Cumming & Walz, 2010; Schertler & Tykvová, 2011).

Summarized, the information asymmetry means: foreign private equity firms are less informed than local private equity firms about the local market and the potential portfolio companies, an information asymmetry between the two is present (Brennan & Aranda, 1999). The information asymmetry theory states that foreign private equity firms will on average perform worse than local private equity firms.

2.5.2 The Network Theory

As discussed in the previous section, the information asymmetry theory has been proven many times and is a widely accepted theory. This theory was a reason for private equity firms to focus on their home country and don't perform cross-border deals, until recent years. Section 2.3 shows the worldwide rapid growth of the private equity industry across borders over the recent years, until 40 percent of the total private equity holdings of 2007 was cross-border (Aizenman & Kendall, 2012; Europe Invest, 2016). The motivation of the private equity firms to cross borders varies: to achieve diversification, to take advantages of undervaluation's of firms in less developed markets and to make use of opportunities in emerging markets (Mayer, Schoors, & Yafeh, 2005; Wrightet al., 2005; Cumming & Walz, 2010; Aizenman & Kendall, 2012; Humphery-Jenner, Sautner, & Suchard, 2014).

Networks are widely spread in the financial markets nowadays. This is shown in the fact that the large investment banks use their network of institutional investors for pricing and distributing equity issues. Regular buyers of equity are also favoured with larger allocations of equity by the investment banks (Cornelli & Goldreich, 2001). Looking to the corporate loan market, the same pattern exists. Banks often prefer to syndicate loans with other banks instead of being the single lender. This pattern also exists in the bond market. Banks prefer to underwrite securities offerings together with bank with whom they have longstanding relationships (Hochberg, Ljungqvist, & Lu, 2007; Ljungqvist, Marston, & Wilhelm, 2009). In the private equity firm industry these networks also exist. Private equity firms prefer to syndicate their investments than to be the sole investor (Lerner, 1994). The past and the current investments of private equity firms bound them together into a network. This is a wide and international network of contacts and connections. These connections consist of international accounting firms, consultancy firms, law firms, private equity firms and so on (Hochberg et al., 2007). These networks can be very useful to reduce the information asymmetry between the local and the foreign private equity firm. Reason for this is that the private equity firms' business model involves a lot of mergers and acquisitions (M&A). Supporting firms and other private equity firms are willing to provide information in return for work or for cooperation in the future. From both a target perspective and an acquirer perspective, both backed by a private equity firm this is valuable for several reasons like convincing the potential buyer or finding the perfect fit of an exit plan. Both reasons are valid to provide accurate information and decrease the information asymmetry to facilitate cross-border deals (Ivashina & Kovner, 2011; Humphery-Jenner et al., 2014).

The private equity firms connections and experience in foreign capital and products markets can be valued by target companies which want to expand internationally. This results in two separated markets in a country. One market with locally focused companies financed by local private equity firms and the other market with internationally focused companies financed by foreign private

equity investors. It's almost impossible that these markets will integrate because the foreign private equity firms cannot compete with the local private equity firms due to the information asymmetry on the local level. Also the local private equity firms can't compete with the foreign private equity firms because of the lack of international experience and expertise (Tykvová & Schertler, 2007; Schertler & Tykvová, 2011). Together with the network, the knowledge required for a firm to operate cross border is different from the knowledge accumulated in the locals country, which is also a central assumption in the academic literature (Johanson & Vahlne, 1977; Dunning & Lundan, 2008; Meuleman & Wright, Cross-border private equity syndication: Institutional context and learning, 2011).

The academic literature shows that experienced private equity firms with wider networks increase the amount of deals performed and the deal flow, the rate at which the private equity firms receive investment proposals, but also the ability to provide higher-quality value adding activities. Reason for this is the access to a wider range of expertise, contacts and pools of capital in their networks. Foreign private equity firms are often more experienced, more professionalized and larger in size (Hellman, Lindsey, & Puri, 2004; Gompers, Kovner, Lerner, & Scharfstein, 2006; Hochberg et al., 2007). It is reasonable to expect that portfolio companies financed by more experienced and better networked foreign private equity firms are more likely to make a bigger impact (Dai, Jo, & Sul, 2009).

Summarized, the network theory means: foreign private equity firms outperform local private equity firms due to their networks and experience which eliminates the information asymmetry. The network theory states that foreign private equity firms will on average perform better returns than local private equity firms.

3. Hypotheses

3.1 Hypothesis 1

In this thesis I try to find clarity if there is a difference in impact between the cross border private equity firms and the local private equity firms. Private equity firms buy portfolio companies local or across border. Cross border portfolio companies and local portfolio companies can differ in several ways. The research question focuses on the differences in operating performance. This thesis tries to find an explanation for these differences but first we have to find if there is a difference at all.

Hypothesis 1a. Cross-border portfolio companies differ in operational performance from local portfolio companies. The H_0 of this hypothesis is: there is no difference between cross border portfolio companies and local portfolio companies for the average company size.

An important difference which has been found by earlier research of Aizenman & Kendall (2012), is the difference in size. This difference has a significant explanatory effect (Schertler & Tykvová, 2011), especially for the information asymmetry between the private equity firm and the portfoio company.

Hypothesis 1b. Cross-border portfolio companies are on average larger in company size than local portfolio companies. The H_0 of this hypothesis is: there is no difference between cross border portfolio companies and local portfolio companies for the average company size.

3.2 Hypothesis 2

The research question of this thesis is: Do foreign private equity firms make a bigger impact on their portfolio companies than local private equity firms? The literature review of chapter two shows that operating improvements are the only way a private equity firm can change a company, which is quantifiable and doesn't depend on the market conditions. Therefore operating improvements are used to research the impact of the private equity firms.

The literature review also shows two conflicting theories, that try to explain the difference, the information asymmetry theory and the network theory. There is no earlier research recorded that addresses both theories in one paper. I expect that the network theory won't outweigh the information asymmetry theory due to the fact that the networks can't let the information asymmetry disappear entirely and the local private equity firms always have an advantage even when it's quite small. This asymmetry makes a big difference in the operational improvements and the financial results.

Hypothesis 2. Local private equity firms improve the operational performance of their portfolio companies more than foreign private equity firms. The H_0 of this hypothesis is: there is no difference between foreign private equity firms and local private equity firms in operational improvements.

3.3 Hypothesis 3

The literature review showed the differences between the cross-border deals and the local deals. In both deals, the size of the portfolio companies and of the deals matters. Also in company size a difference for cross border portfolio companies and local portfolio companies exists (Aizenman & Kendall, 2012). The literature review also showed that the information asymmetry doesn't exist anymore due to the more international character of these companies, this is confirmed by Portes and Rey (2005). The large portfolio companies require other skills, which aren't country specific. The foreign private equity companies have these international skills and valuable networks more than the local private equity firms and can therefore add more value than the local private equity firms.

Hypothesis 3. Foreign private equity firms improve the operational performance of their portfolio companies more than local private equity firms, for the subsample of large portfolio companies. The H_0 of this hypothesis is: there is no difference between foreign private equity firms and local private equity firms in operational improvements, for the subsample of large portfolio companies.

3.4 Hypothesis 4

The US is the birthplace of private equity and therefore the US-based private equity firms have a lot of experience and skills gathered through the years. Therefore I want to test if the difference between foreign private equity firms and local private equity firms ability to make an impact not mainly driven is by the US-based private equity industry.

Hypothesis 4. US-based private equity firms improve the operational performance of their portfolio companies more than foreign private equity firms and local private equity firms. The H_0 of this hypothesis is: US-based private equity firms don't improve the operational performance of their portfolio companies more than foreign private equity firms and local private equity firms.

4. Methodology

4.1 Methods

4.1.1 T-test

A two sample unpaired t-test on the variable company size is used to test hypothesis 1a and 1b. The two sample t-test will be used to determine if the mean of the operational performances and the company size of the two samples, the sample for local deals and the sample for cross border deals, is equal. Therefore the null hypothesis is H_0: μ_1 = μ_2, there is no difference between the means of operational performances and company size. The alternative hypothesis is H_a : $\mu_1 \neq \mu_2$, there is a difference between the means of operational performances and company size. Then the t-statistic will be calculated and compared with the t-distribution of the degree of freedom and a chosen α. If the t-statistic is bigger than the critical region, the null hypothesis will be rejected and the alternative hypothesis accepted and if the t-statistic is smaller the critical region, the null hypothesis cannot be rejected.

First, the degree of freedom of the t-statistic will be calculated. An α of 0.05 will be used and the degree of freedom will be calculated by: $df = df_1 + df_2$. Together, the t-distribution will be determined.

Second, the t-statistic will be calculated by calculating the pooled variance: $s_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$, where SS is the sum of squares. Use the pooled variance to calculate the estimated standard error: $s_{(M_1-M_2)} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$. Lastly is the t-statistic computed: $t = \frac{(M_1-M_2)-(\mu_1-\mu_2)}{s_{(M_1-M_2)}}$. This t-statistic will be compared with the critical region of the t-distribution obtained with the degree of freedom (Gravetter & Wallnau, 2013).

4.1.2 Multiple regression analysis

To further examine the possible differences of hypothesis one, multiple regression analysis will be used, to test hypothesis two, three and four. The dependent variable is the change in operating performance and the independent variables consist of both explanatory variables and control variables, discussed in section 4.2 till 4.4. The most important papers to endorse this methodology are Achleitner et al. (2011), Achleitner & Figge (2014), Dai et al. (2009), Guo, et al. (2011), Kaplan (1989), Jain & Kini (1994) and Schertler & Tykvová (2011).

The purpose of a multiple regression analysis is to gain insight about the relationship between several independent variables and one dependent variable. The main question answered by multiple regression analysis is: if one independent variable changes, by how much will the dependent

variable change? In the multiple regression model, a dependent variable Y_i is related to a number of explanatory variables and control variables X_1, X_2,...,X_k through a linear equation. In case of hypothesis two, the dependent variable is the operating change and one of the explanatory variables is deal experience. Putting all the defined variables in a multiple regression equation results in:

$$(ROS, ROA, SALES)_i = \beta_0 + \beta_1(Deal\ exp)_i + \beta_2(Foreign)_i + \beta_3(Deal\ exp\ For.PE)_i + \beta_4(Company\ size)_i +$$
$$\beta_5(Duration)_i + \beta_6(Leverage)_i + \beta_7(PE\ firm\ age)_i + \beta_8(Fund\ age)_i +$$
$$\beta_9(Dleverage)_i + \beta_{10}(Time0004)_i + \beta_{11}(Time0507)_i + \beta_{12}(Time0812)_i +$$
$$\beta_{13-22}(SIC1 - SIC9)_i + \varepsilon_i$$

β_1-β_3 are the parameters of the explanatory variables and β_4-β_{21} are the parameters of the control variables. The coefficients β_1, β_2, β_3,..., β_k are unknown and correspond with X_2, X_3, ...,X_k. A single parameter, called β_q, measures the effect of a change in variable x_q, when all other variables are held constant, ceteris paribus. In partial derivates this is: $\beta_q = \frac{\partial E(y)}{\partial X_k}$. To calculate the beta's, the formula is: $\beta_2 = \left(\frac{r_{y,x2} - r_{y,x3}r_{x2,x3}}{1-(r_{x1,x2})}\right)\left(\frac{SD_y}{SD_{x1}}\right)$. Where r is the correlation between two variables, for instance Y and X_2, SD is the standard deviation of the variable. To calculate the intercept, the β_0, the formula is rewritten to: $\beta_0 = y_i - \beta_2 x_2 - ... - \beta_k x_k$. All the variables on the right-hand side are known and then it's simple math. The ε_i is the error term. The error term is added because the model may not be able to represent the actual relationship between the variables. The possible difference between the reality and the model is captured in the error term. An important assumption for the used methods is the expectation of error term of zero. When on beforehand a difference between reality and model is expected, more research is required to find suitable variables. The β_0 is the intercept term (Carter Hill, Griffiths, & Lim, 2012). To calculate the multiple regression model of hypothesis two the entire sample of portfolio companies will be used.

For hypothesis three, the multiple regression equation which will be used is:

$$(ROS, ROA, SALES)_i = \beta_0 + \beta_1(Deal\ exp)_i + \beta_2(Foreign)_i + \beta_3(Deal\ exp\ For.PE)_i + \beta_4(Company\ size)_i +$$
$$\beta_5(Duration)_i + \beta_6(Leverage)_i + \beta_7(PE\ firm\ age)_i + \beta_8(Fund\ age)_i +$$
$$\beta_9(Dleverage)_i + \beta_{10}(Time0004)_i + \beta_{11}(Time0507)_i + \beta_{12}(Time0812)_i +$$
$$\beta_{13-22}(SIC1 - SIC9)_i + \varepsilon_i$$

This is exactly the same as the multiple regression equation of hypothesis two, the only difference is that this equation will only be performed on the subsample of large portfolio companies.

For hypothesis four, the multiple regression analysis which will be used is:

$$(ROS, ROA, SALES)_i = \beta_0 + \beta_1(Deal\ exp)_i + \beta_2(Foreign)_i + \beta_3(Deal\ exp\ For.PE)_i + \beta_4(US - based)_i +$$
$$\beta_5(Company\ size)_i\ \beta_6(Duration)_i + \beta_7(Leverage)_i + \beta_8(PE\ firm\ age)_i +$$
$$\beta_9(Fund\ age)_i + \beta_{10}(Dleverage)_i + \beta_{11}(Time0004)_i + \beta_{12}(Time0507)_i +$$
$$\beta_{13}(Time0812)_i + \beta_{14-23}(SIC1 - SIC9)_i + \varepsilon_i$$

β_1-β_4 are the parameters of the explanatory variables and β_5-β_{23} are the parameters of the control variables. The ε_i is the error term. The β_0 is the intercept term. This multiple regression analysis will be performed on both the total sample and the subsample of large portfolio companies.

To test the hypotheses with the multiple regression analyses, two test are performed. First, an F-test of the overall significance is performed. This test has a null hypothesis of: H_0: $\beta_1 = \beta_2 = ... = \beta_K = 0$ and the alternative hypothesis is: H_a : $\beta_j \neq 0$, for at least one value of j. The F-test is: $F = \frac{(SSE_r - SSE_u)/J}{SSE_u/(N-K-1)}$. Where SSE stands for the sum of squared errors or residuals. R stands for the restricted model of the null hypothesis and U for the unrestricted model with all the parameters included. J is the amount of restrictions under the null hypothesis and N-K is the degree of freedom. The result of the F test will be compared to a significance level: F>F critical, then the null hypothesis is rejected and H_a is accepted, the group of parameters are together significant.

To obtain the individual significance of the parameters, a t-test is used. The null hypothesis is: H_0: $\beta_q = 0$ and the alternative hypothesis is: H_a : $\beta_q \neq 0$. The critical t-statistic need to be determined based on alpha and in this research a two tailed t-test are used, therefore the alpha needs to be divided by two and the degree of freedom is N-2. The t-statistic is: $t = \frac{b_k - c_0}{se(b_k)}$. Where b_k is the beta minus the c_0 which is zero because the null hypothesis is zero, divided by the standard error of this beta. This t-statistic will be compared to a significance level: t>t critical. The null hypothesis is rejected and H_a is accepted, the individual parameter is significantly different from zero (Brooks, 2014; Carter Hill, Griffiths, & Lim, 2012).

For every model which will be estimated, a RESET test will be performed to test for any omitted variables, possibly missing variables, in the model.

The multiple regression model is very useful but assumptions about the probability distribution of the random error ε_i need to be made to use the ordinary least squares (OLS) estimation of parameters to receive the best estimations of the parameters, this will be explained later. Each observation of the dependent variable y_i depends on ε_i, therefore y_i is also a random variable and these assumptions also account for y_i. The six assumptions of the multiple regression model are:

I. $y_i = \beta_0 + \beta_1 x_1 + .. + \beta_k x_{ik} + \varepsilon_i$, *i = 1,..,N :* a dependent variable y_i is related to a number of explanatory variables x_1, x_2,…,x_k through a linear equation, as written above. Assumption one will be checked by looking to the graph matrix of the variables.

II. $E(y_i) = \beta_0 + \beta_1 x_1 + .. + \beta_k x_{ik} \leftrightarrow E(\varepsilon_i) = 0$: the expected value of y_i depends on the values of the explanatory variables and the unknown parameters, this means that the errors

have a probability distribution with a mean of zero. Assumption two will be corrected by using a big amount of observations and by adding a constant in the model.

III. $var(y_i) = var(\varepsilon_i) = \sigma^2$: the variance is constant, this results in homoskedastic errors. Assumption three will be checked by using three versions of the Breusch-Pagan and Cook-Weisberg test for heteroskedasticity.

IV. $cov(y_i, y_j) = cov(\varepsilon_i, \varepsilon_j) = 0 \ (i \neq j)$: observations of the dependent variable are uncorrelated, there is no serial correlation, automatically any pair of errors is also uncorrelated: errors have a covariance of null. Assumption four won't be checked because the data is cross sectional, therefore serial correlation isn't possible

V. The values of each x_{ik} are not random and are not exact linear function of other explanatory variables, in other words there is no multicollinearity. Assumption five will be checked by calculating the variance inflation factors (VIFs) for the independent variables, rule of thumb is VIF > 10 means that the assumption is violated.

VI. $y_i \sim N[(\beta_0 + \beta_1 x_1 + .. + \beta_K x_{ik}), \sigma^2] \leftrightarrow \varepsilon_i \sim N(0, \sigma^2)$: values of Y are normally distributed about their mean, which is equivalent to the assumption of normally distributed errors. Assumption six will be checked by looking to the histogram and the quantile plot of the residuals.

The Gauss-Markov Theorem states: if assumption one to five hold, the ordinary least square estimation (OLS) of parameters is the best linear unbiased estimator of the parameters. The OLS principle is to minimize the sum of squared differences between the observations of y_i and the expected values: $E(y_i) = \beta_0 + \beta_1 x_1 + .. + \beta_k x_k$ The sum of squared function will be minimized: $S(\beta_0, \beta_1, ..., \beta_K) = \sum_{i=1}^{n}(y_i - \beta_0 - \beta_2 x_2 - ... - \beta_k x_k)^2$. The β_0, β_1, β_2, ..., β_k which will be found are the best parameters to minimize the sum of squared differences.

4.2 Dependent Variables

The dependent variables used for the multiple regressions are used to determine if there is any relationship between the operating improvements and the characteristics of the portfolio company or private equity firm. Three measures of operating improvements are used, which are the changes in profitability, productivity and sales. These are also used by Acharya et al. (2013) and Jain and Kini (1994), while Achleitner and Figge (2014), Cressy, Munari and Malipiero (2007) and Kaplan (1989) use two out of three of these measures. An increase in one of these three results in a increse in the enterprise value of the portfolio company. The change is always measured between one year before the deal and one, two or three years after the deal (Guo et al., 2011). The third year after the private equity firm gained control is the most important in the analyses because operating

improvements need longer than one year to become implemented and actually improve the profitability, productivity or sales.

Profitability is measured as the change in earnings before interest, tax and depreciation (EBITD) divided by the total sales, also known as return on sales. EBITD is equal to operating revenues minus cost of goods sold (COGS) minus selling, general and administrative expenses (SG&A) minus other cost is operating income. EBITD is commonly used in valuations. This is also the case in the private equity industry because it shows the fundamental operation earnings potential of a company. Productivity is measured as the change in EBITD divided by the total assets, also known as the return on assets. Lastly is the sales, measured as the change in operating revenues earned with the operating activities.

The descriptive statistics for the independent variables in different periods are summarized in table 3.1 and the construction of the variables in appendix A, table A.1.

Table 4.1 Descriptive statistics dependent variables

Variable	Period	# Companies[a]	Mean[b]	Median[b]	Std. Dev.[b]
Profitability	+1	324	31.477	-7.652	517.216
Profitability	+2	324	24.923	-12.333	518.943
Profitability	+3	324	-26.280	-12.740	437.230
Productivity	+1	324	32.522	-44.834	929.068
Productivity	+2	324	-12.649	-56.032	570.943
Productivity	+3	324	-53.307	-60.867	657.412
Sales	+1	324	264.096	39.692	2752.856
Sales	+2	324	311.569	47.152	2771.298
Sales	+3	324	366.788	62.427	2138.011

[a]The variable observations is measured in total companies. [b]The variables Mean, Median and Standard Deviation are measured in percentage point because the variables are defined as total percentages.

4.3 Explanatory Variables

The independent variables used for the multiple regressions consist of two groups: the explanatory variables and the control variables. First, the explanatory variables are discussed and defined and in the next section the control variables are discussed and defined. The descriptive statistics of the explanatory variables are summarized in table 3.2 and the construction of the variables in appendix A, table A.2.

The network theory endorsed by Humphery-Jenner et al. (2014) is tested by the explanatory variable deal experience. Every time the private equity firm gains control over a portfolio company and improve the portfolio company, they meet the same people and the same companies and networks are created. Deal experience is measured by taking the natural logarithm of the amount of

deals the private equity firm had completed in the years before the private equity firm acquired (Dai, Jo, & Sul, 2009; Humphery-Jenner, Sautner, & Suchard, 2014; Cressy et al., 2007). The network theory states that private equity firms do cross-border deals because of diversification purposes. This means that the private equity firms who invest cross border have a certain amount of deals completed and therefore a possible interaction effect is recognizable. Therefore an interaction variable is added, called deal experience of foreign PE firms, which is zero when the deal is local and is the logarithm of the amount of deal experience when the deal is cross-border.

The second hypothesis about the difference between the local and the foreign private equity firms is tested by adding a dummy. The foreign dummy is zero when the deal is local and one if the deal is cross-border. This variable measures the difference between the private equity firms solely based on where they are located relative to the portfolio company.

The fourth hypothesis is focusing on the US-based private equity firms and to isolate their specific effect a US-based dummy is added, which is one when the private equity firm is located in the United States and zero otherwise.

Table 4.2 Descriptive statistics explanatory variables

Variable	# Observations[a]	Mean	Median	Std. Dev.
Deal experience	324	4.997	4.792	1.926
Foreign dummy	324	0.343	0.000	0.475
Deal experience For. PE	324	1.769	0.000	2.745
US-based dummy	324	0.389	0.000	0.488

[a]The variable observations is measured in total companies.

4.4 Control Variables

Related academic literature is used to determine the control variables that could affect the operating improvements. These control variables are used in the multiple regression models and consist of characteristics of the portfolio bo company, private equity firm and the private equity fund. The control variables are summarized in table 3.3 and the construction of the variables in appendix A, table A.2. Companies differ in many ways, also in size, which can vary widely. Different sizes of portfolio companies ask different skills to improve the operating performance from the private equity firm. Therefore, a control variable is added to control for the company size (Acharya et al., 2013; Achleitner & Figge, 2014; Humphery-Jenner et al., 2014; Tykvová & Schertler, 2007). This is measured by taking the natural logarithm of the sales of the portfolio company of the year when the private equity firm gains control over the portfolio company. The time a company is part of the portfolio of a private equity firm can differ alongside the objectives of the private equity firm with the portfolio company. To control for this difference, the variable duration is added (Acharya et al., 2013; Guo et al., 2011). Duration is measured by taking the natural logarithm of the amount of years

a portfolio company is owned by a private equity firm. Differences in leverage for portfolio companies result in differences in the financial risks. These differences can disturb the effect of the explanatory variables and therefore the control variable leverage is added (Achleitner et al., 2011; Achleitner & Figge, 2014; Humphery-Jenner et al., 2014). Leverage is measured by taking the natural logarithm of leverage at the time the private equity firm gained control over the portfolio company, leverage is the total debt divided by the total equity and then multiplied by 100. Leverage changes can have an influence on the decisions made about operating changes. To control for this the dleverage measure is added (Guo et al., 2011). Dleverage is the natural logarithm of the difference in leverage from the year before the private equity firm gained control over the portfolio company and one, two or three years after that year.

For the differences in private equity firms and private equity funds is controlled by adding two variables. The private equity firm age and the private equity fund age (Dai, Jo, & Sul, 2009; Achleitner & Figge, 2014; Achleitner et al.l, 2011). The private equity firms age is measured by taking the natural logarithm of the age of the private equity firm at the time the private equity firm gained control over the portfolio company. Fund age is measured by taking the natural logarithm of the age of the fund of the private equity firm at the time the private equity firm gained control over the portfolio company.

Table 4.3 Descriptive statistics control variables

Variable	# Observations [a]	Mean	Median	Std. Dev.
Company size	324	5.495	5.489	5.495
Duration	324	0.563	1.609	1.717
Leverage	324	1.177	3.772	3.686
Dleverage+1	324	-0.430	-2.208	4.152
Dleverage+2	324	-0.066	-2.324	4.259
Dleverage+3	324	-0.021	-2.833	4.368
PE firm age	324	0.998	2.740	2.576
Fund age	324	0.874	2.485	2.423

[a]The variable observations is measured in total companies.

Time dummies and industry dummies are added to the analyses to control for any systematic patterns in the private equity industry through time and industry. Both dummies are common to use in private equity research (Achleitner et al., 2011; Achleitner & Figge, 2014; Tykvová & Schertler; 2007) The used time dummies are similar to the dummies in the research of Strömberg (2008). The periods are 1995-1999, 2000-2004,2005-2007 and 2008-2012, from which 1995-1999 is the base case. For every period a dummy will be generated, which is one for the specific period and zero otherwise except for the base case. The industry dummies are based on the fist digit of the SIC code. This results in 10 different industries: SIC0 till SIC9, by which SIC0 the base case is.

5. Data

The data considering the private equity firms and the deal characteristics is retrieved from the SDC Platinum database, part of the bigger and well known Thomson One database of Thomson Reuters. I have selected on the portfolio companies of private equity firms from the period 1 January 1995 until 31 December 2012. In the period 1990 until 1994, the private equity firms started to discover new ways for value creation because using leverage wasn't possible in the way it was before. Operating improvements were a new way to improve the portfolio companies, already explained in the literature review. The period starts in 1995 and continues until 2012, due to the fact that the time periods continues 3 years after the year the deal was done. The total dataset consists of data from 1 January 1994 until 31 December 2015. This results in a relevant dataset to research and adds new information to the existing academic literature.

The amount of investors is restricted to one, otherwise several private equity firms could have had different home countries, which isn't possible to analyze. The deal has to be confirmed completed as a last search criteria. These search criteria result in a dataset of more than 14,000 companies worldwide. Striking is the amount of data that is missing, due to the fact that the private equity firms are naturally private owned companies and therefore don't have any disclosure requirement.

This dataset is merged within the Thomson One database with a company information data base to acquire the company specific information of the portfolio companies for the year before the deal, the year of the deal and the three years after. The last selection criterion is the completeness of the observations, this results in a balanced dataset of 324 companies. A sub sample is acquired by selection on company size, the criteria was a company size bigger than the average company size, what results in a balanced database of 160 relatively large portfolio companies. The dataset of the 324 companies is used when explaining the variables. The data is cross sectional due to the definition of the dependent variables in changes over multiple years. In table 1.1 is the distribution of the deals throughout the years stated, clearly the years 2006 and 2007 deliver the most deals, 24% of the total dataset. Figure 5.1 shows the recent merger and acquisitions waves throughout the years, with the best years of both waves in 1999 and 2007.

Table 5.1 Deal distribution

Year	# of deals	%
1995	2	1
1996	4	1
1997	6	2
1998	8	2
1999	19	6
2000	17	5
2001	11	3
2002	8	2
2003	30	9
2004	29	9
2005	22	7
2006	34	10
2007	46	14
2008	26	8
2009	29	9
2010	12	4
2011	20	6
2012	1	1

Figure 5.1 Deal distribution
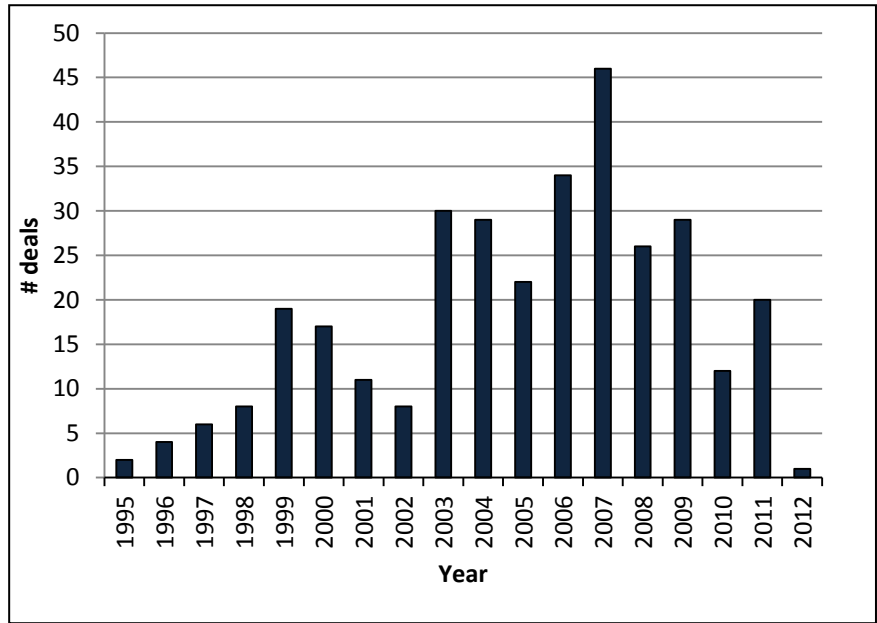
6. Results

In this section, the results will be explained. The period from one year before the deal until one year after the deal is called short term. The period from one year before the deal until two years after the deal is called mid term. The period from one year before the deal until three years after the deal is logically called long term.

6.1.1 Differences in operating performance and company size

The dataset is split into two groups, a group of portfolio companies with a local private equity firm and a group of portfolio companies with a foreign private equity firm as an owner. The local group counted 1,491 observations of 213 companies and the foreign group counted 777 observations of 111 companies. The results of the t-tests performed are shown in table 6.1 and show a significant difference for profitability three years after the deal, productivity two years after the deal and productivity three years after the deal. For these three operating performance indicators a difference is present between the local private equity firms and the foreign private equity firms. For these three operating performance indicators, hypothesis 1a is accepted and H_0 is rejected. For the other six operating performance indicators the H_0 cannot be rejected and hypothesis 1b is not accepted. This confirms the choice of looking to three years after the deal as the most important year, these years show the differences become significant.

The two sample unpaired t-test performed on the equality of the means of company size of the groups gives a t-statistic of 0.817. This results in a probability of 0.414, which is bigger than the α of 0.05 and therefore the H_0 cannot be rejected and hypothesis 1b is not true. There is no difference in means of company size of the portfolio company for the local private equity firm owner and the foreign private equity firm owner in contract to what Aizenman and Kendall (2012) have found. The portfolio companies bought by the private equity firms from abroad or locally doesn't differ in size. The results of the two sample unpaired t-tests are summarized in table 6.1.

Table 6.1 Results T-tests

Variable	Period	T-statistic	Probability
Profitability	+1	0.095	0.924
Profitability	+2	-0.264	0.792
Profitability	+3	-3.340	0.001*
Productivity	+1	0.279	0.780
Productivity	+2	-2.929	0.003*
Productivity	+3	-3.067	0.002*
Sales	+1	1.919	0.055
Sales	+2	1.725	0.085
Sales	+3	0.148	0.883
Company size		0.817	0.414

6.1.2 Assumptions multiple regression

For all the multiple regressions which are executed, four of the six assumptions are immediately satisfied. The first assumption which isn't fulfilled immediately is the required homoskedastic distribution of errors. This is solved by calculating the standard errors with the robust variance estimator. The second assumption which isn't fulfilled for all the multiple regressions is the normal distribution of the errors. The errors are leptokurtic distributed and therefore are all the independent variables calculated by taking the natural logarithm of these variables, the only exceptions are the dummy variables. When all the assumptions are fulfilled, its justified to use OLS in the multiple regression analysis. The R^2 for every model is quite low but this is common in financial research.

For every multiple regression a reset test is performed, almost every time the H_0 is rejected and omitted variables are present. Based on the academic literature, no other explanatory variables or control variables could be found, this is a chance for future research.

6.1.3 Overall impact

The multiple regressions are performed on the entire sample of 324 companies. The results for the short term effects are shown in table 6.2. The F-test on joint significance shows for every multiple regression an p-value below $\alpha = 0.05$ and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. The explanatory variable Deal experience is highly significant for profitability and productivity but insignificant for sales. The economic impact of deal experience is negative for profitability and productivity. This means that more experienced private equity firms on the short term decrease the profitability and productivity of their portfolio companies. The foreign dummy and the interaction variable deal experience Foreign PE are insignificant on the $\alpha = 0.05$ level. The economic impact can therefore not be determined.

Table 6.2 Short term impact

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-7.667***	-6.074***	1.528
Foreign dummy	-15.704	-4.208	2.260
Deal experience For. PE	.761	-.807	-2.658*
Company size	.933	1.686**	-7.290***
Duration	9.997***	9.314***	-2.162
Leverage[a]	-1.713	.182	-5.033***
Δ Leverage	-.675*	-.774**	-.669
PE firm age	10.109***	7.323***	-.382
Fund age[a]	-3.845*	.167	-4.034
Time 00-04	-13.088**	-5.800	-28.072***
Time 05-07	-14.413**	-4.341	-36.599***
Time 08-12	-11.340*	-4.237	-33.504***
SIC 2	-16.426***	.053	-10.676
SIC 3	-1.202	14.325***	-37.159***
SIC 4	23.466***	53.129***	-43.986***
SIC 5	-20.705**	4.093	-32.774***
SIC 6	18.328***	25.859***	-24.000***
SIC 7	-6.815	8.027*	-22.306***
SIC 8	-17.916**	-2.425	-30.923***
SIC 9	-56.373***	-19.877***	-94.180***
C	6.861	-64.507***	186.060***
Adjusted R^2	.059	.069	.096
RESET	.040	.126	.000
F-test	.000	.000	.000

Note: OLS regressions, t-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes.

The results for the mid term multiple regression are shown in table 6.3. The F-test on joint significance shows for every multiple regression an p-value below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. The explanatory variables are separately not significant on the α=0.05 level. The economic impact can therefore not be determined.

Table 6.3 Mid term impact

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-1.884	.271	-.954
Foreign dummy	.691	12.991	-1.490
Deal experience For. PE	-1.131	-.670*	-2.276
Control variables[b]	yes	yes	yes
Time dummies[b]	yes	yes	yes
Industry dummies[b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.065	.078	.094
RESET	.000	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The long term results in table 6.4 show an F-test on joint significance for every multiple regression. For every multiple regression the p-value is below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. Deal experience isn't significant on the α = 0.05 level. The foreign dummy is for profitability and sales significant and has a strong negative effect, so foreign private equity firm perform worse than local private equity firms in increasing the profitability and sales. Contrasting, the deal experience Foreign PE show a significant positive effect for profitability. A foreign private equity firm with enough experience can improve the profitability better than a foreign private equity firm without experience.

Table 6.4 Long term impact

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-2.115	.188	-4.189*
Foreign dummy	-44.803***	-13.531	-36.869**
Deal experience For. PE	6.558***	-2.403*	2.699
Control variables[b]	yes	yes	yes
Time dummies[b]	yes	yes	yes
Industry dummies[b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.044	.058	.128
RESET	.000	.092	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

6.1.4 Overall impact, with United States dummy

The entire sample is used for the multiple regressions, only difference with section before is that a dummy is added for the private equity firms that are located in the United States.

Table 6.5 shows the short term results, an F-test on joint significance for every multiple regression is performed and all p-values are below $\alpha = 0.05$ and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. The results for the explanatory variables are in line with the results of table 6.2. Deal experience has a highly significant negative effect on profitability and productivity. This means that more experienced private equity firms on the short term decrease the profitability and productivity of their portfolio companies. The US-based dummy is highly significant for sales. The economic impact is positive, private equity firms from the United States can improve the sales in the short term better than private equity firms from somewhere else.

Table 6.5 Short term impact with US dummy

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-7.655***	-6.015***	1.356
Foreign dummy	-15.441	-2.973	-1.355
Deal experience For. PE	.721	-.994	-2.110
US dummy	-1.233	-5.784*	16.941***
Control variables[b]	yes	yes	yes
Time dummies[b]	yes	yes	yes
Industry dummies[b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.060	.058	.105
RESET	.075	.092	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The result for the mid term in table 6.6 show an F-test on joint significance for every multiple regression is, all p-values are below $\alpha = 0.05$ and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. Deal experience show a highly significant negative effect on profitability. On the mid term, private equity firm with more deal experience will improve profitability less than private equity firms with less deal experience. The US-based dummy is positive and highly significant for profitability and productivity and highly negative significant for sales. Non US-based private equity firms are better in improving profitability and productivity than the US-based private equity firms. For sales this effect is the other way around. Worth mentioning are the Foreign

dummy which is positive and significant for productivity and the interaction variable deal experience Foreign PE which has a slight negative effect. All the other variables are not significant.

Table 6.6 Mid term impact with US dummy

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-1.631***	.497	-1.670
Foreign dummy	6.022	17.770**	-5.399
Deal experience For. PE	-1.951	-3.407**	-1.735
US dummy	-26.313***	-23.592***	20.811***
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.081	.099	.103
RESET	.000	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = *p*<0.1,** = *p*<0.05, *** = *p*<0.01.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The long term results are placed in table 6.7 and show the p values for the F-tests on joint significance for every multiple regression, these are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. The foreign dummy is significant and negative for profitability and sales. On the long term local private equity firms are better in improving the profitability and the sales than foreign firms. The US-based dummy is highly significant for productivity and for sales. The economic effect for productivity is negative and for sales positive. This shows that US-based private equity firms are better in improving in sales and worse in improving productivity on the long term than non-US-based private equity firms. Deal experience Foreign PE is significant for profitability and shows a positive effect.

Table 6.7 Long term impact with US dummy

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-2.056	.272	-4.449*
Foreign dummy	-43.457***	11.611	-42.790***
Deal experience For. PE	6.350***	2.106	3.6155
US dummy	-6.595	-9.410***	29.003***
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.045	.061	.135
RESET	.000	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = *p*<0.1,** = *p*<0.05, *** = *p*<0.01. [a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

6.1.5 Overall impact for the biggest companies

The multiple regressions in this sample are performed on the 160 biggest companies bought by private equity firms of the sample. The observations are selected on company size, which had to bigger than the mean of the company size.

Table 6.8 shows the results for the multiple regressions on the short term for the biggest companies. The F-test on joint significance is performed for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. Deal experience has on the short term a highly significant negative effect on profitability and productivity. More experienced private equity firms are worse in improving profitability and productivity than less experienced private equity firms. The foreign dummy is highly significant for profitability and productivity and shows an economic negative effect on both dependant variables. This implicates that, on the short term, foreign private equity firms perform worse than local private equity firms in increasing the profitability and productivity. The deal experience Foreign PE interaction variable is slightly significant and positive for profitability and productivity and shows a highly significant negative effect on sales.

Table 6.8 Short term impact on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-10.245***	-7.227***	1.217
Foreign dummy	-46.884***	-36.702***	7.247
Deal experience For. PE	5.550**	4.916*	-5.485***
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.160	.167	.164
RESET	.002	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

For the mid term in table 6.9, the F-test on joint significance is performed for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. All the explanatory variables are not significant except for Deal experience Foreign PE, it shows an highly significant negative effect on sales.

Table 6.9 Mid term impact on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	.100	.975	.432
Foreign dummy	-6.741	17.856	4.985
Deal experience For. PE	-1.511	-3.064	-7.376***
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.097	.082	.151
RESET	.008	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The results for the long term in table 6.10 shows the F-test on joint significance results for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a

is accepted, the variables are jointly significant. All the explanatory variables are not significant except for the foreign dummy, it shows an significant negative effect on sales.

Table 6.10 Long term impact on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	2.167	1.122	-3.504
Foreign dummy	-22.040	-6.334	-33.061**
Deal experience For. PE	2.115	3.976	-4.014
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.089	.091	.154
RESET	.118	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

6.1.6 Overall impact for the biggest companies, with United States dummy

The sample with the biggest companies is used for the multiple regressions, only difference with section before is that a dummy is added for the private equity firms that are located in the United States.

Table 6.11 shows the short term results. The F-test on joint significance is performed for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. Deal experience is highly significant and negative for profitability and productivity. More experienced private equity firms perform worse than less experienced private equity firms in improving profitability and productivity. The foreign dummy shows an highly significant and very negative effect on profitability and productivity. Foreign private equity firms perform worse than local private equity firms in improving profitability and productivity. Deal experience Foreign PE shows a positive significant effect for profitability. Interesting, because the variables separately show a negative effect. Deal experience Foreign PE shows a negative significant effect for sales. The US-based dummy shows a negative significant effect for sales.

Table 6.11 Short term impact with US dummy on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-10.242***	-7.241***	1.146
Foreign dummy	-47.057***	-35.917***	11.238
Deal experience For. PE	5.574**	4.809*	-6.031**
US dummy	.450	-2.040	-10.372**
Control variables[b]	yes	yes	yes
Time dummies[b]	yes	yes	yes
Industry dummies[b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.160	.167	.170
RESET	.000	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The mid term results are shown in table 6.12 The F-test on joint significance is performed for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. The main result is the US dummy which is significant and negative for every dependant variable. Private equity firms located in the US perform worse in improving profitability, productivity and sales than private equity firms located somewhere else.

Table 6.12 Mid term impact with US dummy on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	-.162	.710	.169
Foreign dummy	2.554	27.215**	6.930
Deal experience For. PE	-2.791	-4.352*	-7.428***
US dummy	-24.581***	-24.753***	-10.976**
Control variables[b]	yes	yes	yes
Time dummies[b]	yes	yes	yes
Industry dummies[b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.110	.103	.148
RESET	.194	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

The long term results are shown in table 6.13 The F-test on joint significance is performed for every multiple regression, all p-values are below α = 0.05 and therefore the H_0 is rejected and the H_a is accepted, the variables are jointly significant. Again the main result is the US dummy which is significant and negative for profitability and productivity.

Table 6.13 Long term impact with US dummy on biggest companies

Dependent variables → Independent variables ↓	Profitability[a]	Productivity[a]	Sales[a]
Deal experience[a]	2.020	.899	-3.529
Foreign dummy	-16.367	2.220	-32.093**
Deal experience For. PE	1.339	2.805	-4.146
US dummy	-15.071**	-22.726***	-2.570
Control variables [b]	yes	yes	yes
Time dummies [b]	yes	yes	yes
Industry dummies [b]	yes	yes	yes
Intercept	yes	yes	yes
Adjusted R^2	.094	.105	.155
RESET	.002	.000	.000
F-test	.000	.000	.000

Note: OLS regressions, *t*-stats in aren't displayed; significance level * = $p<0.1$,** = $p<0.05$, *** = $p<0.01$.[a] Due to a few large outliers, the distribution of the dependent variable is winsorized by replacing the 5% highest and 5% lowest values by the next value counting inward from the extremes, for the sales variable the distributions is winsorized by replacing the 10% highest values by the next value counting inward from the extremes. For the independent variable the distribution of the data is winsorized by replacing the 3% highest values by the next value counting inward from the extremes. [b] Variables used as in table 6.2.

7. Discussion and Conclusion

7.1 Discussion

Looking at the results in the section before, the hypotheses can all be answered. Table 6.1 shows the results of the t-test performed on the total dataset. The most important operating performance indicators showed a significant difference between local private equity firms and foreign private equity firms, for two out of the three indicators. Therefore for hypothesis 1a, the H_0 is rejected and hypothesis 1a is accepted like expected. Cross-border portfolio companies differ in operational performance from local portfolio companies. This is a reason to analyse the difference in more detail by using the multiple regression analysis. Table 6.1 also shows that for hypothesis 1b, not such a significant difference in company size exists between local private equity firms and foreign private equity firms. Therefore, the H_0 of hypothesis 1b can't be rejected and is accepted. There is no difference between cross border portfolio companies and local portfolio companies for the average company size. This result was against the proposed expectations, based among other things on Aizenman and Kendall (2012), a possible explanation is the relative small amount of firms and years used in this thesis. Aizenman and Kendall use data from over 100 countries and three decades.

For hypothesis two, table 6.4 is of importance and shows that the foreign private equity firms perform worse than local private equity firms in improving the profitability and sales on the long term. When the US-based dummy is added, this effect continues and is persistent. For hypothesis two is the H_0 therefore rejected and hypothesis two is accepted: local private equity firms improve the operational performance of their portfolio companies more than foreign private equity firms. An explanation for this foreseen result is as previously stated explicable on the basis of the information asymmetry: foreign private equity firms are less informed than local private equity firm about the local market. This result is contrary to the network theory, which states that foreign private equity firms outperform local private equity firms due to having more networks and more experience than local private equity firms. However, the deal experience is not significant on the mid and long term, therefore the network theory can't explain the difference in operating performance indicators. Cressy et al. (2007) also found the outperformance of foreign private equity firms by local private equity firms and they explain this by the fact that portfolio companies were already more profitable before the private equity firm took over and the skill in investment selection is the main explanatory variable instead of the amount of experience.

The tables 6.8 till 6.10 show the results relevant for hypothesis three. These tables show the multiple regression models for the short term, mid term and long term of the sub sample of the biggest portfolio companies. The results show a negative effect of the foreign private equity firm on

the short term and it's significant for profitability and productivity and not for sales. The H_0 of the third hypothesis is therefore accepted and the third hypothesis is not accepted. There is no difference between foreign private equity firms and local private equity firms in operational performance, for the subsample of large portfolio companies. This is contrary to the expectations and the result of hypothesis two. The results of hypothesis two showed a negative long term effect for the foreign private equity firms. The results for the third hypothesis show this same negative effect for the foreign private equity firms but it's on the short term and only for profitability and productivity. An explanation can be that foreign private equity firms can have start up problems due to the information asymmetry but when they know the firm longer, this information asymmetry disappears. The main takeaway, is that hypothesis 3 is not accepted and no difference between foreign private equity firms and local private equity firms is present in operational performance, for the subsample of large portfolio companies.

The effect of the United States private equity firms for the entire sample is shown in table 6.5 till 6.7. On the mid term there is a significant negative effect of the United states on all the operating improvements. This effect is persistent on the long term for productivity and sales. US-based private equity firms perform worse in operating improvements than the non-US-based private equity firms. The tables 6.11 till 6.13 for the subsample show the same pattern. The US-based private equity firms perform worse on the mid term for all dependant variables than non-US-based private equity firms. On the long term this effect is persistent for the variables profitability and productivity. The H_0 of the fourth hypothesis is therefore accepted and the hypothesis four isn't accepted. US-based private equity firms don't improve the operational performance of their portfolio companies more than non-US-based private equity firms. The US-based private equity firms perform worse and therefore it's the opposite of what was expected in hypothesis four.

Any theoretical explanation for this effect is hard to find. A possible explanation can be found in the effect of omitted variables. For every multiple regression a reset test is performed and for almost every multiple regression model the H_0 is rejected and omitted variables are present. Further research is required to find other ways in which the operating performances.

Interesting is the fact that the variable deal experience is strongly negative for profitability and productivity for the short term in both samples, with or without the US-based dummy added. This result has never been found and is in contrast to Meuleman, Amess, Wright and Scholes (2007) who have found a significant positive effect of the deal experience on operational improvements. The differences in the measurement of the operating performance can be an explanation for the opposite of the effect. Meuleman et al. (2007) use for instance the absolute number of employees. In contrast to my definition of for instance productivity.

Looking to the hypotheses, hypothesis two stands out. It's the most important hypothesis of all because it captures the core of my research and adds the most value due to the unique character to test both theories, the information asymmetry theory and the network theory. This has never been done before. The main shortcomings of this research are the used dataset and the omitted variables. The dataset is possibly biased because private equity firms have no disclosure requirement and can choose what they disclose and what not. Also a massive amount wasn't available and the initial dataset of 14.000 companies was reduced to 324 companies and could have been way bigger.

7.2 Conclusion

Private equity is an asset class that started to rise at the beginning of the 1980's. Leverage and multiple arbitrage were the usual way of value creation. However, after the junk bond crisis, the private equity industry started to evolve, looking to new ways to create value. Operating improvements started to gain interest of the private equity industry and they quickly became important.

From 1990 onwards until 2007, the cross-border deals increased, from 15 percent in the early 1990's to over 40 percent in 2007 (Aizenman & Kendall, 2012; Europe Invest, 2016). Interesting is why this increased so much. Why do the foreign private equity firms perform better than the local private equity firms, especially for the operational improvements?

This thesis attempted to test: Do foreign private equity firms make a bigger impact on their portfolio companies than local private equity firms? The academic literature delivers two contrary theories: the information asymmetry theory and the network theory, which are tested for the entire sample and for a subsample on the biggest portfolio companies. Also the effect of the US-based private equity firms is tested. The results show that the local private equity firms improve the operational performance of their portfolio companies more than foreign private equity firms and the US-based private equity firms improve the operational performance of their portfolio companies less than non-US-based private equity firms.

The main shortcomings of this thesis is the used data because the private equity firms have no disclosure requirement a lot of data wasn't available. The published data can be biased because the private equity firms only want to show the good or average results. The other shortcoming is the omitted variables that are present in a lot of multiple regression analyses. Further research can examine extra variables which can purify the effect of the main explanatory variables and increase the explanatory power of the analyses. That's however outside the range of a thesis.

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Appendix A

Table A.1 Dependent variable definitions

Dependent variables	Description
Profitability	Portfolio company's change in EBITD margin as a percentage between the year before the private equity firm take over control and one, two or three after: Δ (EBITD/Sales)
Productivity	Portfolio company's change in EBITD to assets as a percentage between the year before the private equity firm take over control and one, two or three after:Δ (EBITD/Assets)
Sales	Portfolio company's change in sales as a percentage between the year before the private equity firm take over control and one, two or three after: Δ ($Sales_t$-$Sales_0$/$Sales_0$)

Table A.2 Independent variable definitions

Independent variables	Description
Explanatory variables	
Deal experience	The ln of the number of prior deals in which the private equity firm has been involved in from the start of the firm until the year that the private equity firm bought the company.
Foreign dummy	Dummy variable that equals one if the private equity firm isn't investing in the same country as where it is based, otherwise zero.
Deal experience foreign PE	Interaction variable, take the ln of Deal experience times the Foreign dummy
US-based dummy	Dummy variable that equals one if the private equity firm is located in the United States, otherwise zero.
Control variables	
Company size	The ln of the amount of sales of the company in the year it is bought by the private equity firm.
Duration	The ln of the time between the investment and the divestment of the private equity firm in the portfolio company in years
Leverage	the ln of the debt to equity ratio of the portfolio company at the year of investment entry of the private equity firm.
PE age	The ln of the private equity firm age' at investment entry based on the foundation year, measured in years
Fund age	The ln of the private equity fund age' at investment entry based on the foundation year, measured in years
Dleverage	the ln of the change in the debt to equity ratio of the portfolio company achieved between one year before the entry of the private equity firm and one, two or three years thereafter.
Time dummies	Time dummies similar to (Strömberg, 2008). The periods are 1995-1999,2000-2004,2005-2007,2008-2012, from which 1995-1999 the base case is.
Industry dummies	The industry dummies are based on the fist digit of the SIC code: SIC0 SIC1 SIC2 SIC3 SIC4 SIC5 SIC6 SIC7 SIC8 SIC9, from which SIC0 the base case is.