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Sector Performance in the Private Equity Industry

An empirical study on Private Equity in the Nordics between 2004 and 2013

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Abstract

This thesis examines performance of PE-backed companies on a sector-by-sector basis in the Nordics. In addition, this thesis provides a holistic overview of the performance of PE-backed companies across three dimensions: Financial and Operational Performance, Insolvency Risk and Employment. The analysis is based on a sample of 248 portfolio companies from Denmark, Finland, Norway and Sweden between 2004 and 2013, measured relative to a control group of non-PE-backed companies identified through propensity score matching. We find that portfolio companies in the industrial sector have higher growth in turnover and significant improvements in operational profitability compared to sector peers. Furthermore, portfolio companies in Cleantech and ICT & Technology exhibit significant higher growth in turnover post-transaction, while no differences in operational profitability are identified. For portfolio companies in the energy-, consumer- and health care & life science sector we find no significant differences in growth or operational profitability. However, our results suggest that portfolio companies in Transportation perform significantly worse in terms of operational profitability. The results from the overall assessment of the Nordic PE industry depicts higher growth for portfolio companies, while the change in insolvency risk is neutral compared to peers. Lastly, PE-backing appears to have a positive effect on job creation, while wage levels are unaffected.

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1. Introduction

To what degree is specialization in the PE industry an important factor? In general, researchers eliminate the impact of individual industries when evaluating the performance of PE backed companies. However, PE funds frequently specialize towards certain countries and sectors (Cressy, Munari, & Malipiero, 2007). In this thesis, we aim to look at this issue by evaluating performance of PE-backed companies in the Nordics overall and on a sector-by-sector basis. Few previous papers have examined performance across all the Nordic countries, and even fewer have analysed sector performance. Using a novel approach in the region, we examine if PE-backed companies outperform their sector peers, in particular with respect to turnover growth and EBITDA-margin improvements. In the the overall assessment, we provide a holistic overview of economic performance across three dimensions: Financial and Operational Performance, Insolvency Risk and Employment.

Using a sample of 248 PE-backed companies, we find that Nordic portfolio companies have a significant higher turnover growth over the first three years post-transaction. On the other hand, the overall results for operational- and financial profitability are more ambiguous. Furthermore, we find no evidence of increased insolvency risk, while PE-backing has a positive effect on job creation. We find no significant impact on average wage levels.

In the assessment of performance of PE-backed companies within each sector, the results suggest that PE-backed companies in the ICT & technology-, cleantech- and industrial sector have been particularly successful in terms of growth. With respect to operating profitability, we find that PE-backed companies in the industrial sector improve their EBITDA-margin significantly more than their sector controls. Conversely, PE-backed companies in the transportation sector have a significant lower change in EBITDA-margins. We find no significant impact of PE firms on companies in the energy-, health care & life science- and consumer sector when assessing turnover growth and EBITDA-margin improvements. Conclusively, we argue that PE-firms are relatively efficient in terms of their allocation, meaning that a large share of the funds are allocated to sectors associated with higher improvements in turnover and EBITDA-margins. This confirms that the sector allocation of PE funds is non-random in the Nordics. Lastly, our regression models suggest that initial levels of operating profitability and leverage have a significant effect on performance. Thus, the selection skills of PE firms is important when examining PE performance.

The PE industry in Europe and the US, referring to Venture Capital (VC) and Buyouts (LBOs), has grown tremendously over the last four decades (Kaplan & Schoar, 2005; Cressy et al., 2007; Migliorini, 2013). Throughout the 1980s, the Private Equity industry in Denmark, Finland, Norway and Sweden (henceforth "the Nordics") was mainly characterized as developing or undeveloped compared to their European peers (Wrigth, Thompson, & Robbie, 1992), implying that PE is a relatively recent phenomenon in the Nordics. However, the Nordic PE market has grown over the years to become one of the most successful in Europe (BVCA, 2012). Currently, the Nordic countries are among the most attractive in Europe for PE firms (Groh, Liechtenstein, & Lieser, 2009), but they are still relatively small compared to their European peers (Wiese-Hansen & Nordal, 2016). 13 % of the 36.3 EURbn that was invested in Europe by PE funds went to Nordic businesses in 2015 (DVCA, 2016). Furthermore, while fundraising fell in Europe from 2014 to 2015, it rose in the Nordic region.

Although the historic returns for PE investors have been relatively high (Kaplan & Schoar, 2005), the PE industry has been controversial both politically[2] and academically (Lundgren & Norberg, 2006; Bakke & Bull-Berg, 2016). PE has been criticised and questioned in terms of whether there has been real value creation or not (Shleifer & Summer, 1988; Elliot, 2007). Additionally, as the Nordic region is relatively small in terms of economic size compared to its European peers, previous academic attention towards the PE activity in the region has been relatively low. Therefore, the necessity of academic research on PE is imperative as a basis for further debates, and to improve the understanding of PE performance in the region. In the first part of the analysis, our aim is to contribute to this ongoing debate by giving a holistic overview of how PE funded companies perform post-transaction.

Secondly, we provide a comprehensive assessment of the sector performance within the PE industry in the Nordics. Academic research suggests a high concentration of capital flows towards very similar industries and companies, indicating the importance of sector characteristics for PE firms. Furthermore, previous research postulates that there is a difference in performance between industries and sectors. Research also points to the importance of industry knowledge and specialization of General Partners (GPs) relative to their peers (Bottazzi, Rin, & Hellmann, 2004; Cressy et al., 2007; Gompers, Kovner, Lerner, & Scharfstein, 2008). In the light of the evidence provided by these previous studies, sector

[2] See for example (SVCA, 2014): "Private Equity har flytt välfärdssektorn på grund av den politiska osäkerheten" or (Elliot, 2007).

allocation and industry experience undoubtedly plays an important role in explaining investor returns. Furthermore, this implies that the understanding of sector performance is important for PE firms when deciding their investment strategy. Our assessment of sector performance aims to give a better understanding of which allocation strategies that are most successful.

In order to analyse the Nordic PE market, we apply a custom data set containing 248 companies invested into by PE firms between 2004 and 2013. Taking a target-performance approach, we examine operational and financial performance together with insolvency risk and employment. The analysis is based on accounting information collected for each portfolio company in the year of the transaction and three years post-funding. The performance of the portfolio companies is then compared against a benchmark consisting of matched companies identified through Propensity Score Matching (PSM).

The results on operational performance are mixed. Firstly, portfolio companies have significantly higher growth than their peers in both turnover and assets, corroborating with previous findings in Scandinavia (Gulliksen, Wara, & Hansen, 2008) and Finland (Bakke & Bull-Berg, 2016). Over the three years post funding, PE-backed companies have an average of 29 % growth in turnover, compared to the 5 % growth for the control group. However, the results for operating profitability are more ambiguous. We find significant improvements in EBITDA-margins, however, only in the third year post-transaction. Due to the large increase in assets, we find a negative effect on financial profitability. These results corroborate some previous findings from continental Europe (Desbrieres & Schatt, 2002; Friedrich, 2015), while contradicting studies from the UK and the US (Scholes et al., 2011; Scellato & Ughetto, 2013).

The results for insolvency risk supports the findings from Norway (Friedrich, 2015) and Finland (Bakke & Bull-Berg, 2016), suggesting a neutral development compared to the control group. We find no differences in ZM- and O-score between the portfolio companies and the controls. Leverage increases by 6 percentage points over the three-year period, compared to a 5 percentage point increase for the controls, suggesting no signifcant differences between the two groups. This contradicts previous criticism accusing PE firms of paying out dividend recapitalizations (dividend recaps) by increasing leverage. Furthermore, this means that the improvements in performance are not attributable to increased debt levels, contradicting Jensen (1989), who suggests that PE-ownership reduces agency costs by increasing leverage. Additionally, our findings suggest that PE firms target companies with a lower financial

distress risk prior to the transaction, corroborating with Tykvova & Borell (2012). Lastly, we find a higher growth in job creation for PE-backed companies. This supports previous findings in Norway (Freidrich, 2015) and Finland (Bakke & Bull-Berg, 2016), while it contradicts results from Sweden (Lundgren & Norberg, 2006). Moreover, we find no differences in average wages between the portfolio companies and the controls. Hence, we find no evidence suggesting value being transferred from the workforce to the shareholders. On the contrary, we find a positive relationship between PE-backing and employment in the Nordics.

To assess sector performance, we run regressions on the matched sample using both growth (turnover growth) and operating profitability (change in EBITDA-margin) as dependent variables. Furhermore, we control for relevant firm characterisitcs and country- and time specific effects in the models to isolate the effect of PE ownership. We find that portfolio companies in the industrial sector have a significant improvent in both growth and operating profitability in the holding period, making it the best performing sector in our analysis. PE-backed companies in Cleantech and ICT & Technology have a significant higher growth than their peers. However, we cannot find an improvement in operating profitability. For Energy, Health Care & Life Science and Consumer there are no signifcant differences, suggesting that the impact of PE is neutral in these sectors. Lastly, portfolio companies in Transportation have growth similar to their control group, while the difference in operating profitability is negative. The results confirms to some extent our hypothesis that PE firms are efficient in their sector allocation. In other words, we find a correlation between the performance of portfolio companies and the involvement of PE. In line with previous research, such as Cressy et al. (2007), the firm characteristics variables suggest that initial levels of profitability and leverage have a significant effect on performance in the holding period. Thus, the skill of selecting the correct companies, i.e. successfully predicting which companies that will have an abnormal performance in the future, is important when examining PE performance.

The reminder of the thesis is structured into five sections. Section 2 explains the PE industry in the Nordics and discusses the importance of PE in the region. Thereafter, previous literature regarding the impact of PE ownership will be reviewed in Section 3. Then follows, in Section 4, a presentation of the data set used in the thesis, while the empirical analysis is conducted in Section 5. In the last section we present our conclusions, summarize the thesis and present thoughts for future research.

2. The Nordic Private Equity Industry

Wright et al. (1992) report a total of 87 buyouts in the Nordics between 1980 – 1987, with 31, 16, 8 and 32 buyouts in Denmark, Finland, Norway and Sweden, respectively. Commensurate with this growth in buyout activity, the first Scandinavian buyout fund, Procuritas Partners, was raised in 1986 (Gulliksen, Wara, & Hansen, 2008). Throughout the 1980s and 1990s, Nordic buyouts were characterised by, large, domestic firms[3] in traditional industries requiring restructuring (Wright et. al, 1992). However, the importance of the Nordic PE industry in Europe has increased over the last decades, evident by the high contribution of international capital to the Nordics. BCVA (2012) estimates that over 50 % of international investments in the Nordic region are PE investments, and international capital seems to be the main driver of growth, measured in both investment and committed capital. Currently, approximately 10 % of all PE investment in Europe are conducted in the Nordics, whereas approximately 5 % of funds raised come from the region. Hence, there is a substantial flow of international capital towards Nordic portfolio companies.

Over the the last 15 years the Norwegian PE industry has experienced rapid growth in terms of number of funds and Assets Under Management (AUM) (Gulliksen et al, 2008). Norwegian investments have grown with a compounded annual growth rate (CAGR) of approximately 11 % since 2008, measured in NOKs (NVCA, 2016). Most of this growth comes from foreign PE firms investing in Norwegian portfolio companies. When measuring PE activity in invested NOKs, foreign and domestic PE firms have invested an approximately equal amount in Norwegian portfolio companies over the last five years. This finding possibly suggests that the Norwegian PE industry is becoming increasingly attractive to foreign investors. One other possible explanation is a reverse relationship with Norwegian fund managers more actively looking for additonal international capital to sustain growth. With respect to amount invested, roughly 75 % of the capital was invested into buyouts, whereas the other 25 % was invested into seed or venture. Even though VC-backed companies normally are of smaller size and expand thereafter, there has been lack of capital in the Norwegian venture market (Wiese-Hansen & Nordal, 2016).

[3] or groups.

Comparing Norway to the other Nordic countries, it becomes apparent that Norway has the least diversified PE industry in terms of sector investments. Approximately 57 %[4] of all PE investments in Norway was invested into the petroleum- or other energy related industries in 2016. Moreover, the Norwegian PE industry has sector-specialist funds directed towards the energy sector such as Hitec Vision and Energy Ventures (Wiese-Hansen & Nordal, 2016). Hence, capital committed should correlate highly with the crude oil price. This finding has a variety of implications. As expected, capital committed was very low in 2009 and 2015, compared to all other years after 2001. This is likely a result of the collapse in the oil price in the year prior to 2009[5] and 2015. Furthermore, this implicates that Norwegian PE-investments are more volatile compared to Nordic peers, since commodities are known to be more volatile than industries such as industrial and consumer. In fact, capital comitted varied from 15,040 NOKm in 2014, to 889 NOKm in 2015 and 17,092 NOKm in 2016. Lastly, one could be opitimistic for the future availability of capital in the Norwegian PE industry, with the current positive development in the crude oil price[6]. Besides the energy sector, consumer-, industry services- and the ICT & technology sector are the largest PE sectors in Norway.

The Swedish economy is the largest in the Nordics (World Bank, 2017), and it has a mature and large PE industry (Wright et al., 1992). The Swedish PE industry currently ranks third in terms of PE investments relative to GDP in Europe, only surpassed by France and the UK[7] (Invest Europe, 2017). Hence, the Swedish PE industry is the largest in the region. In terms of revenue, Swedish PE backed firms generated approximately 318 SEKbn of revenue in 2014, being equivalent to 8 % of Swedish Gross Domestic Product (GDP) (SVCA, 2015). While the Norwegian PE industry has experienced growth, the Swedish situation is more two sided. SVCA (2015) reports total divestments exceeding total investments over the last years, indicating that the buyout industry is in a more mature phase of the investment cycle. On the other hand, Sweden has had the highest increase in number of VC investments from 2010 to 2014 in Europe, with Finland as the second highest ranked country.

Turning towards industry allocation, investments are more diversified across sectors in Sweden, compared to e.g. Norway. Traditional industries such as industrials and particularly consumer services dominate within the buyout segment, with approximately 60 % of the PE-

[4] Considering investments done by Norwegian PE firms.
[5] Naturally, the global financial crisis also played an important role in 2009.
[6] Current official crude oil price at 62.64 USD, as of 12/05/2017.
[7] Total PE investments divided by total GDP (2012-2016).

backed buyouts operating in these industries. Furthermore ICT, i.e. mostly software developers, is the dominant industry when studying Swedish VC-backed companies. What is worth pointing out, is that when excluding investments prior to 2012, health care & life science and ICT are nearly equally well represented sectors and they are dominant for both VC and LBOs[8]. This indicates a shift in terms of buyout- and VC activity in Sweden in most recent years. Additionally, it becomes evident that both buyout- and VC funds have broadened their sector focus over the last year. Lastly, Swedish buyout funds seem to be more diversified than VC funds (SVCA, 2015).

Finnish PE firms reportedly holds approximately 6 EURbn under management with roughly 1 EURbn being invested in 2015. Furthermore, about 425 EURm was raised in funds in 2015. The Finnish PE market has received attention from international investors despite its relatively small size. Roughly 60 % of all PE investments stems from foreign investors investing into Finnish portfolio companies. Still, the Finnish PE market does not appear to have experienced the same growth as some of its Nordic peers. Although the amount of capital invested has increased, the amount of new funds raised annually have remained steady, currently at the same levels as the late 1990s[9]. However, the Finnish VC industry has experienced a similar development as the Swedish VC industry, with a two-fold increase in number of investments since 2010. As mentioned previously, Finland has had the second highest increase in the number of investments by VC firms in Europe the last few years, only surpassed by Swedish VC firms (SVCA, 2015). However, total PE investments have remained relatively stable (FVCA, 2016).

Looking at sector allocation, industry products and services clearly dominate the Finnish PE market, accounting for approximately 45 % of all investments in 2015. Consistent with the findings in Sweden, VC investments is highly concentrated towards ICT & technology and health care, whilst telecommunications is an important industry as well. One clear distinction between Finland and all the other Nordic countries is that agriculture is the second largest industry in terms of invested amount (FVCA, 2016).

[8] 54 % of all VC investments are in either ICT & technology or health care, while 48 % of all investments are in the aforementioned sectors. All numbers are non-value weighted.
[9] It should be noted that the development has been volatile.

Fundraising in Denmark has had a positive development over the last years. On average, the Danish PE firms have raised approximately 2.5 DKKbn a year (Thorninger & Krogh, 2016). In 2014 and 2015, more than 24 DKKbn was committed to various funds. In fact, in 2015 Denmark had the fourth highest ratio of PE investment relative to GDP in Europe. Furthermore, PE funds managed 90 DKKbn in Denmark in 2015. It is also worth noting that despite the Swedish economy being bigger than the Danish, and that a higher number of PE firms operate in the Swedish market, more equity was contributed to the Danish market in 2016 (DVCA, 2017). Conclusively, the Danish PE industry is a developing market with high growth, as further evident of investments clearly exceeding divestments. For example, in 2015 the number of exits were roughly half the number of acquisitions. When examining the proportion between domestic and foreign funds in Denmark, the amount of capital managed by international funds exceeds the amount managed by Danish funds. This implies that the PE industry is an important contributor for attracting risk capital to Denmark (DVCA, 2016).

The consumer- and service sector are the two largest sectors in Denmark. However, the small and medium-sized transport and industrial companies have been especially successful in attracting PE funding. This could suggest that transportation and industrial are the two sectors with the highest growth, and that there is a shift in the sector allocation similar to what we witness in Sweden. Furthermore, this could imply that PE-backed companies in these sectors perform relatively well compared to sector peers in Denmark[10].

To summarize, it is apparent that the PE industry in the Nordics has matured over the last 15 years. Moreover, PE activity has increased albeit some differences across countries exists. We enumerate several possible explanations for the development in the Nordic market. Firstly, non-Nordic investors seems to have become more familiar with the region, contributing with more capital to the industry. Alongside the advance in the Nordic PE industry, it is reasonable to assume that fund managers are becoming better to identify and negotiate deals, which is expected to increase deal flow (Wright et al., 1992). What should be kept in mind is the low interest rate environment that has been lasting for several years, likely contributing positive to capital commitments. In the assessment of industry investments in the Nordics, ICT & technology, industrial, consumer, energy and health care & life science seem to be the most attractive sectors for PE firms, although there is substantial heterogeneity within the region.

[10] 2015 European Private Equity Activity, Invest Europe (2016).

3. Related Literature on Private Equity

PE has received relatively little attention in the academic literature despite its dramatic growth and increased importance in global capital markets. This is due to the existing difficulties associated with analysing data to assess the financial performance of funds and portfolio companies (Kaplan & Schoar, 2005). These difficulties derive from PE firms being exempt from disclosing financial information, as they are not publicly traded (Fenn, Liang, & Prowse, 1997). However, more research on both fund level data and firm level has been conducted over the last decades. Most of the research has been on PE in the U.S., due to it being the largest and first major market. Nevertheless, more academic attention has been devoted to Europe, commensurate with the growth in the industry (Wright et al., 1992). The majority of this research has been on PE in the UK where the activity has been highest. The Nordic market is, however, still relatively uncharted. Furthermore, little academic attention has been provided to assess the differences in PE performance between sectors.

A substantial body of empirical research suggests that PE firms create value for the funded portfolio company, and that PE-backed companies improve operational profitability and productivity (see e.g. Jensen, (1986); Jensen (1989); Kaplan, (1989); Lichtenberg & Siegel, (1990); Kaplan & Schoar, (2005); Cressy et al., (2007)). Jensen (1989) argued that PE is a more efficient organisational form within mature industries, and that LBOs would become the dominant corporate organisational form in these industries. This is due to the alleged performance incentives associated with increased leverage and the monitoring role of the PE firms. The management in companies with a high level of free cash flow are more likely to invest in operations with a negative NPV instead of paying out excess cash to the investors. This type of behaviour has a negative impact on the value of the firm. By increasing leverage following the PE funding, the management is constrained to focus on more profitable projects in order to meet the payment terms. Hence, PE ownership reduces some of the agency cost between owners and management.

However, not everyone have concurred with PE being an improvement over the traditional organisational form, claiming that it does not add economic value. This research postulates that increased investor returns is a result of value being transferred from other stakeholders to

the shareholders[11]. Shleifer & Summers (1988) suggest that a large part of investor returns is a result of rent-seeking behavior and wealth re-distrubtuion from employees to shareholders, rather than wealth creation. Additionally, critics claim that the PE industry is value extracting and not value creating through asset stripping (Elliot, 2007).

Further in this section, we give a more comprehensive review of previous academic research on PE. The reminder is divided in three different parts, reflecting the focus of the analysis. These sections are financial & operational performance, insolvency risk and employment.

3.1 Financial & Operational Performance

Research on financial performance has been conducted on both fund level- and firm level data. Since fund level data is not available in the Nordics, the review will focus on research on firm level data. Most of the studies suggest that PE funding has a positive effect on financial performance of the portfolio companies. However, there are some contradicting findings.

Several studies during the late 1980s and early 1990s examine firm level data, comparing the financial performance of PE-backed companies, either to an industry benchmark or to their historical performance prior to the buyout. In the research focusing on management ownership in buyouts, Kaplan (1989) found that management in Public-to-Private (P2P) transactions increased their ownership percentage by a factor of four. Hence, both upside- and downside potential for the management increases in these companies. Recent studies corroborate these findings. Acharya, Hahn, & Kehoe (2009) conduct a study on 66 large buyouts from 1997 to 2004. The results show that the average management team as a whole gets 15 % of the equity and that the CEO get 6 %. By connecting the financial performance to the payoff structure for the management, PE creates incentives for maximizing performance. Thus, PE-ownership reduces agency cost as suggested by Jensen (1989). However, the findings of Nikoskelainen & Wright (2007) do not explicitly support Jensen's (1989) hypothesis. Their results postulate that the main drivers of increased value are not the governance mechanisms in LBOs. On the contrary, they suggest that the size of the buyout drives the returns.

[11] See for example. Lowenstein, (1985), Elliot (2007), Shleifer & Summers (1988).

Academic research focusing on financial performance finds a positive effect of PE-funding. Scholes, Wilson, & Wright (2011) analyse different financial performance ratios of PE-backed companies in the UK from 1995-2010, by comparing them to a matched sample of private- and listed companies. Their results suggest that the target companies achieve superior financial performance, such as return on assets, relative to peers both before and during the recession. Scellato & Ughetto (2013) study a group of 241 private-to-private buyouts in Europe and a control group of non-buyouts using PSM. They examine the impact of PE funding on financial profitability and size, and the results indicate a positive effect on buyouts with respect to growth of total assets for target companies.

Most of the academic literature postulates a positive effect on operational performance in LBOs (Kaplan & Strömberg, 2008). Evidence from the US shows a significant positive effect on cash flows and profitability two to three years after the buyout, compared to the initial year. Kaplan (1989) finds a decline in the capital expenditure to sales ratio and an increase in cash flow to sales as well as operating income to sales, when examining 48 US Management Buyouts (MBOs) between 1980 and 1986. These changes are associated with increased value. Furthermore, Kaplan's (1989) findings favour the reduced agency cost theory, as a substantial part of the informed parties irrationally do not participate in successful buyouts. Bull (1989), Malone (1989), Singh (1990), Smith (1990) and Muscarella & Vetsuypens (1990) find similar results.

Moreover, Lichtenberg & Siegel (1990) find improvements in Total Factor Productivity (TFP) up to three years after the buyout for MBO plants in the US compared to industry benchmarks. However, they also find higher productivity compared to the industry before the buyout took place. One could suspect that these improvements came at a cost of other stakeholders. However, they reject this hypothesis since the increase in TFP is not a result of either reduction in capital investments, R&D, wages or layoffs (Amess, Gilligan, & Wright, 2009).

The majority of the findings from European research on productivity enhancements of PE-funding supports previous findings in the US-market concerning TFP. Harris, Siegel & Wright (2005) examine the TFP of 35,752 manufacturing establishment pre- and post-MBOs. Their findings show that plants are less productive compared to their peers pre-buyout, but they experience a significant increase in productivity post-buyout. This increase appears to be a result of new owners taking measures to reduce the labour intensity in production by

outsourcing intermediate goods and materials. The findings imply that MBOs enhance economic efficiency. However, studies conclude ambiguously when examining productivity enhancements in PE. Scellato & Ughetto (2013) do not display the same enhancement in efficiency, as they cannot find a significant difference in TFP between buyouts and their peers. To summarize, the majority of the literature suggests productivity improvements in the U.S., while the results are more mixed in Europe. Furthermore, previous literature finds contradicting evidence regarding the relative productivity of the target companies prior to the investment, i.e. differences in the characteristics of buyout candidates.

In addition, previous research in Europe supports the results from the U.S. that find operational improvements in other areas than TFP. Wright et al. (1992) analyse buyouts in the UK from the 1980's and find improvement in profitability and working capital management. Boucly, Sraer & Thesmar (2008) and Weir, Jones & Wright (2015) find similar results. Cressy et al. (2007) study 122 buyouts in the UK over the period 1995-2000, compared to a matched sample of non PE-backed-companies, to examine whether buyouts have a higher post-buyout operating profitability. They find that the PE-backed companies have an operating profit greater by 4.5% compared to their peers over the first three post-buyout years. Furthermore, if PE firms are specialized in industry selection, this adds 8.5 % to the operating profitability advantage. This suggests that differences among industries can explain a part of the differences in profitability of portfolio companies.

Other research contradicts the aforementioned literature suggesting an improvement in operating profitability. Guo, Hotchkiss & Song (2011) study post-buyout data of LBOs completed between 1990 and 2006 in the U.S. They only find modest increases in cash flows and operating margins. Moreover, the improvements are relatively small compared to those found in deals from the 1980's. Similar results are found by Weir, Jones & Wright (2007), who only find moderate improvements in the UK from the same time period. Even more contradicting are the findings of Jelic & Wright (2011), which show no significant improvements in efficiency or profitability at all, when looking at 1,225 buyouts in the UK occurring between 1980 and 2009. However, they do find positive effects on employment and output.

Turning towards the Nordics, Grubb & Jonsson (2007), Gulliksen et al. (2008) and Friedrich (2015) find evidence of significant improvements in PE-backed companies. Friedrich (2015)

analyses the effect on 113 buyouts in Norway up to three years after the buyout, compared to peers selected through PSM. Furthermore, the long-term performance and immediate effect are assessed in the thesis. The results suggest improvements in operating income and net cash flows. Additionally, Norwegian buyouts have been associated with a substantial increase in inflation-adjusted sales, asset turnover and TFP. This implies that PE firms do not only aim to improve efficiency, but that they also focus on the overall potential of the firms. Bakke & Bull-Berg (2016) study buyouts from Finland over the timespan from 1999 to 2015 compared to a benchmark constructed using PSM, but find no significant operational improvements besides turnover. This improvement is also significant when controlling for sales growth prior to the buyout. This is in line with the findings from Gulliksen et al. (2008), implying that future growth potential is the most important investment criteria when identifying buyout targets in the Nordics. Therefore, the results on operational profitability in the Nordics seem to be somewhat mixed, similar to the rest of Europe.

3.2 Insolvency risk

Despite increased debt levels being associated with reduced agency costs, there has also been criticism against increasing leverage post-buyout. Increasing returns by exploiting tax shields in form of higher interest payments represent a transfer of value from taxpayers rather than creating true economic value (Guo et. al, 2011). In some cases, PE-firms use increased debt to undertake a dividend recap. This is at a cost of debtholders and other shareholders, since bankruptcy rate and financial distress risk increases (Kaplan & Stein, 1993). Moreover, the financial institutions themselves might be affected negativly by the increasment in the bankrupcy rate. Consequently, there is a debate about the impact of the excessive usage of debt levels by PE firms, and the corresponding effects on the stability of the financial system as a whole (Friedrich, 2015).

Kaplan & Stein (1993) study the changes in pricing and financial structure of 124 MBOs between 1980 and 1989. They find that prices increase relative to current cash flows without a compensation in form of decreased risk nor expected future cash flow. Other findings are; (1) required bank principal repayments increased, resulting in lower ratios of cash flow to total debt obligations; (2) Public debt replaced private subordinated debt while usage of strip-financing techinces declines and lastly, (3) the management teams invest a smaller fraction of

their net worth in equity post-buyout. Together, these findings imply that PE-backed-companies have a higher financial distress risk. Bruner & Eades (1992) find similar results. Strömberg (2007) finds an annual default rate of 1.2 %, looking at a list of some 27,000 buyouts at a global level, compared to Compustat's annual rate of 0.6 %.

There is also literature that does not share the same negative view on increased debt levels in PE-backed-companies. Tykvova & Borell (2012) study European buyouts during the period 2000-2008. Their findings contradict the abovementioned literature, suggesting a higher bankruptcy rate for PE-backed-companies when compared to their peers. Furthemore, they suggest that PE firms target companies with a lower financial distress pre funding, and that the distress risk increases after the transaction. However, the distress risk for the portfolio companies does not exceed the risk of the comparable companies three years after the investment. Similar results are found in Finland by Bakke & Bull-Berg (2016), where the portfolio companies seem to have a comparable development in financial distress risk as their peers. Grubb & Jonnson (2007) study PE-backed companies in Sweden, and they find no evidence suggesting increased debt levels. In Norway, Friedrich (2015) does not only find no evidence for a considerable change in distress risk. The findings even suggest a decrease in debt levels post-buyout.

It seems that the majority of the literature supports the criticsism against PE, postulating that PE funding has a negative impact on insolvency risk. However, more recent literature focusing on the Nordic market contradict this criticism. This suggests that there could be differences between regions when assessing insolvency risk.

3.3 Employment

The major point of criticism against PE ownership might have been its effect on the workforce in the acquired companies. The improvements in operational and financial performance that benefits the investors are accused to be at an expense of the employees in form of wage- or job cuts. However, the results found in the literature are mixed. Kaplan (1989) finds a small increase in employment in his study of US P2P buyouts in the 1980's, while lower than the industry benchmark. Lichtenberg & Siegel (1990) also find a similar result, with employment growth being below industry average post-buyout. Davis, Haltiwanger, Jarmin, Lerner &

Miranda (2008) study LBOs in the US from 1980 to 2005. Their findings suggest that employment in target firms have lower growth rate compared to the peers from the same industry post-buyout. However, they also find that target firms tend to have a lower growth rate prior to the buyout. Similar to the findings on performance and insolvency risk, this implies that there are certain characteristics PE firms search for in their target candidates. In addition, their results suggest that there are differences among industries, with the retail industry having significant lower growth compared to other industries. This indicates that there might be differences between sectors as well.

Studying buyouts in the UK from 1999 to 2004 Amess & Wright (2007a) find a slightly higher growth in employment for MBOs, while the growth is lower for Management Buy-Ins (MBIs). In a following study on UK buyouts the same year, Amess & Wright (2007b) cannot find a difference in employment growth between buyouts and comparable firms. However, they do find a lower growth in wages for the buyouts. The findings of Boucly et al. (2008) contradict the literature previously presented suggesting that PE ownership has a negative impact on employment. In fact, their study on French deals from 1994-2004 suggest that LBO targets have a significantly higher employment growth. Similarly, Friedrich (2015) finds in his sample of Norwegian buyouts that the PE-backed companies create more jobs compared to the control companies. Furthermore, the buyouts have a higher growth in wages as well.

Hence, the results from research examining employment are more mixed than the findings from performance and insolvency risk. When concluding, PE-funding seems to have a neutral effect on employment. Moreover, there seem to be a significant difference between regions regarding PE ownership and the impact on employment and wages.

4. Data Sample

To conduct the empirical analysis, we need a comprehensive overview over the PE activity in the Nordics. This is provided through the Argentum's Centre for Private Equity ("ACPE") database, containing a list of PE transactions in the Nordic countries. In addition, we use accounting data from the Amadeus Database ("Amadeus") provided through Wharton Research Data Services ("WRDS"), to assess the performance of these identified portfolio companies. In the Appendix we provide a more detailed presentation of ACPE and Amadeus, together with a review of the sources used to obtain accounting data.

4.1 Sample Selection

The accounting data from Amadeus is merged with the transaction-specific data using the organizational numbers provided by the ACPE list. Despite the relatively high quality of the data, several difficulties are associated with using the data. Firstly, since we examine post-funding performance, at least 3 years of data after the transaction is required to be included in the sample. Secondly, a significant share of the portfolio companies are involved in several transactions. This is due to participation of more than one PE firm; either at the same time, through a sale from one fund to another, or as a result of a follow-on investment of the same firm. Thirdly, a main concern when using the transaction list is that for a considerable share of the deals, we do not have the investment entry- and exit points.

To address these concerns, investments occurring in 2014 or later are discarded. Moreover, we only include the first investment for each portfolio company. This implies that the thesis has a focus on performance the first time a portfolio company is acquired or invested into by a PE firm. A second consequence is that we do not utilize the information associated with trade-sales, follow-up investments and other transactions after the first entry point. Therefore, we caution that the data might not be ideal for generalizing about all PE transactions, as we only measure the impact when a company is acquired or invested in for the first time by a PE firm. Furthermore, we only use observations where the investment year is indicated. Since it is difficult to assess why some of the investment information is missing it is challenging to evaluate if a potential bias is introduced.

Additionally, we are not able to use the observations if the accounting information from Amadeus does not match with the holding period. A relevant note is that the data provided by Amadeus is limited, especially for Denmark. For Danish companies, we only obtain accounting data for the last five years, i.e. from 2012 and onwards. Hence, we cannot analyse Danish transactions prior to 2012. Moreover, it is only possible to obtain a maximum of eight years for each company. We cannot identify any systematic reason behind the restrictions of Amadeus, making it difficult to assess a potential bias. However, it clearly restricts the period analysed in the thesis.

A considerable part of the sample reports accounting figures for the portfolio companies together with the consolidated figures for the whole group. When obtaining the accounting information, we do not have specific information regarding the whole group and the minority companies that might be included. We assume that PE firms mainly control the holding company, and have little or no control over subsidiary firms that are included in the consolidated figures. Hence, consolidated figures are discarded to avoid introducing a bias[12].

To sum up, the aggregate effect of the restrictions mentioned in this and the two previous segments restricts the sample to 346 companies. A further elaboration on the strengths and weaknesses of the data set is provided in Section 4.3.

Before proceeding to the descriptive statistics in Section 4.2, we consider the potentially large influence of outliers in the sample. To address this concern, we examine the distribution of the variables included in the analysis. Numerous portfolio companies report highly negative Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA) and little assets on their balance sheets. Hence, the data set consists of observations with extreme financial ratios, and these observations are generally small companies. These observations have a large impact on the data set, and to address this issue we create winsorized estimates to obtain estimators that are more robust.

The variables in the data set are winsorized at a 99 % level. Winsorizing entails assigning extreme observations in the sample to a specific quartile. Hence, values below the 0.5 %

[12] To assess the impact of this choice, we perform the analysis with consolidated figures as well. As can be seen in Appendix, from Table XVI to Table XVIII, the results are not affected to a large extent. Note that this choice only affects the companies where both consolidated- and unconsolidated figures are reported. This is only the case for a small part of the sample.

percentile are set to the 0.5 % percentile, whereas the 0.5 % highest values will be assigned to the 99.5 % percentile (Yaffee, 2002). Based on existing literature, winsorizing at a 99 % level is conservative although in line with previous research (Brandon & Wang, 2012). Furthermore, all variables are winsorized complying with the majority of academic accounting literature (Leone, Minutti-Meza, & Wasley, 2017). Albeit assigning new values to the outliers interferes with the original observations, we argue that the increased robustness outweighs the downside. Still, the robustness of the winsorization should be evaluated (Wooldridge, 2012). Thus, we perform an analysis without winsorized variables, and the corresponding results are depicted in Table XII in the Appendix.

4.2 Descriptive Statistics

Looking at the overall distribution, we see that the sample consists of 346 companies ranging from 2004-2013. Table I, Panel A provides the distribution between sector and year, while Table I, Panel B depicts the distribution between countries and sectors. Both the median and mean year is 2010. Thus, a substantial share of the transactions in the sample is from the post-financial crisis period.

Moreover, Panel A depicts a large variation in the number of transactions per year. This is consistent with the expected cyclicality in the PE industry. Several factors come into play when PE firms select their target companies, and one of them is timing (Kaplan & Strömberg, 2009). The descriptive statistics therefore display that we need to consider this in the analysis, since timing may explain some of the post-funding performance. Additionally, Panel A depicts large variation between countries, with significant more observations from Norway and Finland compared to Denmark and Sweden in our sample.

Panel B displays a large variation between the sectors. Consumer, Industrial and ICT & Technology are the largest sectors in the sample, with 51, 89 and 91 observations, respectively. On the other hand, the transportation sector is the smallest in terms of number of observations, with 15 deals. This is in line with the distribution we would expect based on the aforementioned focus of PE in the Nordics. There is also a significant correlation between sectors and countries, as for example 34 of 35 energy-transactions are Norwegian.

Table I – Distribution over Sector, Country and Year

Panel A: PE-Funding distribution over Sectors and Countries

	Total	Energy	Technology & ICT	Industrial	Health Care	Cleantech	Consumer	Transportation
Country								
Denmark	32	1	7	6	2	4	10	2
Finland	129	0	28	54	15	13	14	5
Norway	153	34	42	22	16	17	14	8
Sweden	32	0	9	7	4	2	10	0
Total	346	35	86	89	37	36	48	15

Panel B: PE-funding distribution over Sectors and Year

	Total	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Sector											
Energy	35	0	0	2	3	3	4	6	4	6	7
ICT & Technology	86	0	0	2	9	9	9	15	8	17	17
Industrial	89	1	1	2	12	15	8	17	12	15	6
Health Care	37	0	0	0	4	5	4	10	3	7	4
Cleantech	36	0	0	0	6	4	4	10	1	6	5
Consumer	48	0	0	3	5	4	1	9	9	12	5
Transportation	15	0	0	0	1	1	3	4	1	4	1
Total	346	1	1	9	40	41	33	71	38	67	45

Panel A depicts the distribution over Sectors and Countries. Panel B depicts Sectors over Years. The sample consists of 346 observations, and this is the final sample prior to PSM is applied. The observations with missing covariates will be discarded subsequent to the PSM.

4.3 Strengths and Weaknesses of the Data Set

To assess real economic value creation of PE firms, we would preferably have analysed cash flows and not accounting data. However, such data material is not available in the Nordics, as PE firms do not have to disclose cash flows. As a result, we need to rely on accounting data for the portfolio companies and analyse the effect of receiving PE funding when examining the performance of PE firms. Thus, we highlight that the analysis is based on the assumption that accounting performance correlates highly with real performance.

In the analysis, we measure economic performance in the three years following the PE investment, i.e. from year T+1 to year T+3. The data structure has a variety of implications. Firstly, it restricts the analysis. As we cannot compare each company before and after the transaction, we need to examine the changes in economic performance the following years. As will be further elaborated in Section 5.1, these changes need to be compared against an appropriate sample of matched companies. Optimally, we would have analysed the performance of the companies *prior* to the investment with post-investment performance. However, this involves discarding many observations as we lack accounting information prior to funding for a large part of the observations. Furthermore, as we do not utilize accounting data prior to the transaction, we are not able to control for pre-investment characteristics that might correlate with performance going forward. For example, it would be benefital to control for the growth in the number of employees prior to the funding. It is not unlikely that the growth in work force is an autoregressive process, meaning that current growth depends on previous growth. Therefore, we should be somewhat cautious in our conclusions, and possibly not attribute the full effect of the relationships we find to PE funding.

A main strength of the data set is that it consists of data from the PE activity from the entire Nordic region[13]. The risk of losing observations when merging transaction data and accounting data is quite severe. Therefore, one would most likely not be able to analyse the differences between sectors with data from only one country in the Nordic region, due to too few transactions in the final sample. By collecting data from the four countries, we become more certain of having enough observations for each sector to detect any statistical and economical difference, if it exists.

[13] Besides Iceland.

It is important to note that the four countries have several differences despite the Nordics being referred to as one region. For example, the different regulatory environments in the countries, different accounting standards, or the state of the economy could influence the performance of the companies. Consequently, treating the entire region as one unit, e.g. comparing the performance of a Norwegian portfolio company with a comparable company from the same sector, but in Denmark, would be misleading. A potential difference in performance could be due to the different country they operate in. Therefore, it is imperative that we compare companies from the same sector and country. This procedure is explained in Section 5.1.1.

As mentioned previously, there exist a trade-off between including portfolio companies one or multiple times in the data set. If observations are included more than once, we utilize a larger part of the data material. On the other hand, the inclusion of a portfolio company multiple times could in the worst case introduce a survivorship bias. This is a result of the worst performing observations not being invested into several times, while the most attractive companies will go through many rounds of financing and shifts in corporate ownership. If many observations for each company were included, we would expect an upward bias in the assessment of economic performance. In this thesis, we only assess the first time a portfolio company is invested into, as we do not always have the information regarding when investments are existed by the funds.

Lastly, the missing accounting figures influence the choice of metrics used in the analysis. Almost all the observations miss information regarding added value, i.e. gross profit, and interest paid. This weakens the assessment of productivity and insolvency risk. Firstly, added value is a measure of output produced by a company. In our case, we cannot asses output due to the missing figures. Thus, a productivity analysis would entail excluding whole countries and sectors from the analysis. Faced with the trade-off between excluding the productivity analysis and presenting a productivity analysis for less than 50 % of the observations, we choose not to perform the analysis. Secondly, we cannot assess the coverage ratio, as we do not have information regarding interest paid. However, we include four other metrics to assess the change in insolvency risk. All of the metrics used in the analysis will be presented later in Section 5.2.

4.4 Other Considerations

Before we turn to the analysis, one data structure issue should be highlighted. The issue is how to classify the sectors and industries based on the data structure. The data provided by Amadeus separates the portfolio companies into 996 industry segments, through the four level NACE revision 2 classification (Eurostat, 2008) [14]. Furthermore, the transactions are classified into seven sectors in the data sets provided by ACPE. The first classification made by Amadeus is too wide for our purpose, as we argue that such an extensive specialization does not correspond with specialization of PE firms. Furthermore, we need to have a consistent way of classifying PE-backed companies and the control group. As a result, it is not feasible to apply the sector classifications from the ACPE data set to the matching companies and vice versa. To address this concern, a custom seven-sector system is developed, with a basis in the second level NACE codes[15]. We have chosen to divide the companies into the following sectors through our classification scheme: Energy, ICT & Technology, Industrial, Health Care & Life Science, Cleantech, Consumer and Transportation. This is nearly in line with the initial classifications of the transactions and Friedrich (2015), who applied the same ACPE database in the initial data gathering. However, "Other" is removed, and "Transportation" is included. This entails manually assessing each transaction categorized as "Other" in the ACPE list and assign it to a new category. Furthermore, we examine all companies and assign the relevant companies to the transportation sector. In line with Gompers et al. (2008), we group the industry segment into sectors based on technology used, whilst the perceived target market and resources used are also considered. For a detailed overview of the classification scheme, see Table XIV in the Appendix.

For the sake of clarity, any classification of portfolio companies might be perceived as arbitrary. What should be kept in mind, however, is that the best non-custom alternative would be to classify the companies according to their first level NACE code, given the structure of the data set and feasibility. This level consists of 21 different categories, and is also deemed to be too wide for our purpose. The main argument for only including seven sectors is that we need to match sector corresponding with the specialization of PE firms, and we need to have a sufficient number of observations in each sector. Secondly, a narrower classification could

[14] Statistical classification of economic activities in the European Community.
[15] To clarify, each of the 88 two digit NACE codes are assigned into one of our 7 custom sectors manually. As an example, company DK11123244 is classified as 4643 according to NACE rev. 2. We utilize the first two digits 46 i.e. Wholesale trade, except of motor vehicles and motorcycles. According to our custom scheme, these companies are classified into sector six; consumer.

be less consistent in our opinion. For example, when using NACE level 1 as used in Bakke & Bull-Berg (2016), both manufacturing of machinery and equipment[16] and manufacturing of basic pharmaceutical products and pharamaceutical preparations[17] are classified into ”C: Manufacturing”. Using our custom scheme, companies that manufacture machinery, equipment and electronics are classified as industrial, whilst companies that manufacture pharmaceutical products and pharmaceutical preparations are classified as Health Care & Life Science. Conclusively, we argue that the scheme secures that companies are classified in an appropriate, and in some cases, more accurate manner.

[16] NACE level 2 code: 28.
[17] NACE level 2 code: 21.

5. Empirical Analysis

In this section, we control for the endogeneity issues relating to the funding decision of PE firms, taking into account that funding decisions are non-random. To assess the significance of post-funding changes in performance and rank the sectors accordingly, the PE-backed companies must be compared against an appropriate benchmark. Previous empirical literature proposes numerous methods for defining appropriate control firms. We will use the PSM methodology to address the selection bias issue.

5.1 Propensity Score Matching Methodology

The objective of this thesis is to address the impact of the PE industry in the Nordics, and to see whether there are significant differences between sectors. As mentioned in Section 4.5, the respective sectors used for this purpose are Energy, ICT & Technology, Industrial, Health Care & Life Science, Cleantech, Consumer and Transportation. The performance of the companies is measured along three different dimensions: financial and operational performance, insolvency risk and employment. To analyse the effect of PE along these dimensions we need to compare the PE-backed companies with a group of non-PE backed companies. However, the non-random selection process of target companies creates some challenges (Caliendo & Kopeinig, 2008).

With a random selection process, we could simply calculate the difference between average outcome for PE-backed companies and non-PE-backed companies, i.e. the population Average Treatment Effect (ATE):

$$\tau_{ATE} = E(\tau) = E[Y(1) - Y(0)] \quad (1)$$

The ATE estimator tells us what the expected effect on the outcome is if portfolio companies were randomly selected by the PE funds. As Heckman (1997) points out, this estimate might not be of relevance since it includes the effect on companies that were never a PE candidate to begin with. Thus, the PE-backed companies differ both in terms of receiving treatment, i.e. receiving PE funding, and in their initial characteristics. PE funds look after certain characteristics amongst their investment candidates, as described in Section 3. These firms

often have improvement- and growth potential (Harris et al., 2005), while the firms acquired preferably also have strong financial positions (Tykvova & Borell, 2012). Furthermore, academic research suggests that sector allocation and the geographical focus of PE funds is non-random (Cressy, et al., 2007). Lastly, PE activity tends to correlate with the economic cycles, suggesting that timing is not a random factor (Kaplan & Strömberg, 2008). Conclusively, taking a mean outcome of non-PE backed companies as an approximation is not advisable, since target firms and non-PE-backed companies are systematically different even in absence of the buyout (Caliendo & Kopeinig, 2008). Moreover, these characteristics might be correlated with post-funding performance. In other words, if this selection bias is not taken into account, a statistical significance relationship could potentially be a result of PE firms selecting better firms, and not due to the impact that PE-ownership. We need to control for this selection bias to isolate the treatment effect of interest, i.e. the effect of a shift in corporate ownership through PE-funding. Hence, a more suitable parameter than ATE is needed.

A more appropriate parameter would be the Average Treatment effect on the Treated (ATT). We focus solely on the effect of the buyout on the portfolio companies using ATT.

$$\tau_{ATT} = E(\tau|D = 1) = E[Y(1)|D = 1] - E[Y(0)|D = 1] \quad (2)$$

The ATT estimator compares the average outcome of the portfolio companies with PE funding, against the counterfactual outcome where they are not bought by a PE firm. This assumes that we can analyse the effect of PE funding by observing the target firms over the same period with and without PE funding. Naturally, this is a non-observable scenario since the investment decision by PE firms is a dichotomous variable. Therefore, it would be optimal to find companies that are identical to the PE funded companies, but without PE funding. As this is not possible, the procedure involves identifying companies with similar observable characteristics to the portfolio companies prior to the acquisition. By doing this, the performance of our control group can serve as a proxy for the performance of the portfolio companies post funding, without them actually being backed by a PE firm.

This is achieved by applying PSM, which predicts a propensity score by relating a binary variable to a set of predictors. The propensity score is the predicted probability for a company to be treated, i.e. to receive funding by a PE firm, given the observed characteristics

(covariates). We can then match our target companies with other non-PE backed companies that have similar propensity scores. These matches will have characteristics similar to the target companies before they received funding (T=0), thus, serving as an approximation for the outcome of the target firms without PE funding.

It is imperative that the outcome for the untreated state must be independent of the treatment assignment when estimating the propensity scores (Caliendo & Kopeinig, 2008). This form of exogeneity is referred to as unconfoundedness (Rosenbaum & Rubin, 1983), selection on observables (Heckman & Robb, 1985) or conditional independence assumption (Lechner, 1999). What should be kept in mind is that we implicitly assume that we are able to observe all relevant characteristics. If it exists non-observable characteristics that correlates with the treatment, we may not be able to match the funded and non-funded companies on these characteristics. This will most likely introduce a bias as we de facto are comparing companies with crucial differences. To address this potential bias, we follow similar studies[18] when specifying the matching model.

Going forward, we will follow three steps when creating our PSM sample, namely determining the distance measure, choosing an appropriate matching method and lastly assess the quality of the matches (Stuart, 2010).

5.1.1 Distance Measure

There are two main aspects for determining the distance measure. The first is to determine which covariates to include. The second is to combine these into one measure. The key criteria when determining covariates is that there is no unobserved differences between the target firms and the control group conditional on the observed covariates, referred to as strong ignorability (Stuart, 2010). To satisfy this assumption, it is crucial to include all variables known to be related to both the PE investment and the outcome in the matching procedure (Rubin & Thomas, 1996; Hecman, Ichimura, & Todd, 1998; Glazerman, Levy & Myers, 2003). Dehejia & Wahba (1999) show that omitting suitable variables can increase the bias in the resulting estimates greatly, and Shaedis, Clark, & Steiner (2008) prove that models including a limited set of variables generally perform poorly. Furthermore, including variables that are not associated with treatment assignment will be of little influence in the propensity score,

[18] See (Bienz, Thorburn, & Walz, 2016).

meaning that the cost of including extra variables is low (Stuart, 2010). However, one should be careful not to include variables that are believed to be affected by the PE investment, or the anticipation of it (Rosenbaum, 1984; Frangakis & Rubin, 2002; Greenland, 2003). To ensure this, variables should either be measured prior to the investment or fixed over time (Caliendo & Kopeinig, 2008). Hence, the cost of omitting a suitable variable seems to be higher than the cost of including a variable that is not related to a PE funds' decision to invest. This implies that we should include a variable when in doubt on whether it is suitable or not, as long as we are sure it is not affected by the PE investment. This is in line with the findings of Ruben & Thomas (1996).

Barber & Lyon (1996) argue that the matching should be done on the variables the year before the transaction to reduce bias, supported by Holthausen & Larcker (1996) and Kaplan (1989). However, our data set lacks accounting data for the year prior to the transaction (T-1) for most of the observations. To avoid reducing the number of observations significantly, we will match on variables from the year of acquisition (T=0), following Bienz, Thorburn and Walz (2016), and Bakke & Bull-Berg (2016).

In order to choose covariates, we have used the statistical significance approach, meaning that new variables are kept if they are statistically significant at conventional levels. The chosen covariates are deemed important for both the PE firms' decision to invest and post-funding performance of the acquired company. EBITDA, Return on Assets (ROA) and Leverage[19] are chosen as covariates to exhibit the operational and financial state of the company, while logs of size[20] and age are also included. The propensity score is calculated using a logit probability model, as the linear probability model is disregarded due to its shortcomings (Smith, 1997). Still, in a binary treatment case, i.e. a case with the probability of a company being invested into or not, the logit and probit model yields similar results. However, the logit model is preferred due to more mass in the bounds (Caliendo & Kopeinig, 2008).

As mentioned in Section 4.3, it is imperative that we compare the portfolio companies with control companies from the same country, due to differences in the regulatory environment, accounting standards and the economic state. Furthermore, this thesis aims to examine differences in PE performance between the seven defined sectors in the Nordics. Thus, the

[19] Long term debt divided by total assets.
[20] Total Assets is used as a measure of size.

control companies should be from the same sector as well. Therefore, Sector and Country are included as covariates. Country and Sector have been assigned numerical values, respectively ranging from 1-4 and 1-7. To include these variables as approximate variables makes little sense. For example, Energy is assigned the number 1, Health Care & Life Science number 2 and Transportation 7. If Sector were an approximate variable, the model would treat Sector 1 and 2 as more similar than Sector 1 and 7. However, this is not the case so the model needs to match exact on Sector. The same logic applies to Country. Additionally, Year has been included as a covariate with exact matching as well. By doing so, we compare the performance of the target companies against companies from the same sector and country during the same period, mitigating the regulatory-, economic state- and timing factors. The exact matching is achieved by augmenting the propensity score, since PSM chooses the nearest matches in propensity score for the treated individuals. First, we calculate the propensity score, using the aforementioned covariates in a logit probability model. This gives a PS from 0-1, but we then add a value for the specific year, sector and country. Hence, the model will only assign matching control companies from the same year, sector and country.

5.1.2 Matching Method

After deciding the distance measure, we now need to assess how the portfolio companies should be matched with the control group. Stuart (2010) discusses several matching methods that primarily vary in the relative weights different observations receive and the number of individuals that remain after matching. Some of the methods mentioned by Caliendo & Kopeinig (2008) include kernel and local linear, caliper and radius, and the Nearest Neighbour (NN) algorithm.

There are several trade-offs involved when choosing between matching algorithms. The NN algorithm chooses the company from the control group with a propensity score closest to the portfolio company's score as a match. Furthermore, it is the most straightforward method to implement. If the risk of using bad matches is high, caliper matching can be used to impose a tolerance level for maximum propensity score distance. This reduces the bias, but the tolerance level can be difficult to decide ex ante (Smith & Todd, 2005). Kernel matching differs from the other methods by using nearly all the control companies, with different weights as a match for the control companies. This reduces variance since it increases the number of distinct

companies from the control group used to calculate the estimator, but bias increases since the average quality of matches is reduced (Caliendo & Kopeinig, 2008). Thus, there exist a trade-off between bias and variance when choosing matching algorithms. In our sample we have over 870,000 control companies and 346 portfolio companies, meaning that the ratio of control- to portfolio companies is relatively high. This entails that having several good matches for each portfolio company is likely. However, there is large heterogeneity in the ratio for some of our subsamples, when matching exact on country, sector and year. Hence, the NN-method with a caliper of 0.1 is favoured over the other methods since it provides a good balance in the trade-off between bias and variance.

Furthermore, when using the NN method, we can choose to allow replacement or not. If we allow replacement, a control company can be used as a match for several portfolio companies. This also involves a trade-off between variance and bias. If replacement is allowed, the overall quality of matches would improve and reduce bias (Caliendo & Kopeinig, 2008). Still, allowing replacement reduces the amount of information used to calculate the estimator, resulting in higher variance (Smith & Todd, 2005). We choose to allow replacement to make sure that the portfolio companies in the different subsamples achieve adequate matches.

Similarly, the number of matches allowed for each portfolio company involves a trade-off between bias and variance. Using fewer controls for each portfolio company gives better average matches resulting in reduced bias (Smith, 1997). Still, fewer control companies result in higher variance. After testing for both one-to-one and five-to-one-NN with replacement, the results favour five-to-one. The results of the assessment between the two methods are depicted in Table II.

5.1.3 Diagnosing the Matched Sample

To assess the matching quality, we look at the covariate balance in the matched group (Stuart, 2010). By balance, we refer to the similarity of the empirical distribution of covariates in the matched portfolio- and control companies. Moreover, the treatment must be uncorrelated to the covariates, meaning that the covariates should not be statistically different in the portfolio group and the matched control group. This is shown as:

$$\tilde{\rho}(X|T = 1) = \tilde{\rho}(X|T = 0) \tag{3}$$

Where $\tilde{\rho}$ denotes the empirical distribution. To test the covariate balance, we perform a simple two-sample t-test to see whether there exists a significant difference in the covariate mean between the portfolio- and matched group. As depicted in Table III, there is a significant reduction in bias after matching with the chosen covariates. Furthermore, the p-values show that there are no differences in the mean of the two groups in the matched sample. Note that due to missing accounting data for some of the covariates, the number of portfolio companies are reduced to 248 through PSM. This should not create a bias as long as there is no systematic reason behind the missing figures.

The difference in matching quality using one-to-one and five-to-one NN is investigated in Table II. Following Rubin (2001), the matching quality is assessed by looking at the number of standard deviations between the means of the groups (B) and the variance ratio of the propensity score (R). B should preferably be small, and R should be between 0.5 and 2. Sianesi (2004) suggests that one should re-estimate the propensity score on the matched sample, and then compare the pseudo-R^2 prior and post matching. The pseudo-R^2 specifies how well the covariates explain the funding probability. Furthermore, pseudo-R^2 should be low when comparing before and after matching, since there should be no difference in the distribution of covariates between both groups after matching (Sianesi, 2004). Additionally, we perform a likelihood ratio test on joint significance of all regressors in the model.

Table II – Matching Quality

	Unmatched Sample	One-to-one	Five-to-one
Bias			
Mean	59	7.80	7.80
Median	52.8	7.00	4.60
LR chi-sq	1028.66	4.89	4.67
B	228	20	19.5
R	0.91	0.66	0.85
Pseudo R-sq	0.203	0.007	0.007

This Table provides an assessment of the matching quality of the propensity score for one-to-one and five-to-one nearest neighbour matching with common support, replacement and caliper of 0.1. In addition to the bias between the portfolio- and control companies the Pseudo R^2 and the results of a likelihood ratio test on joint significance of all covariates are shown. B is the number of standard deviations between the group means and R is the portfolio companies' variance divided by the control group variance.

Both methods yield the same low Pseudo R^2 compared to before matching, and mean bias has been reduced from 59 to the same value of 7.80. However, the five-to-one method has a higher R, i.e. a lower variance. This is expected since the method uses a higher number of control companies in the matched sample. Furthermore, B is slightly lower for the five-to-one method. Overall, we can conclude that five-to-one nearest neighbour matching is the most suitable method for our data set.

Table III – Bias Reduction in Covariates

Covariates		Portfolio Companies	Control Group	Percentage bias (in %)	Abs. Perc. Reduc. Bias	T-Statistic	p-value
Country	Unmatched	2010	2010	-1.8		-0.29	78%
	Matched	2009.9	2009.9	0	100	0	100%
Sector	Unmatched	3.36	4.68	-77.6		-12.37	0%
	Matched	3.35	3.35	0	100	0	100%
Year	Unmatched	2.63	3.71	-85.4		-12.64	0%
	Matched	2.63	2.63	0	100	0	100%
Revenue (EURm)	Unmatched	10	18	70		22.08	0%
	Matched	10	12	-12.9	81.5	-1.05	30%
EBITDA (EURm)	Unmatched	0.88	0.18	42.6		15.64	0%
	Matched	0.87	1.2	-17.6	58.7	-1.44	15%
lnTotal Assets	Unmatched	15.15	12.72	150.5		22.68	0%
	Matched	15.14	15.35	-12.9	91.4	-1.35	18%
IBD/Total Assets	Unmatched	0.22	0.27	-14		-1.88	6%
	Matched	0.22	0.23	-2.7	80.9	-0.37	71%
RoA	Unmatched	-0.15	0.06	-52.8		-11.25	0%
	Matched	-0.15	-0.07	-19.8	62.5	-1.84	7%
lnAge	Unmatched	2.00	2.34	-36.7		-6.04	0%
	Matched	1.99	2.03	-4	89.1	-0.43	67%
# Observations	Unmatched	870,236	348	-	-	-	-
	Matched	1230	248	-	-	-	-

This table shows the assessment of bias before and after five-to-one nearest neighbour matching with replacement and common support. In addition, a caliper of 0.1 has been applied. The mean of the covariates is depicted for both the portfolio companies and the control group before and after matching. Note that the model matches exact on country, sector and year. The percentage difference of the means in the groups of portfolio companies and control companies as a percentage of the average of the respective sample variances' square root, i.e. standardized percentage bias, is shown. Absolute percentage reduction in bias as a result of matching is displayed as well, and a t-test is performed to assess the quality of the matching. A higher p-value indicates better matching quality.

5.2 Empiricial Analysis and Results

In this section, we examine if PE firms add value to their investments by comparing the PE-backed companies against the controls identified in the matching procedure. In the first part of the analysis we aim to give a holistic overview of how PE funded companies perform post-funding. Differences in financial and operational performance, insolvency risk and employment are assessed three years post-investment for the matched sample. In total, we analyse 15 metrics to complete the assessment of the PE-industry in the Nordic region. To evaluate the robustness of the findings in mean differences, the differences in median values are also examined.

The analysis will place a greater emphasis on differences in mean values than medians, as the PSM methodology focuses on minimizing the mean differences between the portfolio companies and the control companies. To test the differences in means we perform paired student t-tests. More specifically, the t-tests performed measures the difference between mean changes in the ratios of the two groups. Although the matching procedure aims to minimize the selection effect, it is practically not possible to obtain controls that are equal to the observations across all dimensions. As there still might exist some differences between the two groups at T=0, we should compare change in the initial values and not use absolute figures. Hence, we argue that the tests will be an accurate measure to capture the effect of receiving treatment, i.e. the effect of receiving PE-funding.

The ATT estimator used in the t-tests is a difference-in-difference estimator. For example, the changes in EBITDA-margins are assessed with the following estimator:

$$Diff - in - Diff = (EBITDA_{PE,i} - EBITDA_{PE,0}) - (EBITDA_{Control,i} - EBITDA_{Control,0}) \quad (4)$$

Where $i = 1, 2, 3$. If the ATT estimator is positive, this would indicate that the PE-backed firms outperform their peers with respect to EBITDA-margins.

When assessing the medians, we perform Wilcoxon-Mann-Whitney Rank Sum tests to analyse whether the changes in medians differ in the two samples post-funding. The rationale for performing additional non-parametric tests is to control for outliers dominating the mean. This makes particularly sense with smaller samples, which will be the case in the sector analysis.

One would expect the mean values to be higher in absolute terms, relative to the medians with non-normal distributions (Kaplan, 1989).

After evaluating the performance of Nordic portfolio companies, we assess the cross variation between sectors post-transaction, and rank the sectors accordingly. In this part of the empirical analysis, we run eight regressions on the matched sample of PE-funded companies and the control companies. We use two measures of economic performance, namely growth in turnover and change in EBITDA-margins, as dependent variables.

There are several reasons for using these two measures to assess improvement in economic performance. Firstly, we know ex ante that Nordic PE firms focus on both growth and EBITDA-margin improvement when acquiring companies (Gulliksen et al., 2008). Secondly, there exist several previous papers using these two dependent variables in the assessment of PE performance. It is preferable to use the same variables if we are to compare our results with previous research in a consistent way. Thirdly, we need to have a narrower focus on performance when we assess the sector performance. It would be too comprehensive to assess the sectors across all dimensions as done in the first part of the analysis. Lastly, we highlight that we have focused more on operational performance rather than financial performance throughout the thesis. Hence, we also choose to focus on operational performance when performing the regressions. We also opt for an EBITDA-metric instead of an earnings-metric to exclude all financial effects in the assessment of operational profitability.

Finally, we address an important concern. Even though we have applied the PSM methodology, the direction of causality is difficult to assess as we cannot completely eliminate the selection bias. Therefore, when we find significant relationships, we should be cautious when interpreting the results. We cannot exclude the possibility that PE firms correctly anticipate which companies that have the highest potential, and that this contributes to the statistical relationship prevailing in the analysis.

The rest of the analysis is structured as follows. First, we present all results for the whole PE-industry in Table IV, and examine the differences across the three aforementioned dimensions. Thereafter, we describe the specifications and choice of variables in the regression models. In addition, a detailed overview of all variables used in the regressions is presented in Table VII. The corresponding results from the regressions are reported in Table VIII and IX.

Table IV – Assessment of Performance, Insolvency Risk and Employment between PE funded companies and controls

Panel A: Mean Differences

	Values at T = 0		Difference From Time of Investment													
	T = 0		T + 1					T + 2					T + 3				
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-Value
Performance																	
CAGR	-	-	1.35	0.39	0.95	0.3	**0.00*** **	0.45	0.12	0.33	0.08	**0.00*** **	0.29	0.05	0.24	0.05	**0.00*** **
Turnover/Total Assets	1.14	1.25	0.034	0.11	-0.07	0.06	0.23	0.05	0.10	-0.04	0.06	0.53	0.11	0.07	0.05	0.07	0.50
EBITDA-Margin	-1.14	-0.2	0.15	0.03	0.11	0.12	0.34	0.32	0.08	0.24	0.15	0.10	0.43	0.07	0.37	0.15	**0.02** **
EBITDA/TotalAssets	-0.08	0,00	-0.04	0.04	-0.08	0.02	**0.00*** **	-0.03	0.04	-0.07	0.02	**0.00*** **	-0.00	0.04	-0.05	0.03	**0.08** *
ROA	-0.15	-0.07	-0.06	0.05	-0.10	0.03	**0.00*** **	-0.04	0.07	-0.11	0.04	**0.00*** **	-0.04	0.07	-0.11	0.04	**0.01** **
Profit Margin	-1.64	-0.37	0.18	0.07	0.12	0.23	0.61	0.24	0.25	-0.01	0.29	0.97	0.53	0.20	0.33	0.27	0.23
Net Income/Total Assets	-0.17	-0.09	-0.06	0.04	-0.10	0.04	**0.00*** **	-0.09	0.05	-0.14	0.04	**0.00*** **	-0.06	0.07	-0.12	0.04	**0.01*** **
Cash Flow/Total Assets	-0.11	-0.01	-0.03	0.03	-0.07	0.02	**0.00*** **	-0.05	0.03	-0.08	0.02	**0.00*** **	-0.02	0.03	-0.05	0.03	**0.04** **
Cash Flow/Turnover	-1.06	-0.15	0.11	0.06	0.05	0.13	0.7	0.21	0.11	0.09	0.15	0.55	0.42	0.13	0.29	0.15	**0.06** **
Current Ratio	2,92	4,15	-0.85	0.18	-1.03	0.59	**0.08** *	-1.21	2.10	-3.31	0.91	0.00	-1.31	3.21	-4.52	1.26	**0.00*** **
Insolvency Risk																	
IBD/EBITDA	0.11	1.19	1.18	0.37	0.82	1.51	0.59	0.09	0.45	-0.36	1.48	0.81	-0.82	0.07	-0.89	1.55	0.56
Leverage	0.21	0.23	0.03	0.02	0.00	0.02	0.91	0.04	0.04	-0.00	0.03	0.91	0.06	0.05	0.01	0.03	0.78
ZM-Score	-0.12	-0.19	0.69	0.90	-0.21	0.71	0.78	0.97	0.93	0.05	0.72	0.94	1.76	1.75	0.01	1.25	0.97
O-Score	-	-	-	-	-	-	-	0.28	-0.31	0.59	0.42	0.16	1.87	2.03	-0.16	1.9	0.95
Employment																	
Rel. Change Wages (EURm)	2.59	2.69	0.69	0.31	0.38	0.19	**0.04*** **	1.22	2.08	-0.86	1.52	0.58	1.64	1.22	0.41	0.48	0.38
Rel. Change Employment	51	48	0.29	0.11	0.18	0.10	**0.07** **	0.54	0.21	0.34	0.17	**0.04*** **	0.66	0.26	0.40	0.19	**0.04** **
Rel. Change Wage Level (EURt)	47.95	54.70	0.19	0.11	0	0.07	0.27	0.20	0.13	0.08	0.08	0.32	0.29	0.17	0.13	0.09	0.14
Number of Observations	248	1,230															

The Table displays the change in ratios for operational performance, insolvency risk and employment. Mean values are shown in the year of the transactions. For each of the three subsequent years mean changes are depicted with standard errors adjusted for the weights calculated in the PSM. We perform a t-test with the null hypothesis that the mean change is equal in both populations. The alternative hypothesis is that changes in mean value in each population differ. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

5.2.1 Assessment of the Nordic PE Industry

Financial & Operational Performance

In this section, we analyse financial and operational performance of portfolio companies relative to the performance of their respective controls. We use several measures following the majority of previous literature when analysing operational performance of the portfolio companies[21]. To assess the change in turnover, two separate metrics are applied. First, we analyse the CAGR for turnover. Secondly, the turnover growth is scaled against size i.e. total assets. The rationale for including a relative measure in the analysis is to control for divestments or investments into assets affecting the turnover growth.

PE-funded companies have significant higher turnover growth than their peers in all three years subsequent to the funding. When looking over the three-year post-funding period, we find that PE-funded firms have an average increase in turnover of 29 %, compared to the 5 % for non-funded companies. A large share of the growth advantage is achieved the first year subsequent to funding. PE-funded companies have a median growth of 11 % in T+1. Furthermore, we find a large growth in assets for PE-funded companies. Despite the growth in assets, we find significant results in turnover divided by total assets for PE-funded companies, although only significant in the third year. When examining the medians, the results are not significant, indicating that a few companies have a large growth in assets.

The results from the turnover assessment show that portfolio companies grow quickly, both in terms of turnover and in terms of assets. This corroborates previous findings from the Nordics (Friedrich, 2015; Bakke & Bull-Berg, 2016). The turnover growth could suggest that PE-firms tries to maximize the commercial potential of their portfolio companies, and do not only focus on increasing operational performance. It is, however, difficult to assess whether the PE-backed companies grow as a result of a buy-and-build strategy, or through organic growth. The statistical evidence suggests that PE-backed companies become more efficient in terms of revenue, but the portfolio companies requires a longer period to outperform peers when controlling for asset growth.

[21] See Muscarella and Vetsuypens (1990), Grubb and Jonsson (2007), Boucly et al. (2011), Guo et al. (2011), Jelic and Wright (2011), Friedrich (2015) and Bakke and Bull-Berg (2016). The works of Grubb and Jonsson, Friedrich and Bakke & Bull-Berg mainly inspire the choice of variables since they focus on the Nordic market.

Furthermore, we examine both EBITDA-margin and EBITDA divided by total assets, when assessing the changes in EBITDA post-transaction. These ratios indicate if a company increases its operational profitability. The results for the EBITDA-metrics display a more mixed picture than the revenue metrics. We find that the ATT is positive all years subsequent to the investment. However, the improvement in EBITDA margins is only significant at conventional levels in the third year, as shown in Table IV. Hence, the evidence again suggests that PE-backed companies require a longer period to achieve efficiency improvements. Nevertheless, these measures seem to be influenced by positive outliers, as the median differences between portfolio companies and the control companies does not differ by more than 2 percentage points for both metrics throughout the entire period. When combining the EBITDA-results with the turnover metrics, we conclude that PE firms are effective at growing their firms at first, while it takes a longer period to achieve improved operational profitability.

To assess operating profitability more thoroughly, we examine net income relative to turnover and size. We find mixed results concerning these metrics. As the PE-backed companies grow their asset base more rapidly than the matched companies, the change in net income to total assets is significantly negative for portfolio companies. When looking at medians, there is no difference between portfolio companies in T+1 and T+2, while portfolio companies perform worse than the matched companies in the third year. The difference in changes is no more than 4 percentage points, i.e. not very large. Therefore, it is difficult to assess if this is of significant economic importance. When analysing the profit margin, we find similar results. The mean changes suggest that PE-backed companies improve more than their matches, while not significant at conventional levels. When looking at medians, PE-backed companies are significantly better than the control companies in T+1, while they perform worse in terms of profit margins in T+2 and T+3. Therefore, it is difficult to assess whether PE-backed companies perform better or worse than the control companies do in terms of profit margins.

Furthermore, we look at two cash flow metrics to measure changes in operational performance, namely cash flow relative to turnover and cash flow relative to total assets. The ratios indicate if a company becomes more efficient in generating cash flows relative to its size. When assessing Table IV, we find that PE-backed firms have significant improvements in cash flow relative to turnover in T+3, and a positive ATT in all years subsequent of funding. However, when measuring cash flow to total assets we find that PE-backed firms perform somewhat worse. This should not come as a surprise when taking the growth in assets into account. We

find little change in both cash flow metrics when examining the medians. When trying to conclude on the cash flow measures, both groups improve their cash flow generation slightly while growing their asset base. Overall, there seems to be relatively little differences between the two groups. Additionally, the ratios depict ambiguous trends. Since we find a strong growth in both turnover and assets, PE funded companies seem to prioritize growth above improving efficiency in cash flow generation.

To complete the assessment of operational performance, we examine the current ratio. The ratio is calculated as current assets divided by current liabilities, and measures the ability to meet it short-term obligations. Both the PE-backed companies and the control companies have high current ratios initially, with averages of approximately 3 and 4, respectively. As the mean changes are highly influenced by extreme observations, we choose to focus on median values. We find significant differences between the two groups, as the median decreases by 31 % for the PE companies, while it increases by 5 % for the matched companies. This indicates that the PE-backed companies struggle to maintain their solid financial position when they grow, compared to peers.

Lastly, we examine the financial performance of PE-backed companies by analysing changes in ROA. This metric depicts how profitable a company is relative to its total assets, or how efficient the management is at using the assets to generate earnings. While we find somewhat improved operational performance for PE-funded companies, we find significant lower ROA for the PE-backed companies. Again, this is related to the increase in assets. The results are in line with Desbrieres & Schatt (2002) studying PE in France, while it contradicts other studies such as Scholes et al., (2011) and Scellato & Ughetto (2013) studying PE in Europe and the UK, respectively. As previously noted in this section, PE-funded companies grow fast in the start of the holding period, whereas they improve operational performance subsequent to the first years. Thus, we could possibly expect this relationship to reverse if we would have examined the portfolio companies over a longer period.

A potential concern for the performance analysis is that the book value of assets usually increases for the target companies when they are acquired. This is due to added goodwill, i.e. the difference between the purchase price and the book value at the time of the investment. The increase in book value of total assets from T-1 to T=0 results in downward biased estimators of the efficiency measures. To address this concern Kaplan (1989) adjusts the assets

prior to the investment by the size of the buyout-induced accounting change in assets. As mentioned in Section 4.3, our data set does not contain information prior to the investment for most of the observations. In other words, we are not able to perform the adjustment suggested by Kaplan (1989) without reducing the number of observations greatly. However, we argue that the potential bias is mitigated when matching the portfolio companies and the controls at the time of the transaction (T=0), i.e. after the goodwill has been added.

Insolvency Risk

To measure insolvency risk, we include accounting metrics following other studies in the Nordics (Bakke & Bull-Berg, 2016; Friedrich, 2015). The first metric is interest-bearing debt to EBITDA ratio (IBD/EBITDA). This ratio depicts a company's ability to decrease its debt, or more precisely, how many years it would take for the company to pay back its debt given that both variables remain constant. The second metric is the leverage ratio (LTD/TA). Preferably, the coverage ratio (EBIT/Interest Paid) which shows a company's ability to meet its financial obligations should be included in the assessment. However, since we have close to no data regarding interest paid, we have decided not to include the coverage ratio.

To complement the analysis, two indicators designed for measuring financial distress risk is included, following Tykvova & Borell (2012). Namely ZM-score (Zmijewski, 1984) and the Ohlson O-score (Ohlson, 1980). The ZM-score is calculated as follows:

$$ZM_{it} = -4.336 - 4.513 * \frac{NI_{it}}{TA_{it}} + 5.679 * \frac{TL_{it}}{TA_{it}} + 0.004 * \frac{CA_{it}}{CL_{it}} \quad (3)$$

Where NI represents net income, TA is total assets, TL is total liabilities, CA is current assets and CL is current liabilities. A higher ZM-score represents a higher insolvency risk.

The Ohlson O-score is estimated as: (4)

$$O_{it} = -1.32 - 0.407 * \log\left(\frac{TA_{it}}{GDPdeflator_t}\right) + 6.03 * \frac{TL_{it}}{TA_{it}} - 1.43 * \frac{WC_{it}}{TA_{it}} + 0.0757 * \frac{CL_{it}}{CA_{it}} - 1.72 * TL\_D_{it} - 2.37 * \frac{NI_{it}}{TA_{it}} - 1.83 * \frac{EBITDA_{it}}{TL_{it}} + 0.285 * NL\_D_{it} - 0.521 * \frac{NI_{it} - NI_{it-1}}{|NI_{it}| + |NI_{it-1}|}$$

The O-score consists of nine different measures used to predict default risk. The ratios measure size, leverage, working capital, liquidity, profitability, debt financing and change in net income. The GDP deflator denotes the deflator in the respective countries so we obtain an inflation-adjusted measure of total assets. Working capital is denoted as WC. TL_D is a binary

variable that takes the value 1 if total liabilities exceeds total assets in the period, while EBITDA serves as a proxy for funds from operations. Additionally, NL_D is a binary variable equal to 1 if net income is negative for both the current and previous period. Lastly, NI denotes net income. Together they result in an O-score, where a higher score indicates higher insolvency risk. Moreover, a score above 0.5 indicates a high chance of default.

Previous literature suggests that PE firms target companies with lower financial distress risk (Tykvova & Borell, 2012), i.e. with unexploited potential for increased gearing. After the acquisition, the PE firm can raise the debt levels in the target company to stimulate growth, but potentially also to pay out special dividends. As previously noted, the PE industry has been criticised for paying these dividends, because it results in increased insolvency risk (Kaplan & Stein, 1993). If this would be the case, we should see a significant increase in the leverage ratio the years following T=0.

As depicted in Table IV, the means of IBD/EBITDA and Leverage for portfolio companies at T=0 are lower for the portfolio companies than the control group. The IBD/EBITDA is 0.11 and 1.19 whilst the leverage ratios are 0.21 and 0.23 for the PE-backed companies and controls, respectively. The lower initial means of IBD/EBITDA supports previous findings suggesting that PE target firms with lower initial distress risk. Furthermore, we observe a mean increase in leverage for the portfolio companies over the three years, but compared to the control group the ATT estimator is only different from 0.00 in T+3. Besides this, the ATT estimator has a p-value above conventional significance levels in all years. The same pattern is present when examining the changes in the medians, as depicted in Table X in the Appendix. Since we cannot observe a significant difference in the debt-levels following the acquisition, our findings do not support the aforementioned criticism against PE, nor the findings from Friedrich (2015). Nevertheless, the neutral development in leverage contradicts previous literature, postulating that PE firms improve efficiency and profitability through increased leverage.

Our results do not imply that a PE-backed company experience increased financial distress risk post-funding. The ATT for IBD/EBITDA depicts an increase for portfolio companies compared to the control companies in T+1, while followed by a decrease in the two following periods. However, these changes are not significant and can be influenced by outliers. When observing the changes in medians, there are also little significant results. The exemption is in

T+3 where the median is 0.06 lower for the portfolio companies compared to the benchmark with a p-value of 0.02. We observe that the portfolio companies have a lower mean in ZM-score at T=0, further supporting that target firms have lower financial distress risk prior to the transaction. The ZM-score for the portfolio companies increase in the three following years, with the increase being especially high in T+3. However, when controlling against the benchmark, the ATT is negative in T+1 and close to zero in T+2 and T+3. When analysing the O-score, we find a different development. The ATT estimator in T+2 displays an increase of 0.59 for portfolio companies compared to the control group, but a decrease in T+3. Still, none of the changes are significant at conventional levels for the ZM- and O-score.

To summarize, our findings suggest that financial distress risk remain equal between the two groups, corroborating previous research such as Bakke & Bull-Berg (2016). Thus, our results contradict previous criticism against PE-ownership, suggesting that it increases the insolvency risk for the target companies following the acquisition (Bruner & Eades, 1992; Kaplan & Stein, 1993). The change in growth in IBD/EBITDA is not significantly different compared to the benchmark, demonstrating that the PE-ownership does not change a company's ability to pay its debt. Combined with the neutral difference in ZM- and O-score, we conclude that PE transactions are neutral in terms of insolvency risk. Furthermore, our findings contradict the allegations against PE ownership, claiming that it transfers value from other stakeholders to its shareholders by increasing debt level. Additionally, this implies that PE firms in the Nordics does not use increased leverage to improve performance and stimulate growth. Instead, it is likely that the improvements stem from the monitoring role of the PE firms, or from increased equity stakes for the management. Lastly, our findings support previous results suggesting that PE firms select companies with a lower financial distress risk.

Table V- Mean Differences for Insolvency Risk

Mean Differences	T+1			T+2			T+3		
	ATT	SE(ATT)	P-value	ATT	SE(ATT)	P-value	ATT	SE(ATT)	P-value
Insolvency Risk									
IBD/EBITDA	0.82	1.51	0.59	-0.36	1.48	0.81	-0.89	1.55	0.56
Leverage	0.00	0.02	0.91	-0.00	0.03	0.91	0.01	0.03	0.78
ZM-Score	-0.21	0.71	0.78	0.05	0.72	0.94	0.01	1.25	0.97
O-Score	-	-	-	0.59	0.42	0.16	-0.16	1.9	0.95

The Table displays the change in ratios for insolvency risk. For each of the three subsequent years mean changes are depicted with standard errors adjusted for the weights calculated in the PSM. A t-test with the null hypothesis that the mean change is equal in both populations is performed. P-values are presented to the right of each section. Note that due to missing figures in T-1 we are not able to calculate the change in O-score from T=0 to T+1.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Employment

To assess the impact PE-funding has on employment, we use three common measures following a majority of previous research[22]. These measures are total wages, number of employees, and average wage per employee. The reason for including the average wage per employee-variable is that we would expect to see a high correlation between total wages and the number of employees.

Firstly, we find a significant increase in number of employees for PE-backed companies compared to their peers. The ATT coefficient is significant at conventional levels in all three years subsequent to the transaction, although only significant at a 10 % level in the first year. The results of the Wilcoxon-Mann-Whitney tests are consistent with the results from the student t-tests. Mean changes in employment over the three-year period are 66 % and 26 % for portfolio- and control companies, while the median changes are 22 % and 0 %. Our results corroborate previous findings from the Nordics, suggesting that portfolio companies have a higher job creation rate than comparable firms (Friedrich, 2015; Bakke & Bull-Berg, 2016).

A natural question to ask is whether the significant growth in the workforce is a result of increased labour intensity or a result of the growth in assets. When assessing this question, we

[22] See e.g. (Kaplan, 1989), (Lundgren & Norberg, 2006) or (Amess & Wright, 2007b)

perform a student t-test where change in workforce is scaled relative to change in total assets. The ATT is small and negative in absolute terms when comparing the portfolio companies against the control companies. However, the differences are not significant. Thus, we do not have statistical evidence claiming that labour intensity changes as a result of PE-funding, and conclude that the increase in the labour force is a result of the high growth in PE-backed firms.

The ATT for total wages display a decrease in T+2, while an increase the other two periods. Nonetheless, only the ATT coefficient of 0.38 in T+1 is significant. Furthermore, we find small differences in terms of average wages for the portfolio- and matched companies, with the change in mean values being 29 % and 19 % comparing T=0 to T=3. The results for ATT are non-significant all three years for wage per employee. Again, the results from the non-parametric tests support the findings from the t-tests examining total wages and wage per employee. Our results indicate a neutral relationship between the change in wages and average wages for PE-backed companies and their peers.

To summarize, our results contradicts the criticism against PE ownership, suggesting that a large share of efficiency improvements in portfolio companies stem for reductions in the workforce and wages. Such hypotheses have been postulated by for example Shleifer & Summers (1988) and Lichtenberg & Siegel (1990). Based on our results, there seem to be a neutral relationship in the devlopment of wages for PE-backed companies compared to peers. Furthermore, we find a positive relationship between PE-backing and growth in employment. Hence, value creation is achieved through top line growth, rather than organizational efficiency measures focusing on job cutting initiatives.

Despite the relatively high quality of the accounting data, some difficulties are associated with the data material relating to employment. Compared to the other categories, we have more missing data in this section. We therefore caution that our data may not be ideal when generalizing about employment in the Nordic PE industry. However, it is important to bear in mind that our results corroborate previous research on PE in the region[23]. Lastly, we note that the distribution of wages in the companies are not available. Thus, we have to focus on central tendency measures and are not able to assess the distibution within the workforce.

[23] See e.g. Friedrich (2015) and Bakke & Bull-Berg (2016)

Table VI- Mean Differences for Employment

Mean Differences	T+1			T+2			T+3		
	ATT	SE(ATT)	P-value	ATT	SE(ATT)	P-value	ATT	SE(ATT)	P-value
Employment									
Rel. Change Wages (EURm)	0.38	0.19	**0.04*** **	-0.86	1.52	0.58	0.41	0.48	0.38
Rel. Change Employment	0.18	0.10	**0.07** **	0.34	0.17	**0.04*** **	0.40	0.19	**0.04** **
Rel. Change Wage Level (EURt)	0.00	0.07	0.27	0.08	0.08	0.32	0.13	0.09	0.14

The Table displays the change in ratios for Employment. For each of the three subsequent years mean changes are depicted with standard errors adjusted for the weights calculated in the PSM. A t-test with the null hypothesis that the mean change is equal in both populations is performed. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

5.2.2 Sector Performance in the Nordic PE Industry

Variables included

The thesis now turns toward a specific assessment of performance for PE-backed companies compared to their controls within each sector. To assess the sector differences, we run eight regression models on the matched sample following Cressy et al. (2007). We specify seven interaction terms to assess whether there are significant differences between PE-backed firms and their controls in each sector. It is natural to predict that the sectors with highest involvement of PE should be those that are positive, while the sectors with lowest PE involvement should be non-significant[24]. Before proceeding to the empirical specifications, we elaborate on the choice of variables included. All variables used in the empirical assessment are described in Table VII.

We use two different dependent variables. First, we run four regression models with the CAGR in turnover over all three years as the dependent variable. The geometric mean is preferred over the arithmetic mean when specifying a backward-looking model. There are two main reasons for choosing this dependent variable. First, Gulliksen et al. (2008) found in their survey in the Scandinavian PE industry that growth potential is the most important trait for PE firms when selecting their investments. Furthermore, it is extensively analysed in the literature,

[24] See Table XV in the Appendix for an overview over the assessment of sector allocation

and many have found significant higher growth for PE-funded companies compared to peers in the Nordic region. This makes turnover growth one of the most relevant variables to assess in our opinion.

Additionally, we evaluate the operational profitability during the holding period. Several suitable metrics could be used to capture change in operational profitability, and we choose to use the change in EBITDA-margins. There are two reasons making this is a desirable variable in the regression model. First, we are interested in a metric that capture change, not absolute values, as explained previously. Secondly, we choose to focus on an operational metric and not a financial metric, since the financial metrics are composed by both financial and operational effects (Cressy et al., 2007). Hence, the change in EBITDA-margins (hereafter refered to as operational profitability) over all years is a suitable metric.

When specifying the model, we need to control for company specific effects that might differ between sectors, and that correlate with the dependent variables post-funding. Thus, we control for the initial levels of turnover and operational profitability. Previous research suggests that these variables serve as predictors for future growth (Cressy et al., 2007). Furthermore, we include leverage in all of the regressions. We also tried to include size as a control variable in the models, as there might be economies of scale in efficiency. However, this was not found to be significant and did not affect the following results. A possible reason could be that turnover captures the size effect.

For both turnover growth and operating profitability, we run four regressions. First, we include a dummy for PE to isolate the effect of PE-funding. Secondly, we exclude the PE dummy, and add 13 new dummies to analyse if PE-backed companies perform better within each sector. This entails including one dummy for each sector and one interaction term between each industry and PE to identify the differences between PE-backed firms and controls. Hence, the variables of interest in the models are the interaction terms between PE and industry. Thirdly, we include dummies for countries in the third regression, and time-specific dummies in the fourth regression. Thus, we control for the specific effects relating to timing and differences between countries that might affect performance. These effects are explained in Section 4.3 and Section 5.1.1[25].

[25] We omit Sector 7 (transportation), Country 4 (Sweden) and Year-dummy T2004 to avoid perfect collinearity in the model. Thus, companies from the transportation sector in Sweden with 2004 as T=0 will serve as a reference group.

The four regression specifications are as follows. Note that the same models are specified for the change in EBITDA-margins.

$$Turnover\ Growth = \alpha + \beta_1 * PE_D + \beta_2 * Turnover_0 + \beta_3 * Profitability_0 + \beta_4 * Leverage_0 \quad (5)$$

$$Turnover\ Growth = \alpha + \sum_{i=1}^{6} \beta_i * Sector_i + \beta_7 * Turnover_0 + \beta_8 * Profitability_0 + \beta_9 Leverage_0 + \sum_{i=1}^{7} \delta_i * (PE_D * Sector_i) \quad (6)$$

$$Turnover\ Growth = \alpha + \sum_{i=1}^{6} \beta_i * Sector_i + \beta_7 * Turnover_0 + \beta_8 * Profitability_0 + \beta_9 Leverage_0 + \sum_{i=1}^{7} \delta_i * (PE_D * Sector_i) + \sum_{i=1}^{3} \gamma_i * Country_i \quad (7)$$

$$Turnover\ Growth = \alpha + \sum_{i=1}^{6} \beta_i * Sector_i + \beta_7 * Turnover_0 + \beta_8 * Profitability_0 + \beta_9 Leverage_0 + \sum_{i=1}^{7} \delta_i * (PE_D * Sector_i) + \sum_{i=1}^{3} \gamma_i * Country_i + \sum_{i=2005}^{2014} \pi_i * Year_i \quad (8)$$

Table VII – Description of All Variables Included in the Regression Models

Dependent Variables	
Turnover Growth	The three year geometric growth in turnover after the PE transaction
Change in EBITDA-Margin	Mean change in EBITDA-margin of the three years after the PE transaction. Calculated as: 100 *Δ (EBITDA/Turnover)
Theoretical Independent Variables	
PE-dummy	A dummy that takes the value of 1 if a company is backed by a Private Equity firm, and 0 if the firm is a control firm
PE-dummy * Sector-dummy	An interaction term that takes the value of 1 if a controll company is backed by a Private Equity firm and if it belongs to a specific sector. The variable takes 0 for all matced companies and for PE-backed companies that are not in the given sector. 7 Interaction terms are included, one for each sector. Sector 7, i.e. Transportation is omitted to avoid perfect collionarity
Control Variables	
Sector-dummy	A dummy that takes the value of 1 if a company is classified into the given sector based on its two digit NACE code. Seven sectors are included: Energy, ICT & Technology, Industrial, Health Care & Life Sciences, Cleantech, industrial and Transportation. For an explanation of the variable, see Section 3.5
Country-dummy	A dummy that takes the value of 1 if a company is from the given country. The four countries that are included are: Denmark, Finland, Norway and Sweden
Year-dummy	A dummy that takes the value of 1 if the given year equals T=0 for the company. The dummy variables are named T2006, T2007 etc.
Initial Turnover	Turnover measured in EUR at the time of the PE transaction for PE-backed firms, and turnover measured in EUR at the time of matching for the controll firms
Initial Profitability	A measure of the initial profitability defined as 100 * (EBITDA/Total Assets) at either the time of the PE transaction or the time of matching for the controls. Measured in EUR
Initial Leverage	A measure of intial leverage definied as Non Current Liabilities / Total Assets at either the time of the investment for the PE-backed firms or at the time of matching for the control firms. Measured in EUR

This table provides an overview of the variables included in the regression models. We divide the variables into three categories; dependent variables, theoretical independent variables and control variables. All accounting measures are denominated in EUR. For an additional explanation of the sector dummies, see section 4.5.

Table VIII – Growth Regressions with All Controls

PANEL A **Growth Post-Funding for PE and Sectors**

Independent Variables	CAGR Turnover (1)	Sector CAGR Turnover (2)	Sector CAGR Turnover (3)	Sector CAGR Turnover (4)
PE_D	**0.20*** **			
	0.040			
Initial Turnover	**-5.6e-09*** **	**-5.2e-09*** **	**-5.1e-09*** **	**-4.4e-09*** **
	(9.2e-10)	(9.1e-10)	(9.4e-10)	(8.5e-10)
Initial Profitability	**-0.002** **	**-0.001***	**-0.0014***	**-0.0015***
	(0.000)	(0.001)	(0.00078)	(0.00078)
Initial Leverage	-0.11	-0.11	-0.12	**-0.14***
	(0.076)	(0.081)	(0.079)	(0.079)
PE * Energy		0.15	0.14	0.14
		(0.15)	(0.15)	(0.14)
PE * Technology		**0.28*** **	**0.28*** **	**0.28*** **
		(0.096)	(0.096)	(0.094)
PE * Industrial		**0.17** **	**0.17** **	**0.17*** **
		(0.067)	(0.067)	(0.067)
PE * Healthcare		0.012	0.012	0.021
		(0.11)	(0.11)	(0.11)
PE * Cleantech		**0.41** **	**0.40** **	**0.40** **
		(0.18)	(0.18)	(0.18)
PE * Consumer		0.17	0.17	0.16
		(0.10)	(0.10)	(0.10)
PE * Transportation		-0.054	-0.057	-0.068
		(0.11)	(0.10)	(0.099)
Energy		0.0043	0.014	0.014
		(0.079)	(0.081)	(0.085)
Technology		-0.089	-0.091	-0.092
		(0.067)	(0.067)	(0.069)
Industrial		-0.086	-0.094	-0.11
		(0.061)	(0.064)	(0.066)
Healthcare		0.12	0.11	0.078
		(0.079)	(0.080)	(0.084)
Cleantech		-0.016	-0.017	-0.034
		(0.067)	(0.068)	(0.072)
Consumer		-0.026	-0.020	-0.0097
		(0.063)	(0.067)	(0.073)
Denmark			0.0051	0.13
			(0.074)	(0.086)
Finland			0.051	0.046
			(0.061)	(0.062)
Norway			0.020	0.030
			(0.071)	(0.074)
T2006				-0.067
				(0.14)
T2007				-0.050
				(0.090)
T2008				**0.19***
				(0.12)
T2009				0.043
				(0.12)
T2010				-0.0071
				(0.089)
T2011				-0.058
				(0.085)
T2012				**-0.14***
				(0.084)
T2013				0.0024
				(0.10)
Constant	**0.153*** **	**0.19*** **	**0.16***	0.16
	(0.028)	(0.067)	(0.085)	(0.12)
N	1,406	1,406	1,406	1,406
R-squared	0.0899	0.1092	0.1100	0.1362
Robust Standard Errors	yes	yes	yes	yes

Note. - The sample consist of the identified PE-funded companies identified through the Propensity Score Matching Methodology and the corresponding matches. This means that N (1,406) represents both the PE-backed companies and the controls. The regressions are OLS regressions. We do not include each company more than one time, i.e. each company is represented by one row in the data set. In regression (1) we identify the effect of PE-funding with CAGR Turnover as the dependent variable. Initial leverage, initial profitability and initial turnover are used as control variables. Regression (1), -(2), -(5) and -(6) are described in Table X. In regression (3) and - (6) we add country controls, while regression (4) and -(8) also include time dummies. Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.

Table IX – EBITDA Regressions With All Controls

PANEL B **EBITDA-margin Post-Funding for PE and Sectors**

Independent Variables	EBITDA-Margin Improvments (5)	Sector EBITDA-Margin Improvements (6)	Sector EBITDA-Margin Improvements (7)	Sector EBITDA-Margin Improvements (8)
PE_D	5.55			
	(4.14)			
Initial Turnover	**-0.000****	**-0.000***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Initial Profitability	**-0.40*****	**-0.40*****	**-0.41**	**-0.40*****
	(0.12)	(0.12)	(0.12)	(0.12)
Initial Leverage	**-20.4****	**-21.9****	**-24.9*****	**-25.1*****
	(8.74)	(8.81)	(8.60)	(8.75)
PE * Energy		1.01	0.38	0.48
		(19.8)	(19.8)	(19.0)
PE * Technology		12.5	12.8	13.0
		(11.5)	(11.5)	(11.5)
PE * Industrial		**9.64****	**10.1****	**10.2****
		(4.35)	(4.39)	(4.40)
PE * Healthcare		-1.97	-1.97	-1.87
		(16.3)	(15.8)	(15.9)
PE * Cleantech		8.98	7.90	7.65
		(19.1)	(18.9)	(19.0)
PE * Consumer		-5.68	-6.19	-5.48
		(5.13)	(5.03)	(5.35)
PE * Transportation		**-14.8***	**-15.2****	**-15.1***
		(7.93)	(7.33)	(7.84)
Energy		-3.96	-0.54	1.67
		(6.44)	(6.89)	(7.46)
Technology		**-10.9****	**-12.3****	-10.4*
		(4.51)	(4.88)	(5.48)
Industrial		**-7.48****	**-10.9****	**-9.15****
		(3.80)	(4.36)	(4.66)
Healthcare		-6.42	-9.56	-9.24
		(5.87)	(6.36)	(6.70)
Cleantech		-2.08	-2.62	-1.25
		(3.57)	(3.89)	(4.53)
Consumer		-5.26	-5.58	-0.46
		(4.61)	(5.29)	(5.82)
Denmark			-5.85	-6.15
			(11.1)	(12.3)
Finland			6.46	7.02
			(8.00)	(7.79)
Norway			-3.90	-4.19
			(8.70)	(8.47)
T2006				-16.3
				(19.9)
T2007				6.66
				(10.4)
T2008				**17.4***
				(9.52)
T2009				**19.5****
				(9.28)
T2010				**13.2****
				(6.67)
T2011				**12.2***
				(6.78)
T2012				**11.3***
				(6.84)
T2013				**17.0***
				(9.36)
Constant	**11.0*****	**17.6*****	18.5**	4.02
	(3.28)	(4.70)	(9.20)	(11.4)
N	1,304	1,304	1,304	1,304
R-squared	0.0750	0.0813	0.0870	0.0993
Robust Standard Errors	yes	yes	yes	yes

Note. - The sample consist of the identified PE-funded companies identified through the Propensity Score Matching Methodology and the corresponding matches. This means that N (1,304) represents both the PE-backed companies and the controls. The regressions are OLS regressions. We do not include each company more than one time, i.e. each company is represented by one row in the data set. In regression (1) we identify the effect of PE-funding with CAGR Turnover as the dependent variable. Initial leverage, initial profitability and initial turnover are used as control variables. Regression (1), -(2), -(5) and -(6) are described in Table X. In regression (3) and - (6) we add country controls, while regression (4) and -(8) also include time dummies. Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.

The first regression model supports our findings in the bivariate analysis, and we have evidence confirming that portfolio companies grow faster than their peers. When assessing Table XIII, we find that PE-backed firms have a 20 percentage points higher average growth than non-PE backed companies over the three-year period. This is slightly different from the figures we found in Section 5.2.1, and the difference is attributable to the fact that the PE-funded companies are marginally smaller and less profitable than the matches at T=0.

In order to control for differences between the sectors[26], we include dummy variables for sector in the second regression model. None of the coefficients for the sector dummies are significant, meaning that there are no differences in growth between the sectors. However, our results for the interaction terms suggest that portfolio companies within Industrial, ICT & Technology, and Cleantech grow significantly faster than their peers within the same sectors. Industrial portfolio companies have a growth in turnover 17 percentage points higher than their non-backed peers over the three years post funding. Furthermore, the coefficients for ICT & Technology and Cleantech suggest that PE-backed companies outgrow their peers with 28- and 40 percentage points, respectively. This is to some extent consistent with our hypothesis suggesting that sector allocation in PE correlates with the performance in the sector, as ICT & Technology and Cleantech are among the sectors with the highest involvement of PE. However, the PE-involvement in Industrial is relatively low compared to the size of the sector. Therefore, the results are not monotonic, meaning that the PE performance and sector allocation do not follow each other perfectly. Nevertheless, PE firms seem to specialize relatively well in terms of sector allocation.

As pointed out above, our model does not suggest that PE-backed companies within the consumer industry grow faster than their peers. This can to some extent explain why the PE sector allocation has shifted over the previous years. When assessing the sector allocation in Section 2, we found a shift from traditional industries, such as Consumer and Industrial, to other sectors such as Technology in Sweden. The current shift towards more technical industries could be explained by a higher growth potential in the ICT & Technology sector. The results could therefore suggest that growth is one of the most important criterias when determening sector allocation.

[26] Note: not differences between PE-backed companies and the controls in the sectors, but the specific sector differences captured by the sector dummies.

Turning towards the change in operational performance, Table IX depicts a 5.55 percentage point higher change in EBITDA-margin for PE-backed companies. However, the coefficient is not statistically significant and support the evidence from Section 5.2.1. The model suggests that we have weak evidence on operational performance, and that there are large variations in this metric from year to year. However, the fourth regression model in Table IX suggest that PE-backed companies have significantly improved EBITDA-margins compared to their peers in the industrial sector. In this sector, PE-backed companies achieve a 10.2 percentage points higher EBITDA-margin over the three-year period, compared to their sector peers. Additionally, PE-funded companies within the transportation sector perform significantly worse than their control group. These results are surprising, considering the statistics from Denmark suggesting that Transportation is one of the fastest growing sectors in terms of PE investments. However, it corroborates with our assessment of sector allocation in the region. As depicted in Table XV in the Appendix, Transportation is one of the sectors with the lowest involvement of PE. This suggests, according to our hypothesis, that portfolio companies should not outperform their peers in this sector.

To conclude, PE firms seem to be most successful within the industrial sector. Our empirical results suggest that portfolio firms within this sector grow significantly faster than their peers. Additionally, industrial PE-backed companies have a significant increase in operational profitability. Secondly, we find that PE-backed companies within more technical industries such as ICT & Technology, and Cleantech have higher turnover growth their peers. However, we do not find the same improvements in operational profitability in these sectors. This could be due to these firms not being as mature as the companies in the industrial sector. Therefore, we could expect a larger focus on growth instead of operational improvements in these companies. Furthermore, Transportation seems to be the least successful sector within the Nordic PE industry. However, we caution that this is the sector with fewest observations, meaning that the results can be dominated by a few observations. Lastly, we do not find and significant difference between the PE-funded companies within Energy, Health Care & Life Science and the Consumer sectors. Overall, we conclude that PE firms seem to be relatively successful in their sector allocation, as they allocate most of their resources in the sectors where they outperform their peers.

6. Conclusions and Future Research

By examining the sample of 248 companies from Denmark, Finland, Norway and Sweden this thesis makes two contributions to the growing literature on PE. Firstly, the overall assessment of the Nordic PE industry along three different dimensions, contributes to a better understanding of the economic impact of PE in one of the most attractive regions in Europe. Secondly, our novel approach for assessing sector performance answers a question that to a large degree has been ignored by many; is there a difference in the impact of PE-backing between sectors?

The results on operational performance from the overall assessment are mixed. Portfolio companies have significant higher growth, in both turnover and assets, than comparable companies. However, more ambiguous results are found for operating profitability. For EBITDA-margins we can only find significant improvements in the third year post-transaction, and due to the large increase in assets there is a negative effect in financial profitability. For insolvency risk we cannot find any significant differences, suggesting a neutral development compared to the control group. Furthermore, our findings suggest that PE firms target companies with a lower financial distress risk. Lastly, we find a significant higher growth in employment for PE-backed companies, while the effect on wage levels is non-significant.

The results from the second part of the analysis confirms to some extent our hypothesis that PE firms are efficient in their sector allocation. Portfolio companies in the industrial sector have significant improvent in both growth and operating profitability during the holding period compared to sector peers. This is somewhat surprising as it is one of the sector with the lowest involvement of PE. On the other hand, PE-backed companies in Cleantech and ICT & Technology have significant higher growth, while there are no improvements in operating profitability. Both of these are sectors which PE have a high allocation towards, suggesting that there is some correlation between performance of portfolio companies and involvement of PE. Furthermore, the results for the transportation sector support this hypothesis. This is one of the sectors with the lowest involvement of PE while it is one of the worst performing sectors for PE-backed companies. Lastly, we find no significant difference between portfolio companies and sector controls in Energy, Healt Care & Life Science and Consumer. Additionally, the variables for firm characteristics suggest that initial levels of profitability

have a significant effect on performance in the holding period. Thus, the selection skills of PE firms are important when examining PE performance.

While previous research postulates that specialization is advantageous for PE-firms (Cressy et al., 2007), this thesis contributes to existing research by more clearly indicating where specialization has been most profitable, in the Nordics. A relevant question for future research is whether the same results are present in other markets, or if our findings is merely a Nordic phenomenon. It is also important to point out that there are several ways to define the intensity of PE in a sector. In this thesis, we have chosen to define it as the number of companies backed by a PE divided by the total number of companies in the sector. This is mainly due the information that is available in our data set, but one could for example use value weighted calculations as an alternative.

As is evident from this thesis, PE firms are centered towards certain sectors, potentially representing a significant segment of the activity in them. A natural question to ask is how this affects the other non-PE-backed companies in the sectors or industries where PE-backing is evident on a large aggregate level. As for now, we know very little about this potential effect (Bienz, 2016). Going forward, it is imperative to improve the understanding of how competition within sectors is affected by PE firms entering the sector, to fully understand the impact of PE-investments. Bernstein et al. (2009) suggest that industries where PE firms have been active over the last years, experience higher growth and less volatility in total wages and employment. Jensen (1989) proposes that competition intensifies in sectors experiencing LBOs. Nevertheless, several fruitful topics still remain open for future research aiming to increase our understanding of the impact of PE ownership.

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8. Appendix

Assessment of Accounting Data Sources

The Amadeus database contains accounting data on more than 21 million European companies, whereof most companies are private. The Amadeus database is one of the products offered through Bureau Van Dijk, owned by Moody's. Since Bureau Van Dijk reveals its data sources, we know that Danish and Norwegian accounting data is collected from Experian, whereas Finish accounting data is collected from Suomen Asiakastieto and Swedish accounting data is collected from UC. Experian is an English consumer credit reporting company, collecting financial information on 1 billion individuals and businesses, and a constituent of FTSE 100 Index. UC is the largest Swedish credit reporting company, while Suomen Asiakastieto is a market leading company in terms of providing company information on Finish companies. ACPE is an independent research institution with focus on Private Equity in the Nordics, founded in 2012.

The information regarding the data sources was obtained from the company webpages and various other webpages as of 11/01/2017.

TABLE X – Equality of the distributions – Wilcoxon-Mann-Whitney Rank Sum Test – Medians

Panel A: Wilcoxon-Mann-Whitney Rank Sum Test

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Median Level	Controll Median Level	PE-backed Median Change	Controll Median Change	Diff in Diff	Rank Sum P-value	PE-backed Median Change	Controll Median Change	Diff in Diff	Rank Sum P-value	PE-backed Median Change	Controll Median Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.11	0.05	0.06	**0.00*** **	0.11	0.04	0.07	**0.00*** **	0.10	0.03	0.07	**0.00*** **
Turnover/Total Assets	0.74	0.99	0.03	0.01	0.02	0.87	0.03	0	0.03	0.43	0.06	0.00	0.06	**0.05***
EBITDA-Margin	0.01	0.07	-0.02	0.00	-0.02	0.06*	0.00	0	0.00	0.27	-0.01	0.00	-0.01	0.78
EBITDA/TotalAssets	0.01	0.07	-0.02	0.00	-0.02	**0.00*** **	-0.01	0.01	-0.02	**0.00*** **	-0.01	0.00	-0.01	**0.04** **
ROA	-0.03	0.02	-0.02	0.00	-0.02	0.00***	-0.03	0	-0.03	**0.00*** **	-0.03	0.00	-0.03	**0.00*** **
Profit Margin	-0.03	0.01	0.01	0.00	0.01	**0.00*** **	-0.01	0	-0.01	**0.00*** **	-0.02	0.00	-0.02	0.06*
Net Income/Total Assets	-0.01	0.05	0.00	0.00	0.00	**0.00*** **	-0.03	0	-0.03	**0.00*** **	-0.04	0.00	-0.04	**0.00*** **
Cash Flow/Total Assets	0.01	0.06	-0.01	0.00	-0.01	**0.00*** **	-0.03	0	-0.03	**0.00*** **	-0.02	0.00	-0.02	**0.01** **
Cash Flow/Turnover	0.01	0.06	0.00	0.00	0.00	0.10	-0.01	0	-0.01	**0.06** **	0.00	0.00	0.00	0.82
Current Ratio	1.64	1.33	-0.1	0.00	-0.1	**0.00** **	-0.24	0.05	-0.29	**0.00*** **	-0.31	0.05	-0.36	**0.00*** **
Insolvency Risk														
IBD/EBITDA	0	0.12	0.00	0.00	0.00	0.93	0.00	0	0.00	0.24	-0.06	0.00	-0.06	**0.02** **
Leverage	0.13	0.11	0.00	0.00	0.00	0.76	0.00	0	0.00	0.83	0.00	0.00	0.00	0.11
ZM-Score	-	-	0.16	-0.05	0.21	**0.00*** **	0.06	-0.03	0.09	0.36	0.35	0.11	0.24	0.44
O-Score	-	-	-	-	-	-	0.40	-0.08	0.48	**0.00*** **	0.63	-0.10	0.73	**0.00*** **
Employment														
Rel. Change Wages (EURm)	0.90	1.06	0.18	0.00	0.18	**0.00*** **	0.27	0.05	0.22	**0.00*** **	0.31	0.07	0.24	**0.00*** **
Rel. Change Employment	23	21	0.06	0.00	0.06	**0.00*** **	0.10	0	0.10	**0.00*** **	0.22	0	0.22	**0.00*** **
Rel. Change Wage Level (EURt)	45.30	48.40	0.06	0.02	0.04	**0.03*** **	0.09	0.03	0.06	**0.03*** **	0.12	0.08	0.04	**0.05***
Number of Observations	248	1,230												

The Table displays the change in operational-, insolvency risk- and employment ratios for the complete matched sample. Median values are shown in the year of the transactions. For each of the three subsequent years, median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Table XI - Equality of the distributions: Wilcoxon-Mann-Whitney Rank Sum Test – For each sector

Panel A: Median Differences Energy

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.13	0.02	0.11	0.85	0.04	-0.03	0.07	0.77	0.10	-0.02	0.12	**0.10***
Turnover/Total Assets	0.51	0.18	0.07	0.00	0.07	0.48	0.05	0.00	0.05	0.49	0.04	0.00	0.04	0.73
EBITDA-Margin	-0.18	0.29	-0.03	0.00	-0.03	0.15	-0.05	-0.01	-0.04	0.64	0.00	-0.01	0.01	0.64
EBITDA/TotalAssets	-0.06	0.06	-0.05	0.01	-0.06	**0.03****	-0.11	0.00	-0.10	**0.01****	-0.05	0.00	-0.05	0.11
ROA	-0.07	0.02	-0.04	0.00	-0.04	0.20	-0.12	0.01	-0.12	**0.05***	-0.12	0.01	-0.12	**0.05***
Profit Margin	-0.19	0.04	-0.02	0.00	-0.03	0.75	-0.02	0.01	-0.03	0.49	-0.01	0.00	-0.01	1.00
Net Income/Total Assets	-0.04	0.01	-0.05	0.00	-0.04	0.38	-0.11	0.00	-0.11	**0.04****	-0.11	0.00	-0.10	**0.04****
Cash Flow/Total Assets	-0.02	0.04	-0.03	0.00	-0.04	0.28	-0.14	0.00	-0.14	**0.02****	-0.09	0.00	-0.09	0.06
Cash Flow/Turnover	-0.06	0.18	-0.02	0.00	-0.02	0.35	-0.02	0.02	-0.04	0.54	-0.01	0.01	-0.02	0.77
Current Ratio	1.73	1.55	0.10	-0.06	0.16	0.63	-0.57	0.12	-0.69	**0.03***	-0.33	0.21	-0.54	0.00
Insolvency Risk														
IBD/EBITDA	0.00	0.17	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.30
Leverage	0.01	0.15	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.98
ZM-Score	-	-	-0.07	-0.01	-0.06	0.25	0.51	-0.01	0.52	**0.04****	-0.88	0.04	-0.92	0.07
O-Score	-	-	-	-	-	-	0.37	-0.09	0.47	0.14	0.65	-0.09	0.73	**0.03****
Employment														
Rel. Change Wages (EURm)	1.242	1.409	0.19	0.00	0.19	0.32	0.34	0.11	0.22	0.12	0.36	0.13	0.23	**0.06****
Number of Observations	26	127												

Panel A displays the change in operational-, insolvency risk- and employment ratios for the Energy Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel B: Median Differences ICT & Technology

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.11	0.06	0.06	**0.03****	0.17	0.03	0.14	**0.00*****	0.13	0.01	0.13	**0.00*****
Turnover/Total Assets	0.68	1.13	0.06	0.01	0.04	0.64	0.06	0.00	0.06	**0.02****	0.07	0.00	0.07	**0.07***
EBITDA-Margin	-0.24	0.03	0.01	0.01	0.00	1.00	0.06	0.02	0.04	0.60	0.03	0.01	0.02	0.41
EBITDA/TotalAssets	-0.10	0.03	0.00	0.01	-0.02	**0.07***	0.02	0.02	0.00	0.54	0.02	0.02	0.01	0.76
ROA	-0.15	0.00	0.00	0.01	-0.01	**0.07***	0.00	0.01	-0.01	0.30	0.00	0.01	-0.01	0.30
Profit Margin	-0.23	0.01	0.02	0.01	0.02	0.76	0.01	0.01	0.00	0.45	-0.01	0.01	-0.02	0.45
Net Income/Total Assets	-0.12	0.01	0.00	0.01	-0.01	0.12	-0.05	0.01	-0.06	**0.03****	-0.01	0.01	-0.02	0.27
Cash Flow/Total Assets	-0.08	0.04	0.00	0.01	-0.01	0.19	-0.01	0.02	-0.02	0.32	0.01	0.01	0.00	0.92
Cash Flow/Turnover	-0.14	0.03	0.02	0.00	0.02	0.88	0.02	0.01	0.01	0.82	0.00	0.01	0.00	0.55
Current Ratio	1.57	1.29	-0.22	-0.01	-0.21	**0.02****	-0.39	0.05	-0.44	**0.00*****	-0.49	0.05	-0.54	**0.00*****
Insolvency Risk														
IBD/EBITDA	0.00	0.00	0.00	0.00	0.00	0.99	-0.04	0.00	-0.04	0.27	0.00	0.00	0.00	0.44
Leverage	0.15	0.03	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.72	0.01	0.00	0.01	0.04**
ZM-Score	-	-	0.05	-0.11	0.16	0.20	0.02	0.06	-0.04	0.33	0.16	0.16	0.00	0.69
O-Score	-	-	-	-	-	-	0.47	-0.04	0.51	**0.07***	0.71	-0.10	0.81	**0.00*****
Employment														
Rel. Change Wages (EURm)	0.757	1.168	0.23	0.00	0.23	**0.00*****	0.33	0.00	0.33	**0.00*****	0.26	0.00	0.26	**0.00*****
Number of Observations	70	345												

Panel B displays the change in operational-, insolvency risk- and employment ratios for the ICT & Technology Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel C: Median Differences Industrial

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.05	0.04	0.01	0.87	0.07	0.02	0.05	0.31	0.06	0.00	0.05	**0.00*** **
Turnover/Total Assets	1.36	1.40	-0.07	0.06	-0.13	**0.00*** **	-0.01	0.02	-0.03	**0.01*** **	0.01	0.02	0.00	0.20
EBITDA-Margin	0.08	0.08	-0.02	-0.01	-0.02	0.22	-0.02	-0.02	0.00	0.44	-0.04	-0.02	-0.02	0.29
EBITDA/TotalAssets	0.10	0.12	-0.05	0.00	-0.05	**0.01*** **	-0.03	-0.01	-0.02	0.15	-0.06	-0.01	-0.05	**0.02** **
ROA	0.05	0.06	-0.06	0.00	-0.06	**0.02** **	-0.08	-0.01	-0.07	**0.01*** **	-0.08	-0.01	-0.07	**0.01*** **
Profit Margin	0.04	0.03	-0.04	-0.01	-0.03	**0.02** **	-0.02	-0.01	-0.01	0.23	-0.04	-0.01	-0.03	0.10
Net Income/Total Assets	0.05	0.04	-0.06	-0.01	-0.05	**0.02** **	-0.03	-0.01	-0.02	0.13	-0.08	-0.01	-0.07	0.01
Cash Flow/Total Assets	0.09	0.09	-0.06	0.00	-0.05	**0.02** **	-0.04	-0.01	-0.03	0.13	-0.05	-0.02	-0.03	**0.03** **
Cash Flow/Turnover	0.07	0.06	-0.03	-0.01	-0.02	0.09	-0.02	-0.01	-0.01	0.27	-0.03	-0.01	-0.02	0.47
Current Ratio	1.70	1.39	-0.05	0.01	-0.06	0.31	-0.14	0.05	-0.18	**0.01*** **	-0.16	0.04	-0.20	**0.01** **
Insolvency Risk														
IBD/EBITDA	0.41	0.27	0.02	0.00	0.02	0.72	-0.06	0.00	-0.06	0.33	-0.36	0.00	-0.36	0.04
Leverage	0.18	0.09	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.99	-0.01	0.00	-0.01	0.67
ZM-Score	-	-	0.32	-0.06	0.39	0.01	-0.06	0.01	-0.07	0.78	0.26	0.30	-0.04	0.55
O-Score	-	-	-	-	-	-	0.17	-0.11	0.28	0.10	0.41	-0.01	0.42	0.13
Employment														
Rel. Change Wages (EURm)	1.463	0.964	0.09	0.02	0.07	0.14	0.08	0.05	0.03	0.35	0.18	0.06	0.12	**0.02** **
Number of Observations	65	323												

Panel C displays the change in operational-, insolvency risk- and employment ratios for the ICT & Technology Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel D: Median Differences Health Care & Life Sciences

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.12	0.09	0.03	0.86	0.14	0.09	0.04	0.51	0.20	0.09	0.11	**0.05****
Turnover/Total Assets	0.18	1.24	0.03	0.01	0.02	0.83	-0.02	0.08	-0.11	0.24	0.03	0.06	-0.03	0.78
EBITDA-Margin	-0.30	0.05	0.00	0.00	0.00	0.54	-0.04	0.01	-0.05	0.23	0.07	0.01	0.06	0.57
EBITDA/TotalAssets	-0.08	0.06	0.01	0.01	0.00	0.85	0.02	0.02	0.00	0.89	0.01	0.02	0.00	0.90
ROA	-0.13	0.02	0.01	0.00	0.00	0.88	0.01	0.01	0.00	0.47	0.01	0.01	0.00	0.47
Profit Margin	-0.28	0.00	0.01	0.00	0.01	0.54	-0.01	0.02	-0.03	0.27	0.03	0.01	0.02	0.93
Net Income/Total Assets	-0.14	0.00	0.01	0.00	0.01	0.86	0.02	0.01	0.01	0.53	0.01	0.01	0.00	0.33
Cash Flow/Total Assets	-0.09	0.03	0.02	0.01	0.01	0.96	0.05	0.02	0.04	0.94	0.02	0.01	0.01	0.69
Cash Flow/Turnover	-0.23	0.04	0.01	0.00	0.01	0.58	0.00	0.02	-0.02	0.42	0.04	0.01	0.03	0.69
Current Ratio	2.26	1.10	-0.92	0.04	-0.96	**0.00*****	-0.56	0.11	-0.67	**0.01****	-1.16	0.04	-1.20	**0.00*****
Insolvency Risk														
IBD/EBITDA	-0.21	0.07	-0.37	0.00	-0.37	**0.09***	-0.24	-0.02	-0.22	0.52	-0.14	-0.11	-0.03	0.43
Leverage	0.30	0.17	-0.04	0.00	-0.04	0.43	-0.09	-0.01	-0.08	0.19	-0.04	-0.02	-0.02	0.65
ZM-Score	-	-	-0.05	-0.09	0.04	0.25	-0.15	-0.06	-0.10	0.75	0.87	0.05	0.83	**0.10***
O-Score	-	-	-	-	-	-	0.93	-0.25	1.18	0.19	1.58	-0.27	1.85	0.01
Employment														
Rel. Change Wages (EURm)	0.722	2.435	0.31	0.00	0.31	**0.04****	0.43	0.07	0.36	**0.09***	0.64	0.08	0.56	0.18
Number of Observations	17	85												

Panel D displays the change in operational-, insolvency risk- and employment ratios for the Health Care & Life Science Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel E: Median Differences Cleantech

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.48	0.05	0.43	**0.01*** **	0.32	0.05	0.27	**0.01** **	0.34	0.05	0.29	**0.01*** **
Turnover/Total Assets	0.21	0.59	0.13	0.00	0.13	**0.01*** **	0.16	0.00	0.16	**0.02** **	0.13	0.00	0.13	**0.01*** **
EBITDA-Margin	-1.58	0.14	-0.01	0.00	-0.01	0.93	0.17	0.00	0.17	0.25	0.22	0.00	0.22	**0.06***
EBITDA/TotalAssets	-0.22	0.07	-0.06	0.00	-0.06	0.23	-0.02	0.00	-0.02	0.44	0.06	0.00	0.06	0.67
ROA	-0.23	0.02	-0.06	0.00	-0.06	0.13	-0.01	0.00	-0.01	0.68	-0.01	0.00	-0.01	0.68
Profit Margin	-1.76	0.01	0.03	0.00	0.03	0.69	0.06	0.00	0.06	0.64	0.32	0.00	0.32	0.12
Net Income/Total Assets	-0.25	0.01	-0.02	0.00	-0.02	0.21	-0.04	0.00	-0.04	0.39	-0.04	0.00	-0.04	0.36
Cash Flow/Total Assets	-0.24	0.06	-0.01	0.00	-0.01	0.29	-0.02	0.00	-0.02	0.54	-0.01	0.00	-0.01	1.00
Cash Flow/Turnover	-1.73	0.12	0.03	0.00	0.03	0.60	0.23	0.00	0.23	0.19	0.40	0.00	0.39	**0.02** **
Current Ratio	3.67	1.28	-1.46	-0.02	-1.44	**0.00*** **	-1.48	0.02	-1.50	**0.00*** **	-1.76	0.14	-1.91	**0.00*** **
Insolvency Risk														
IBD/EBITDA	-0.01	2.12	0.00	0.04	-0.04	0.91	0.00	-0.01	0.01	0.97	-0.08	0.04	-0.12	0.11
Leverage	0.04	0.32	0.01	0.00	0.01	**0.02***	0.03	0.00	0.03	0.02	0.04	-0.01	0.05	**0.01** **
ZM-Score	-	-	0.94	0.00	0.94	**0.00*** **	-0.05	-0.10	0.05	0.86	-1.14	0.00	-1.13	**0.03** **
O-Score	-	-	-	-	-	-	2.00	-0.03	2.03	**0.00*** **	1.01	-0.08	1.09	**0.00*** **
Employment														
Rel. Change Wages (EURm)	0.487	1.001	0.51	0.05	0.47	**0.00*** **	0.84	0.15	0.68	**0.00*** **	0.93	0.20	0.73	**0.00*** **
Number of Observations	27	135												

Panel E displays the change in operational-, insolvency risk- and employment ratios for the Cleantech. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel F: Median Differences Consumer

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	0.16	0.05	0.12	0.37	0.14	0.05	0.09	**0.07***	0.09	0.04	0.06	**0.05***
Turnover/Total Assets	1.67	0.43	0.06	0.01	0.06	0.27	0.06	0.01	0.05	0.39	0.20	0.02	0.19	**0.03****
EBITDA-Margin	0.04	0.10	-0.01	0.00	-0.01	0.27	-0.02	0.01	-0.03	0.14	0.00	0.01	-0.01	**0.07***
EBITDA/TotalAssets	0.06	0.06	0.01	0.00	0.01	0.71	-0.02	0.01	-0.03	**0.02****	0.00	0.01	-0.01	0.28
ROA	0.03	0.03	0.00	0.00	-0.01	0.23	0.00	0.01	-0.01	**0.08***	0.00	0.01	-0.01	**0.08***
Profit Margin	0.00	0.02	-0.01	0.01	-0.01	**0.05***	-0.02	0.02	-0.04	**0.03****	-0.01	0.02	-0.03	**0.01*****
Net Income/Total Assets	0.00	0.01	-0.01	0.00	-0.01	0.18	-0.04	0.01	-0.05	**0.00*****	-0.01	0.01	-0.02	**0.01*****
Cash Flow/Total Assets	0.03	0.04	0.01	0.00	0.00	0.71	-0.04	0.01	-0.05	**0.00***	0.00	0.01	-0.01	0.10
Cash Flow/Turnover	0.03	0.08	0.00	0.00	-0.01	0.23	-0.04	0.01	-0.05	**0.02***	-0.01	0.01	-0.02	**0.05***
Current Ratio	1.32	1.35	-0.08	0.03	-0.11	**0.05***	-0.05	0.04	-0.09	**0.06***	-0.15	0.05	-0.20	0.01
Insolvency Risk														
IBD/EBITDA	0.03	1.07	-0.08	-0.01	-0.08	0.73	0.00	0.00	0.00	0.56	0.00	-0.08	0.08	0.49
Leverage	0.08	0.23	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.94	0.00	0.00	0.00	0.82
ZM-Score	-	-	0.30	-0.04	0.34	**0.05***	0.13	-0.04	0.17	0.08*	0.74	0.05	0.68	0.32
O-Score	-	-	-	-	-	-	0.24	-0.13	0.37	**0.00*****	0.49	-0.17	0.67	**0.00*****
Employment														
Rel. Change Wages (EURm)	1.708	0.469	0.15	0.00	0.15	**0.04****	0.14	0.00	0.14	**0.02****	0.22	0.09	0.13	0.19
Number of Observations	33	165												

Panel F displays the change in operational-, insolvency risk- and employment ratios for the Consumer Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

Panel G: Median Differences Transportation

	Values at T = 0		Difference From Time of Investment											
	T = 0		T + 1				T + 2				T + 3			
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value	PE-backed Mean Change	Controll Mean Change	Diff in Diff	Rank Sum P-value
Performance														
CAGR	-	-	-0.09	0.03	-0.12	0.47	-0.07	0.05	-0.12	0.18	-0.07	0.04	-0.11	0.22
Turnover/Total Assets	1.44	0.82	-0.08	0.00	-0.08	0.83	0.03	0.00	0.03	0.83	-0.02	0.02	-0.04	0.95
EBITDA-Margin	0.04	0.03	-0.01	0.00	-0.01	0.32	-0.01	0.02	-0.03	0.05	-0.07	0.03	-0.09	**0.01****
EBITDA/TotalAssets	0.03	0.04	-0.02	0.00	-0.02	0.45	-0.03	0.02	-0.04	0.16	-0.05	0.02	-0.07	0.25
ROA	-0.01	0.00	-0.02	0.00	-0.02	0.48	-0.04	0.02	-0.07	0.18	-0.04	0.02	-0.07	0.18
Profit Margin	0.01	0.01	0.00	0.00	-0.01	0.35	-0.02	0.03	-0.05	0.05	-0.02	0.03	-0.05	0.12
Net Income/Total Assets	0.00	0.01	-0.01	0.01	-0.01	0.33	-0.06	0.02	-0.08	0.04	-0.05	0.01	-0.07	0.14
Cash Flow/Total Assets	0.06	0.04	0.00	0.01	-0.01	0.49	-0.05	0.01	-0.06	0.13	-0.04	0.01	-0.05	0.28
Cash Flow/Turnover	0.04	0.06	0.00	0.00	-0.01	0.47	-0.02	0.01	-0.03	0.11	-0.02	0.01	-0.03	0.24
Current Ratio	0.99	1.57	-0.03	-0.05	0.03	0.53	-0.12	-0.06	-0.06	0.65	-0.10	0.01	-0.11	0.81
Insolvency Risk														
IBD/EBITDA	0.51	0.00	-0.04	0.00	-0.04	0.90	-0.66	0.00	-0.66	0.35	-0.67	0.04	-0.71	0.28
Leverage	0.13	0.13	-0.01	0.00	-0.01	0.81	-0.01	0.00	-0.01	0.78	-0.05	0.00	-0.05	0.59
ZM-Score	-	-	-0.32	0.02	-0.34	0.36	0.63	0.02	0.61	0.11	1.83	0.04	1.78	0.13
O-Score	-	-	-	-	-	-	0.36	-0.10	0.45	0.20	1.20	0.10	1.10	0.08
Employment														
Rel. Change Wages (EURm)	7.125	0.967	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.79
Number of Observations	10	50												

Panel G displays the change in operational-, insolvency risk- and employment ratios for the Transportation Sector. Medians values are shown in the year of the transactions. For each of the three subsequent years median changes are depicted. We perform a Wilcoxon-Mann-Whitney Rank Sum test with the null hypothesis that the distribution of both samples are equal. The alternative hypothesis is that the distributions of the two samples are not equal. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

TABLE XII – Assessment of Performance, Solvency and Employment between buyouts and controls – Mean Values (Non-Winsorized)

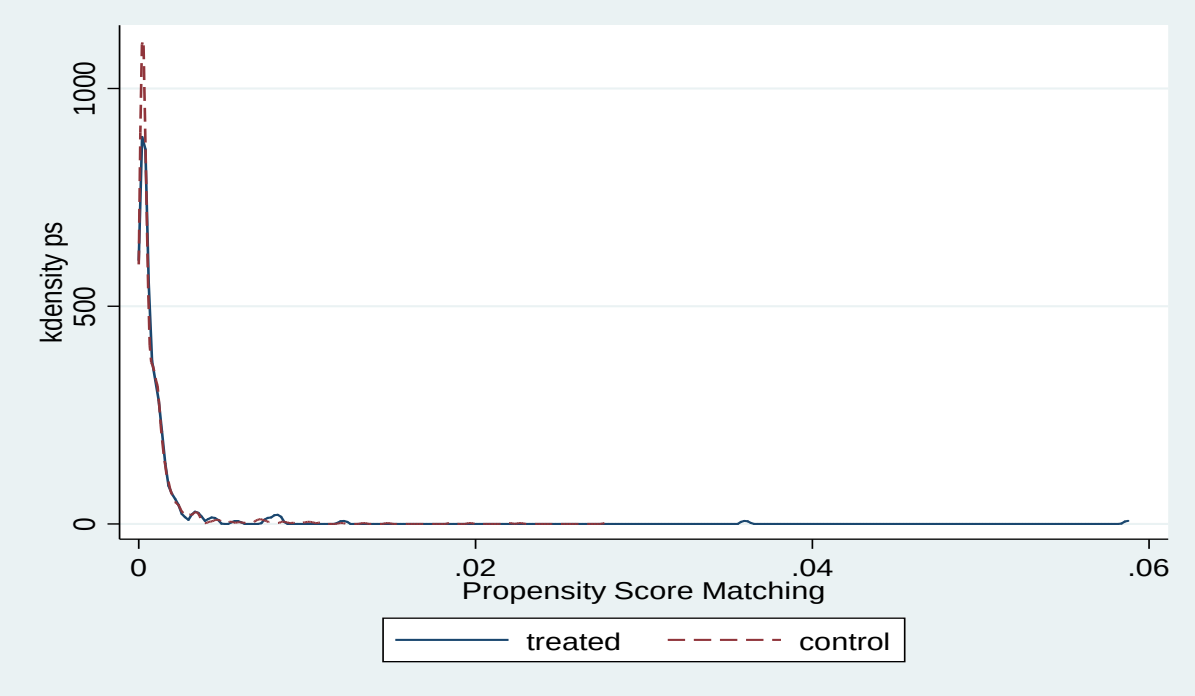
Panel A: Non Winsorized Mean Differences

	Values at T = 0		Difference From Time of Investment														
	T = 0		T + 1					T + 2					T + 3				
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-Value
Performance																	
CAGR			2.81	1.15	1.66	1.08	0.12	0.83	0.16	0.67	0.24	**0.01*** **	0.06	0.39	-0.33	0.08	**0.00*** **
Turnover/Total Assets	1.14	1.30	0.06	0.07	-0.01	0.09	0.9	0.05	0.06	-0.01	0.06	0.99	0.06	0.12	-0.06	0.07	0.31
EBITDA-Margin	-7.62	-4.93	4.47	-3.84	8.31	8.12	0.31	6.32	-0.98	7.3	6.21	0.24	2.94	6.84	-3.9	5.51	0.48
EBITDA/TotalAssets	-0.11	0.14	-0.06	-0.02	-0.04	0.03	0.2	-0.08	-0.04	-0.04	0.05	0.37	-0.02	-0.28	0.26	0.23	0.25
ROA	-0.17	0.09	-0.05	-0.04	-0.01	0.04	0.65	-0.29	-0.03	-0.26	0.35	0.58	-0.03	-0.29	0.26	0.24	0.29
Profit Margin	-8.01	-5.89	4.3	-2.83	7.13	8.73	0.42	6.22	2.34	3.88	6.81	0.57	0.12	6.64	-6.52	7.50	0.38
Net Income/Total Assets	-0.19	0.06	-0.05	-0.04	-0.01	0.05	0.81	-0.13	-0.06	-0.07	0.08	0.41	-0.01	-0.32	0.31	0.25	0.21
Cash Flow/Total Assets	-0.12	0.10	-0.06	-0.0	-0.06	0.04	0.34	-0.14	-0.04	-0.1	0.08	0.19	-0.02	-0.31	0.29	0.23	0.22
Cash Flow/Turnover	-7.54	-4.41	4.39	-3.78	8.17	8.21	0.32	6.14	1.28	4.86	6.09	0.42	-2.03	6.59	-8.62	6.98	0.22
Current Ratio	2.92	4.95	-0.94	0.25	-1.19	0.72	0.11	-1.20	3.17	-4.37	1.75	0.01	3.06	-1.32	4.38	1.83	**0.02** **
Insolvency Risk																	
IBD/EBITDA	8.69	-13.4	71.1	17.8	53.3	80.02	0.52	-6.58	19.4	-25.98	18.02	0.13	14.9	-9.92	24.82	18.09	0.14
Leverage	0.22	0.27	0.03	-0.00	0.03	0.02	0.19	0.04	-0.00	0.04	0.02	**0.06** **	0.03	0.06	-0.03	0.04	0.38
ZM-Score			0.64	0.12	0.52	0.49	0.28	0.65	0.96	-0.31	0.53	0.13	-0.19	2.38	-2.57	1.76	0.12
O-Score								1.19	0.39	0.8	0.81	0.7	0.28	2.99	-2.71	2.27	0.26
Employment																	
Rel. Change Wages (EURm)	7.455	4.029	0.72	0.63	0.09	0.31	0.77	1.24	0.74	0.5	0.36	0.16	1.23	1.67	-0.44	0.64	0.49
Rel. Change Employment	103.3	83.2	0.32	0.14	0.18	0.10	**0.10***	0.57	0.20	0.37	0.16	**0.02** **	0.28	0.70	-0.42	0.19	**0.03** **
Rel. Change Wage Level (EURt)	47.768	57.194	0.18	0.09	0.09	0.06	0.15	0.20	0.12	0.08	0.07	0.29	0.16	0.29	-0.13	0.08	0.17
Number of Observations	248	1224															

The Table displays the change in ratios for operational performance, solvency risk and employment for non-winsorized figures. Mean values are shown in the year of the transaction. For each of the three subsequent years mean changes are depicted with standard errors adjusted for the weights calculated in the PSM. We perform a t-test with the null hypothesis that the mean change is equal in both populations. The alternative hypothesis is that changes in mean value in each population differ. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

TABLE XIII – Kernel Density Function



This table displays the common support distribution for the treated companies and the control group. The matching has been performed using the five-to-one nearest neighbor method, allowing for replacement and a caliper of 0.1. The kernel density is given on the vertical axis, and the propensity score is given on the horizontal. The dotted line represents the propensity score distribution for the control group, and the continuous line represents the score for the treated companies.

TABLE XIV – Custom two-digit NACE code classification

Sectors and Corresponding Two-Digit NACE Codes

Sector	NACE-Digits
Energy	5, 6, 19, 35
ICT & Technology	18, 26, 58, 59, 60, 61, 62, 63, 71, 72, 74, 95
Industrial	2, 7 ,8, 9, 16, 17, 20, 22, 23, 24, 25, 27, 28, 32 , 37, 41, 42, 42, 69, 70, 78, 80, 81, 84
Health Care & Life Sciences	21, 75, 86, 87, 88
Cleantech	36, 38, 39
Consumer	1, 3, 10, 11, 12, 13, 14, 15, 31, 33, 45, 46, 47, 55, 56, 64, 65, 66, 68, 73, 77, 79, 85, 90, 91, 92, 93, 94, 96, 97 98
Transportation	29, 30, 49, 50, 51, 52, 53, 82, 99

This table provides an overview of the classification scheme in the thesis, based on the two-digit NACE code. The NACE code is a European Standard Classification system, similar to the SIC codes used in the US. The codes are identical for all European countries. Each company is assigned to an industry given the first two digits the company has in its NACE code. The custom classification system of the two-digit codes was classified prior to the analysis. The authors of the thesis developed this classification system. For more information regarding the scheme, see Section 4.4.

Table XV – Sector Allocation

Sector	All Companies	PE-backed Companies	Differance in Perc. Points	Allocation-Ratio
Energy	0.48%	10.20%	0.097	1.172
ICT & Technology	12.37%	30.30%	0.179	0.136
Industrial	25.99%	24.65%	-0.013	0.052
Health Care & Life Scier	3.40%	9.73%	0.063	0.158
Cleantech	0.30%	7.54%	0.072	1.386
Consumer	53.10%	15.23%	-0.379	0.016
Transportation	4.37%	2.35%	-0.020	0.030

This table provides an overview of the sector allocation of PE firms in the Nordics. Calculations have been made using our sample of transactions and controls. We caution that our list of transactions and non-PE-backed companies might not be complete. However, we argue that the ratios are representable. All calculations have been made using the number companies. The first row shows the percentage of all companies in the Nordics for the sectors. The second row shows the percentage of all PE-backed companies in the Nordics within the different sectors. Furthermore, the third and fourth row are used to examine the sector allocation. Difference in percentage points is the second row subtracted the first row. This depicts whether the number of PE investments in the respective sector is higher or lower than it should be given that they select target companies randomly among sectors. The allocation-ratio is the number of PE investments in the sector divided by the total number of companies in the sector multiplied by a 100. This ratio allows us to rank the sectors in term of PE involvement.

TABLE XVI – Growth regressions with All Controls – Consolidated

TABLE XVI **Growth Post-Funding for PE and Sectors**

Independent Variables	CAGR Turnover (1)	Sector CAGR Turnover (2)	Sector CAGR Turnover (3)	Sector CAGR Turnover (4)
PE_D	**0.21*** **			
	(0.041)			
Initial Turnover	**-5.3e-09*** **	**-5.0e-09*** **	**-5.0e-09*** **	**-4.4e-09*** **
	(9.2e-10)	(8.8e-10)	(9.1e-10)	(8.4e-10)
Initial Profitability	**-0.0017** **	-0.0012	-0.0013	**-0.0014***
	(0.00072)	(0.00077)	(0.00077)	(0.00078)
Initial Leverage	-0.13	-0.12	-0.13	**-0.15***
	(0.078)	(0.083)	(0.082)	(0.082)
PE * Energy		0.14	0.13	0.13
		(0.14)	(0.14)	(0.14)
PE * Technology		**0.32*** **	**0.32*** **	**0.32*** **
		(0.099)	(0.098)	(0.096)
PE * Industrial		**0.15** **	**0.15** **	**0.16** **
		(0.064)	(0.064)	(0.064)
PE * Healthcare		0.046	0.045	0.050
		(0.100)	(0.100)	(0.11)
PE * Cleantech		**0.46** **	**0.46** **	**0.45** **
		(0.18)	(0.19)	(0.19)
PE * Consumer		**0.18***	**0.18***	**0.18***
		(0.10)	(0.10)	(0.10)
PE * Transportation		-0.057	-0.053	-0.070
		(0.11)	(0.11)	(0.099)
Energy		0.0037	0.010	0.015
		(0.079)	(0.081)	(0.085)
Technology		-0.089	-0.089	-0.087
		(0.067)	(0.067)	(0.068)
Industrial		-0.088	-0.092	-0.10
		(0.061)	(0.064)	(0.065)
Healthcare		0.12	0.12	0.089
		(0.079)	(0.080)	(0.083)
Cleantech		-0.015	-0.017	-0.030
		(0.067)	(0.068)	(0.071)
Consumer		-0.025	-0.018	-0.0027
		(0.063)	(0.067)	(0.072)
Denmark			0.040	**0.16***
			(0.074)	(0.086)
Finland			0.053	0.048
			(0.062)	(0.062)
Norway			0.033	0.040
			(0.072)	(0.075)
T2006				-0.075
				(0.13)
T2007				-0.035
				(0.085)
T2008				0.18
				(0.11)
T2009				0.056
				(0.12)
T2010				-0.025
				(0.082)
T2011				-0.066
				(0.079)
T2012				**-0.14***
				(0.080)
T2013				-0.0091
				(0.100)
Constant	**0.15*** **	**0.19*** **	0.16*	0.16
	(0.029)	(0.067)	(0.085)	(0.12)
N	1,401	1,401	1,401	1,401
R-squared	0.0899	0.1092	0.1100	0.1362
Robust Standard Errors	yes	yes	yes	yes

Note. - The sample consist of the identified PE-funded companies identified through the Propensity Score Matching Methodology and the corresponding matches. This means that N (1,401) represents both the PE-backed companies and the controls. The regressions are OLS regressions. We do not include each company more than one time, i.e. each company is represented by one row in the data set. In regression (1) we identify the effect of PE-funding with CAGR Turnover as the dependent variable. Initial leverage, initial profitability and initial turnover are used as control variables. Regression (1), -(2), -(5) and -(6) are described in Table X. In regression (3) and - (6) we add country controls, while regression (4) and -(8) also include time dummies. Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.

TABLE XVII – EBITDA regressions with All Controls – Consolidated

TABLE XVII **EBITDA-margin Post-Funding for PE and Sectors**

Independent Variables	EBITDA-Margin Improvments (5)	Sector EBITDA-Margin Improvements (6)	Sector EBITDA-Margin Improvements (7)	Sector EBITDA-Margin Improvements (8)
PE_D	5.98			
	0.155			
Initial Turnover	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Initial Profitability	**-0.41*** **	**-0.41*** **	-0.42***	-0.42***
	(0.12)	(0.12)	(0.12)	(0.12)
Initial Leverage	**-18.3** **	**-19.5** **	**-22.3** **	-22.9**
	(8.96)	(9.05)	(8.81)	(9.06)
PE * Energy		-0.22	-0.94	-1.02
		(19.4)	(19.4)	(18.6)
PE * Technology		12.7	13.1	13.0
		(11.8)	(11.8)	(11.7)
PE * Industrial		**9.24** **	**9.53** **	**9.56** **
		(4.33)	(4.36)	(4.39)
PE * Healthcare		-5.19	-5.34	-5.36
		(16.0)	(15.5)	(15.6)
PE * Cleantech		9.64	8.72	8.23
		(18.9)	(18.8)	(18.9)
PE * Consumer		-2.32	-2.96	-2.22
		(3.86)	(3.90)	(4.26)
PE * Transportation		-12.0	-10.2	-10.4
		(9.17)	(8.62)	(9.04)
Energy		-4.18	-0.53	1.45
		(6.39)	(6.84)	(7.39)
Technology		**-10.6** **	**-12.2** **	**-10.8** **
		(4.47)	(4.82)	(5.40)
Industrial		-7.09*	**-10.8** **	**-9.20** **
		(3.77)	(4.32)	(4.59)
Healthcare		-6.56	-9.74	-9.59
		(5.85)	(6.35)	(6.65)
Cleantech		-2.14	-3.08	-1.76
		(3.51)	(3.81)	(4.43)
Consumer		-5.23	-6.23	-1.45
		(4.57)	(5.21)	(5.71)
Denmark			2.94	2.87
			(7.59)	(9.17)
Finland			6.69	6.94
			(8.00)	(7.76)
Norway			-4.02	-4.16
			(8.71)	(8.45)
T2006				-20.2
				(19.7)
T2007				2.68
				(9.48)
T2008				13.9
				(8.88)
T2009				15.1
				(9.17)
T2010				8.76
				(6.82)
T2011				8.57
				(6.87)
T2012				7.41
				(7.18)
T2013				13.5
				(8.88)
Constant	**9.86*** **	**16.4*** **	17.6*	7.39
	(3.29)	(4.71)	(9.17)	(11.0)
	1,301	1,301	1,301	1,301
	0.0750	0.0813	0.0870	0.0993
	yes	yes	yes	yes

Note. - The sample consist of the identified PE-funded companies identified through the Propensity Score Matching Methodology and the corresponding matches. This means that N (1,301) represents both the PE-backed companies and the controls. The regressions are OLS regressions. We do not include each company more than one time, i.e. each company is represented by one row in the data set. In regression (1) we identify the effect of PE-funding with CAGR Turnover as the dependent variable. Initial leverage, initial profitability and initial turnover are used as control variables. Regression (1), -(2), -(5) and -(6) are described in Table X. In regression (3) and - (6) we add country controls, while regression (4) and -(8) also include time dummies. Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.

TABLE XVIII – Assessment of Performance, Solvency and Employment between buyouts and controls – Mean Values (consolidated)

Panel A: Diff-in-Diff with consolidated figures

	Values at T = 0		Time Period														
	T = 0		T + 1					T + 2					T + 3				
	PE-backed Mean Level	Controll Mean Level	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-value	PE-backed Mean Change	Controll Mean Change	ATT	SE(ATT)	P-Value
Performance																	
CAGR			1.40	0.46	0.94	0.29	**0.00*** **	0.47	0.16	0.31	0.08	**0.00*** **	0.30	0.08	0.22	0.04	**0.00*** **
Turnover/Total Assets	1.19	1.32	0.06	0.04	0.02	0.06	0.67	0.09	0.04	0.05	0.07	0.42	0.16	0.03	0.13	0.07	**0.06***
EBITDA-Margin	-1.03	-0.18	0.13	0.06	0.07	0.11	0.476	0.30	0.1	0.2	0.14	0.14	0.41	0.1	0.31	0.14	**0.03** **
EBITDA/TotalAssets	-0.08	-0.01	-0.04	0.04	-0.08	0.02	**0.00*** **	-0.03	0.07	-0.1	0.02	**0.00*** **	0.03	0.06	-0.03	0.03	**0.03** **
ROA	-0.15	-0.10	-0.06	0.08	-0.14	0.03	**0.00*** **	-0.07	0.10	-0.17	0.04	**0.00*** **	-0.03	0.10	-0.13	0.04	**0.00*** **
Profit Margin	-1.57	-0.34	0.24	0.08	0.16	0.22	0.47	0.32	0.11	0.21	0.27	0.45	0.55	0.16	0.39	0.26	0.13
Net Income/Total Assets	-0.17	-0.12	-0.06	0.07	-0.13	0.04	**0.00*** **	-0.08	0.09	-0.17	0.04	**0.00*** **	-0.05	0.1	-0.15	0.04	**0.00*** **
Cash Flow/Total Assets	-0.10	-0.02	-0.03	0.03	-0.06	0.02	**0.00*** **	-0.04	0.05	-0.09	0.02	**0.00*** **	-0.01	0.05	-0.06	0.03	**0.02** **
Cash Flow/Turnover	-1.02	-0.12	0.16	0.05	0.11	0.12	0.36	0.29	0.08	0.21	0.14	0.15	0.40	0.13	0.27	0.15	**0.06***
Current Ratio	2.60	6.13	-0.66	-0.43	-0.23	0.96	0.83	-0.92	0.05	-0.97	1.10	0.39	-1.01	0.99	-2	1.13	**0.08***
Insolvency Risk																	
IBD/EBITDA	0.23	1.67	1.35	0.40	0.95	1.49	0.52	0.26	-0.48	0.74	1.57	0.64	-0.09	-0.30	0.21	1.63	0.89
Leverage	0.23	0.23	0.03	0.04	-0.01	0.02	0.99	0.05	0.06	-0.01	0.03	0.69	0.07	0.08	-0.01	0.03	0.65
ZM-Score			0.71	0.72	-0.01	0.68	0.98	0.31	-0.01	0.32	0.70	0.51	1.51	1.24	0.27	1.32	0.94
O-Score								1.02	0.56	0.46	0.31	0.32	1.71	1.81	-0.1	1.3	0.84
Employment																	
Rel. Change Wages (EURm)	3.037	2.832	0.71	0.38	0.33	0.15	**0.03** **	1.28	0.87	0.41	0.31	0.32	1.79	1.19	0.6	0.42	0.15
Rel. Change Employment	67.1	59.1	0.26	0.13	0.13	0.10	0.17	0.49	0.21	0.28	0.16	**0.08***	0.61	0.28	0.33	0.18	**0.07***
Rel. Change Wage Level (EURt)	44.012	52.932	1.20	0.83	0.37	1.15	0.75	1.08	1.05	0.03	1.13	0.98	0.53	1.02	-0.49	0.76	0.53
Number of Observations	261	1,301															

The Table displays the change in ratios for operational performance, insolvency risk and employment for consolidated values (when applicable). Mean values are shown in the year of the transaction. For each of the three subsequent years mean changes are depicted with standard errors adjusted for the weights calculated in the PSM. We perform a t-test with the null hypothesis that the mean change is equal in both populations. The alternative hypothesis is that changes in mean value in each population differ. P-values are presented to the right of each section.

*Significance levels 10 %, 5 %, 1 % are denoted by asterisks ***, ** and *, respectively.*

9. List of Abbreviations

ACPE	-	Argentum's Centre for Private Equity
AUM	-	Assets Under Management
Bn	-	Billion
CAGR	-	Compounded Annual Growth Rate
DKK	-	Dansk krone, official currency of Denmark
EBIT	-	Earnings Before Interest and Taxes
EBITDA	-	Earnings Before Interest, Taxes, Depreciation and Amortization
EUR	-	EURO, official currency of the European Union
GDP	-	Gross Domestic Product
GP	-	General Partner
ICT	-	Information Communications Technology
LBO	-	Leveraged Buyout
M	-	Million
MBI	-	Management Buy-In
MBO	-	Management-led Buyout
NN	-	Nearest Neighbour
NOK	-	Norwegian krone, official currency of Norway
P2P	-	Public-to-Private
PE	-	Private Equity
PSM	-	Propensity Score Matching
ROA	-	Return on Assets
SEK	-	Swedish krona, official currency of Sweden
TFP	-	Total Factor Productivity
VC	-	Venture Capital