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Private Equity – When the Dust Has Settled

A study on the post-IPO operational performance of Private Equity-backed companies in the Nordic Markets during 2006-2015

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Abstract

Title:	Private Equity – When the Dust Has Settled
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Authors:	Johan Gren, Christos Karabelas, Erik Johansson
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Key words:	Private Equity, Operational Performance, IPO, Nordic Markets
Purpose:	To explore if Private Equity-backed companies display better post-IPO operational performance compared to non-backed companies in the Nordic markets during the post 2000's boom period (2006-2015)
Methodology:	Quantitative Research
Theoretical approach:	Previous findings and theory suggest that Private Equity-backed companies outperform non-backed companies after they are issued to the public. A majority of the literature is however focused on periods preceding the end of the 2000's boom and on the U.S or a select few European markets. Frequently, investor returns and stock performance is furthermore the object of study. Hence, the focus of this study is to compare Private Equity-backed companies' post-IPO operational performance versus non-backed firms in the Nordic market after 2006
Empirical approach:	110 companies were studied that IPOed during 2006-2015 in the Nordics, where 46 companies represent the sample group of PE-backed firms and the remaining 64 companies as a benchmark to test against. Data was collected from Bloomberg, Capital IQ and Zephyr
Conclusion:	Based on the study's sample and results, no post-floatation operating overperformance of PE-backed companies in comparison to a benchmark of non-PE-backed peers can be evidenced

Word List

Buyout: Defined as the purchase of a company by a Private Equity firm

IPO: Initial Public Offering

Financial Sponsor (also referred as "Sponsor"): In the context of this thesis, it is synonymously used with Private Equity firm

Nordic Markets: Includes Denmark, Finland, Norway and Sweden. Iceland and Greenland are subsequently not represented in this thesis

PE: Private Equity

Preface

We would like to thank our supervisors Reda Moursli and Amanda Sonnerfeldt for their continuous guidance and invaluable feedback.

We would also like to thank our families for all their love and support.

Johan Gren Christos Karabelas Erik Johansson

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1. Introduction

This section will give a brief background to the purpose of the study followed by the presentation of the research question and its scope. Lastly, the contribution of this paper in comparison to previous literature is discussed.

1.1 Background

Since the initial Private Equity (PE) boom in the 1980's, the PE industry has undergone a notable change. Following the collapse of the junk bond market in the 1990's, Private Equity firms started to center their investing activity around finding operational improvement potential rather than focusing on leverage (Spliid, 2013). In parallel to this development, the Nordic PE market emerged and has grown to distinguish itself by both its ability to attract capital and deliver persistent returns to its investor base (Næss-Schmidt, Heebøll & Karlsson, 2017). Due to this, along with the market's somewhat distinct characteristics, the Nordic Private Equity market presents an interesting context when studying the effects of Private Equity activity.

Following the shift of focus towards operational improvements, measuring the PE firms' ability to create operational value in their portfolio companies[1] is of high relevance (Spiild, 2013). Furthermore, whether these operational improvements persist after the PE firm divests and exits the portfolio company is also of great interest from a value creation perspective. As taking a company public through an Initial Public Offering (IPO) is a common exit strategy for PE firms, it also presents an opportunity to study the operational performance of Private Equity-backed companies after going public. The purpose of this paper is to explore whether PE-backed companies display better post-IPO operational performance compared to non PE-backed peers in the Nordic markets.

The Private Equity sector has globally been found to display a significant cyclicality in terms of a boom-bust pattern, with sharp rises in investing activity followed by distinct cooling down-periods (Kaplan & Strömberg, 2009). The most recent boom period took place during 2000-2007 (Acharya, Franks & Servaes, 2007). Studying companies that Private Equity firms divested in 2006 and onwards provides an opportunity to examine if PE activity during the

[1] *Companies that are owned by a Private Equity firm*

boom generated persistent operating improvements in their portfolio companies. The 2000's boom displayed certain characteristics that could motivate PE investment activity due to other factors than operational improvement potential. Kaplan and Strömberg (2009) note that liquidity in credit markets seem to fuel booming periods in the industry. The authors find that these conditions might have driven PE investing during the boom even in the absence of clear potential for operational improvements in the target companies[2] (Kaplan & Strömberg, 2009).

As noted by Kaplan and Strömberg (2009), favorable market conditions such as those during the boom furthermore enables worse performing funds to attract capital. This erodes some of the importance of past fund performance to receive new funding, implying that a significant proportion of the deal activity during the period potentially has been generated by weakly performing PE firms.

As Private Equity funds generally have a finite lifespan of a maximum of ten years, most investments conducted during the recent boom period would have been exited during 2006-2015. Examining PE divestments during this period captures deals that were potentially largely driven by favorable market conditions, rather than operational improvement potential in target companies. Consequently, the time period presents an interesting setting to examine whether Private Equity activity succeeds in generating value through persistent operating improvements in their portfolio companies.

1.2 Research Question

Against the aforementioned background, we aim to test the impact on operational performance that PE firms bring to their portfolio companies. Therefore, our research question is as follows:

Is there a difference in the post-issuance operating performance of PE-backed IPOs compared to non PE-backed IPOs in the Nordic markets during the period of 2006-2015?

Previous studies largely suggest that Private Equity firms generate operational value for firms that lasts even after the holding period (Kaplan & Strömberg, 2009). By capturing PE investments made during the boom period (2000-2007) that might have been driven by other

[2] *Companies that the PE firm analyses and seeks to potentially invest in*

factors than the potential for operating improvements, this paper aims to investigate the presence of these improvements when the prospect of achieving them might not be the main driver of transaction activity.

The study's focus towards specifically operational results is partly based on the view of value creation put forth by Bergström, Grubb and Jonsson (2007). The authors argue that while concepts such as financial arbitrage and market timing might indeed provide Private Equity investors with improved returns, they contain a significant element of wealth distribution effects. Based on this, the argument is put forth that the best measure of persistent, underlying value created by PE-activity consists of operational performance improvements in portfolio companies.

1.3 Thesis Scope

This study is concerned specifically with the operating performance displayed by PE-backed firms after their IPO. Investment returns and other stock-specific factors related to the chosen context thus lie outside the thesis' scope. There exists a substantial body of previous research dedicated towards the investment performance and other stock-specific dynamics in our chosen context. As such, we believe it would be of limited value to include these considerations, opting instead to focus solely on operational performance and leaving stock performance outside of the thesis' scope.

The operating performance of a given firm is the result of a large number of determinants. These are oftentimes interlinked and both diverse and complex in nature. It thus lies beyond the scope and ambition of this thesis to determine an exact explanation of the factors driving relative operating improvements, or lack thereof, in the studied firms. Rather, the fundamental aim is to determine whether any incremental operating performance in the PE-backed firms can be evidenced given the chosen context. The results will be interpreted based on previous research and theory, however with the main aim of providing a basis for potential further research.

1.4 Contribution to Previous Literature

Ever since the publication of the findings of Jensen (1989), the value created by Private Equity activity has been subject to extensive research. Some studies into the matter has

focused on value created in terms of fund investor returns and portfolio company stock performance, such as those conducted by Kaplan and Schoar (2005), Bergström, Nilsson and Wahlberg (2007), Levis (2011) and Michala (2016).

Another large part of the literature aims to specifically examine the value created through operating improvements in conjunction to PE involvement, such as Kaplan (1989) and Acharya et al. (2011). The majority of these studies have focused on value created during the holding period and present results reaffirming the notion of Jensen (1989) that PE-activity does indeed generate operating improvements in their portfolio firms. While several studies such as Bergström, Grubb and Jonsson (2007) have reached similar conclusions in a Nordic context, the vast majority of the work has been set in other European and the U.S markets. Some studies of PE investments in the latest boom of the 2000's have however to some degree failed to reaffirm these previous findings. One example being the study by Guo, Hotchkiss and Song (2009) that find, at best, questionable evidence for operating improvements post-holding period.

A significant proportion of the previous literature, including the papers mentioned above, has been dedicated towards post-holding period returns that concerns investments performed before or during the 2000's boom. Much of the literature concerning specifically post-exit performance, such as Cao and Lerner (2009), Holthausen and Larcker (1996) and Harris, Murray and Niu (2006) is similarly based on exits performed before the ending of the 2000's boom.

This thesis will examine the post-IPO operating performance of Nordic PE-backed firms in the post-boom period against a benchmark of non PE-backed peers. As previously described, the PE industry characteristics of this period along with the choice of market implicates interesting aspects for potential contribution to past research. Moreover, the focus on specifically post-exit operational performance rather than on stock performance, will allow this paper to provide an addition to the existing body of literature.

2. Theory

This section will present the theoretical framework used to analyze the results and answer our research question.

2.1 Definition of Private Equity and Value Creation

Private Equity, as defined by the industry organization Invest Europe (2017)[3], is the provision of equity capital by financial investors – over the medium to long term – to non-quoted companies with significant growth potential. While the broad range of Private Equity activity shares the characteristic of targeting private firms with a defined strategic purpose, Private Equity is not a homogenous investment category, but rather an umbrella term for a broad asset class with several subsets of investment categories.

Michala (2016) makes a broad distinction between Venture Capital and Buyout Capital. The former refers to investments typically in the form of minority stakes into young or emerging companies. Buyout Capital, in contrast, refers to the practice of acquiring the majority share of an established business, usually through the employment of considerable amounts of debt financing. This paper will adhere to this distinction and focus on buyout capital employed by PE firms.

Kaplan and Strömberg (2009) divide value-creating activities of the PE firm into three subclasses: Governance Engineering, Financial Engineering and Operational Engineering, each one with several direct and indirect effects on the portfolio firms' operational performance. In the following section we examine the subclasses Governance Engineering and Financial Engineering in connection to established theories. The third subclass, Operational Engineering, is reviewed empirically and presented in Section 3.

2.2 Theoretical Framework

2.2.1 Agency Theory and Governance Engineering

Assuming that the owners of the firm (The "Principals") and the management of the firm (The "Agents") are both utility-maximizing entities with potentially divergent goals, the agency

[3] *Previously known as The European Private & Venture Capital Organization*

theory states that in the separation of ownership and control of a firm, a potential conflict of interest arises. As decision-authority is delegated by the owners to the managers, managers might aim to pursue their individual goals regardless of whether these goals serve the Principal's best interests. Several corporate mechanisms exist to combat this behavior and align the agendas of the parties, but most usually come at a cost. These costs, along with those arising from the divergent behavior itself, are collectively termed Agency Costs (Jensen & Meckling, 1976; Fama & Jensen, 1983).

In the context of the PE industry, two main mechanisms are employed to minimize the agency problem. Firstly, the Private Equity firm generally acquires a controlling part of the target company. Jensen (1989) argues that the greater ownership concentration allows a closer monitoring, enabling a tighter control of the target companies' management and a more efficient decision-making process. Acharya et al. (2011) find further support for this view, concluding that the boards of PE-owned companies meet more frequently than their public counterparties. The same study found a much greater propensity of replacing underperforming management teams in PE-owned firm, with a third of CEO's in the studied firms being replaced within a year of the buyout.

Secondly, Private Equity firms employ a considerable amount of interest-aligning measures in the form of management incentive programs and co-ownership. Jensen (1989) finds that management equity stakes following PE investments increases significantly. In their study of 59 U.K buyouts between 1997 and 2004, Acharya et al (2011) furthermore find that median management equity stakes increased from 3% to 15% following the buyouts. By granting the management an equity stake and tying their personal wealth to the company performance, adverse behavior such as wasteful spending and shirking is dissuaded. The impact of these effects can be substantial as noted by Filatotchev and Wright (2011), who argue that the reduction of agency costs is the main driver of operational improvements in PE-owned firms.

2.2.2 The Effects of Leverage and Financial Engineering

Financial Engineering refers to the manipulation of the capital structure of the acquired company, mainly through the use of leverage (Kaplan & Strömberg, 2009). The level of leverage of a firm has several important effects on operational performance.

An increase in leverage can create value through purely financial mechanisms. While the first Modigliani-Miller Theorem states that the value of a firm should be independent of its capital structure, the revised version subsequently published by the same authors acknowledges the tax-related implications that follows an increase in leverage. Since interest payments are tax deductible, an added debt burden lowers the total amount of tax-subjected income and effectively creates a tax shield (Modigliani & Miller, 1963).

An increased level of leverage has additional important consequences in the context of agency problems. Beyond the improved governance abilities due to disciplining effects, Jensen (1989) argued that the increased leverage reduces what he terms the "Free Cash Flow Problem". The "Free Cash Flow Problem" relates to the scenario where a company generates excess Free Cash Flow after all immediate investment projects with positive Net Present Values have been pursued. The hypothesis speculates that this might lead management to engage in superfluous spending rather than distribute excess capital to shareholders.

The inflexibility of debt-related payments such as interest payments and debt repayments act to reduce this behavior by putting pressure on the incumbent management to meet these obligations (Kaplan & Strömberg, 2009). Guo, Hotchkiss and Song (2009) further find evidence for the reduced agency costs following an increase in leverage, noting that increases in operational cash flows are larger for Private Equity portfolio firms with a higher debt burden.

While leverage can work to create value, it can also generate significant costs (Jensen & Meckling, 1976). Despite mitigating some adverse agency effects, a too high debt burden can give rise to other agency problems. An example of these problems include the debt overhang problem, where firm leadership is dissuaded from pursuing value generating projects due to a perceived unfavorable distribution of project gains in the favor of lenders (Berk & DeMarzo, 2014). Furthermore, an increase in leverage introduces the firm to the prospect of financial distress cost. The trade-off theory states that as the firm's debt ratio increases, financial distress costs increase. Consequently, firm's face an optimization decision, weighing the benefits and costs of increased leveraged against each other to maximize the utility from leverage (Myers, 1984).

Another adverse effect of the employment of leverage is the fact that it might necessitate the diversion of funds from long-term investments towards paying down debt, resulting in underinvestment in the long-term (Harford & Kolasinski, 2012). This hypothesis is also brought forward by Kaplan (1989) and consolidated by the findings of Holthausen & Larcker (1996). They find that capital expenditures of PE-backed firms going public are significantly lower than those of their industry peers in the period immediately preceding an IPO.

3. Literature Review

The following section will lay out the empirical foundation of the paper. Firstly, an overview of Initial Public Offerings is given followed by a description of the Private Equity sector and the Nordic markets. Lastly, operational value creation abilities of PE firms are presented followed by examining the previous literature specifically tied to the operational performance of PE-backed firms after going public.

3.1 Initial Public Offerings (IPOs)

3.1.1 Stock Performance

The post-issue performance of firms having gone through an IPO has been the subject of a large amount of research, finding several aftermarket anomalies. As documented by Ibbotson (1975), IPOs are in general underpriced in the short run, frequently generating large initial stock returns. Several potential explanations of this phenomenon have been laid forth. In his study of approximately 1000 IPOs between 1977 and 1982 Welch (2011) builds upon the findings of Ibbotson to form the argument that underpricing is utilized as a signaling tool by the firms going public to appear attractive to the market.

In Ritter's (1991) study of 1526 IPOs in the period of 1975-1984, he finds that in the long term, the reverse seems to hold true, with IPOed firms significantly underperforming in the three years following their flotation. The study attributes this to a combination of factors including investor optimism and firms timing their offerings.

3.1.2 Operational IPO Performance

Several studies on the operating performance of firms after their IPO mirrors the underperformance of their stock returns. Studying 682 IPOs performed in the US market between 1976 and 1988, Jain and Kini (1994) conclude that their sample firms displayed significant operating performance declines in the five years following flotation based on several measures. The study lays forth several possible explanations for this result, including firm overinvestment post-IPO, managerial changes and window-dressing activities by issuing firms.

These findings were corroborated more recently outside the U.S market by Arik and Mutlu (2015) in their study of 102 IPOs on Borsa Istanbul in the period of 2007-2013. Beyond confirming the general notion of underperformance, the study also finds evidence for the window-dressing and signaling hypothesis as mentioned above. This was based on the fact that number of intermediary institutions connected to an IPO has a significantly positive effect on post-IPO operating performance.

3.2 The Private Equity Industry Dynamics During the 2000's Boom

Both the long-term growth of the PE-industry and its inherent boom-bust pattern appears to be intimately linked to credit market conditions and subsequently the prevailing supply of leverage in the financial system. Acharya, Franks and Servaes (2007) find the increased liquidity of the credit markets to be a chief contributing factor to the industry's growth and particularly notes its prevalence in fueling the Private Equity boom in the 2000's. Kaplan and Strömberg (2009) arrive at similar conclusions, noting that buyout activity accelerates as interest rates decreases. This notion is the basis of the mispricing hypothesis, which argues that PE investors take advantage of systematic mispricing between debt and equity markets in order to arbitrage from the difference. This suggests that PE-activity levels increase in periods of favorable credit terms.

The effect of this pattern on the 2000's boom specifically is investigated by Acharya, Franks and Servaes (2007) in their study of the 1980's and early 2000's booms. Their results suggest that one of the main factors determining booming levels of PE-activity and the amount of leverage used in the conducted transactions might not be the relative supply of attractive target companies, but rather prevailing debt-market conditions. This fact brings with it interesting implications for the deals conducted in the late part of the 2000's activity wave, as this period was characterized by an explosion of credit market liquidity beyond that of previous periods (Acharya, Franks & Servaes, 2007; Guo, Hotchkiss & Song, 2007).

Furthermore, the significant use of leverage in the early 2000's buyout boom was also confirmed by Guo, Hotchkiss and Song (2007). They find that their sample of 192 buyouts in the period of 1999-2006 on average displayed a Total Debt-to-Capital-Ratio of 70%, approaching the same levels of employed leverage as during the 1980's peak. While the levels of employed leverage are similar between the two booms, the nature of the utilized debt

financing differs along several important dimensions. Acharya, Franks and Servaes (2007) argue that as part of the introduction of syndicated debt, loans originated by banks are frequently sold off and traded on second-hand markets, not seldom in the form of structured products such as collateralized loan obligations. As noted by the authors, this carries with it weakened incentives for the originating institution to conduct strict monitoring and screening practices.

The free trade of the debt products has also introduced increased opacity in terms of who actually maintains exposure to the credit risk. The terms and composition of the financing itself also changed between the periods. During the 2000's boom, a majority of debt was interest-only with a bullet payment at the maturity, while utilizing instruments such as mezzanine debt and PIK-provisions[4] (Acharya, Franks & Servaes, 2007). The use of covenant-lite or covenant-loose debt structures also became substantially more prevalent during the period. These structures exclude the traditionally employed maintenance-covenants in favor of relying solely on incurrence-based terms, which Acharya, Franks and Servaes (2007) considers a manifestation of further weakened lending standards. Both Acharya, Franks and Servaes (2007) and Kaplan and Strömberg (2009) speculate that this dynamic might have led to a significant portion of deals during the latest Private Equity boom to be motivated primarily by attractive debt market conditions rather than the potential for value creation in the target companies.

In the context of Private Equity activity, an abundance of available capital carries yet another important implication. As noted by Kaplan and Strömberg (2009), the PE-industry is subject to distinct reputational effects. The ability of a given firm to raise capital strongly depends on the performance of its previous funds, motivated by the presence of persistence in performance between subsequent funds raised by the same firm. An influx of capital undermines this dynamic by allowing worse-performing funds a greater ability to attract capital, with the authors finding a suggestive negative correlation between overall industry performance and capital commitments. The importance of these effects during the 2000's boom is noted by Guo, Hotchkiss and Song (2009) who despite finding some evidence for

[4] *PiK, or Payment in Kind securities, are a type of mezzanine financing. They allow the lender to pay interest with additional debt rather than cash. Characterized by high interest rates and considered risky.*

improved operational performance in their sample of buyouts, during the period, question whether these effects would persist under less favorable credit conditions.

3.3 The Nordic Context

The Nordic Private Equity market distinguishes itself both in terms of maturity and in terms of activity level. As one of the first European countries for PE-investments, the Swedish market emerged in the late 1980's and has grown substantially beyond the global sector expansion, becoming the third largest market in Europe in terms of assets under management (Næss-Schmidt, Heebøll & Karlsson, 2017). In relation to the size of the country's economy, the prevalence of the PE-market is further noteworthy, only being surpassed by UK in terms of buyout investments as a share of GDP (Næss-Schmidt, Heebøll & Karlsson, 2017). Asset concentration in the Nordic PE-market is furthermore amongst the highest in Europe. These market characteristics have allowed the market to attract significant foreign investments, with approximately half of all the capital raised by Nordic funds originating from cross-border investors (Mueller, 2017).

The Nordic stock market in general also displays distinct characteristics in that public firms frequently follow a somewhat special model of corporate governance. Ownership concentration is distinctively high, with 62% of public firms having at least 20% of their voting rights controlled by a single owner. This ownership is frequently possessed by long-term and sophisticated investors, who actively engage in monitoring activities of their investments (Lekvall, 2014).

3.4 Operational Value Creation of Private Equity Firms

The capacity of a Private Equity firm to generate returns for its investors depends on the value created in the companies of the firm's portfolio. Since the 1980's, a substantial amount of research has been dedicated to the subject of value creation in the Private Equity context. Studying both the U.S and other markets, these efforts have largely resulted in support for the value creation efforts of Private Equity (Kaplan & Strömberg, 2009). Previous literature finds several economically significant, sometimes interlinked, sources of value. These can broadly be categorized into two subsets, non-operational, extrinsic factors such as changes in industry multiples and those that are related to operational factors, such as strategies employed by the PE firm (Guo, Hotchkiss & Song, 2009). Examining a sample of 192 U.S buyouts conducted

from 1990 to 2006, Guo, Hotchkiss and Song (2009) find that improved operating performance and changes in industry multiples each contributed to the increased value of the sample firms by approximately 20%. While the extrinsic factors are highly relevant in the value generation process, this study concerns the persistence of operational value directly generated by PE-activity.

While the value creation activities employed by PE firms in the 1980's were primarily based on financial and governance engineering, the strategies of modern PE firms rely to an increasingly larger extent on operating engineering (Mattson & Mårild, 2006; Spiild, 2013). Operating engineering refers to the operational and industry expertise applied by the PE firm to generate efficiency improvements in their portfolio companies (Kaplan & Strömberg, 2009).

The importance of the value created by operating activities was observed in a study of 1000 European PE buyouts by Achleitner et al. (2010). While not taking the disciplining effects of leverage into account, the study finds that operational improvements were the single largest driver of value creation in the studied sample. Mattson and Mårild (2006) further find that the reliance among PE firms on creating value through operational engineering increases as the competition in the industry intensifies. Furthermore, Jelic and Wright (2011) argue that the increased competitive pressure of the industry has led to PE investments being conducted based on strategies of more radical measures rather than simple efficiency improvements. These measures, amongst others, aim to create value through technological innovations and aggressive growth tactics. This development has largely led to an increasing tendency of PE firms to center their activities on certain industries or niches, as well as broadening the operational expertise possessed by Private Equity professionals (Kaplan & Strömberg, 2009).

Measures employed by PE firms in their operating engineering activities are varied and can include elements of cost cutting opportunities, changes to production lines, strategic changes and management improvements, as well as more financially centric measures such as add-on acquisitions and asset optimizations (Acharya et al. 2008; Kaplan & Strömberg, 2009; Guo, Hotchkiss & Song, 2009). The ability to pursue these activities are greatly enhanced for a firm subjected to Private Equity ownership, as found by Johansson and Näsholm (2015) in their comparison between six Swedish PE-backed firms and a group of non-backed peers. PE firms tend to engage in financing activities with greater intensity than non-PE backed firms.

Subsequently, PE firms are better at identifying and pursuing attractive investment opportunities for their portfolio firms as well as leveraging their relationships with creditors to secure more favorable financing terms.

The tax shields formed by employing leverage furthermore has direct implications on the operating performance of a firm. The Cash Flow derived by tax shields can be used to pursue Net Present Value-positive investments or otherwise utilized in the business. Potentially, this could improve performance when measured along cashflow-centric measures and Return on Invested Capital (Harris, Murray & Niu, 2006; Guo, Hotchkiss & Song, 2009). In the context of Private Equity owned firms, the exact extent of impact of these tax shields on operating performance can be hard to measure (Kaplan & Strömberg, 2009). Nonetheless, Kaplan (1989) finds it to be substantial, estimating that it could explain 4%-40% of the increased value of the firm. Guo, Hotchkiss and Song (2009) also find the value generated by tax shields to not only be significant, but equal in magnitude to that created by more direct operational improvements.

Focusing specifically on operational improvements in the Swedish context, Bergström, Grubb and Jonsson (2007) studies the performance changes during the holding period of 76 PE portfolio firms in the period of 1998-2006. Using EBITDA-margin, Net Sales growth and Return on Invested Capital (ROIC) as benchmarks, the study concludes that when measured against an industrial peer group, the sample firms displayed a significantly better EBITDA-margin and ROIC, while no evidence of superior Sales growth was shown. The authors note that the exact drivers of this value creation is opaque, resulting from a highly complex process that is hard to estimate with a select few variables.

3.5 Operational Performance of Private-Equity Backed IPOs

In one of the first studies dedicated specifically to the post-exit operational performance of Private Equity-backed firms, Holthausen and Larcker (1996) review the performance of 90 PE-backed US firms having gone through an IPO. Using amongst others three variations of operating income as metrics, the study concludes that the Private Equity-backed offerings significantly outperform their benchmarks of non-backed firms in the four years subsequent to the IPO. These results were consolidated by a more recent study by Cao and Lerner (2009) who conclude that the 496 PE-backed IPOs in their sample exhibited significantly better

financial performance than their benchmark. The PE-owned firms displayed a higher Return on Assets (ROA) and were in general levered to a higher degree.

Confirming these results in the UK market through his study of 204 PE-backed IPOs, Levis (2011) observed that PE-backed firms were both more highly levered and displayed better operating performance than their non-backed peers when measured along EBITDA-margin and Asset Turnover. The paper notes that the exact drivers of these operational metrics are not clear, but theorizes that the significant difference in leverage between the firms is probable to be one of the main elements. One interesting result of the study is its observation that all IPOed firms, including those backed by PE firms, significantly deteriorated in operating performance post flotation. Moreover, this is especially true for the PE-backed sample of companies where leverage levels drastically decreased.

In his study of the French market, Moreira (2013) did however arrive at a somewhat divergent result. Examining a sample of 90 PE-backed IPOs in the period 2000-2010, he finds that the PE-backed offerings did not display a significant outperformance against the non-backed peers when measured along EBITDA-margin, ROIC and ROA. These results were however altered when controlling for size, leverage and industry, which yielded some indication of outperformance. Due to the inconsistency of the results, the study concludes that at best, PE-backed firms seem to display outperformance before, but not after the exit date.

Holthausen and Larcker (1996) also find a progressive decline in operating performance of PE portfolio firms during a four-year period subsequent to going public. The authors argue that this decline can be attributed to the the reduction of leverage observed in the period in combination with a decrease in equity ownership concentration. In particular, the study notes that a dilution of equity ownership correlates with an increase in working capital and capital expenditure levels, suggesting that a change in organizational incentives affects the operations of the firms. A deterioration of post-exit operating performance was also observed by Moreira (2013). The study concludes that a test of performance differences between the control group and sample group yielded insignificant results three years post-exit, even when controlling for size, industry and leverage. The results furthermore suggest that this development could be attributed to the erosion of PE-mechanisms after divestment.

Part of the explanation of the increased operating performance of PE-backed firms observed in the studies above is put forth by Harris, Murray and Niu (2006). Also conducted in the UK market, the study examines the post-IPO performance of 178 buyouts, focusing the metrics of Cash Flow-to-Total Assets, Cash Flow-to-Sales and Total Asset Turnover. While affirming the broadly consistent findings of increased operational performance, the study's results suggest that these improvements are not achieved through margin expansion. Rather, it finds that PE firms generally achieve operational improvements through rationalization of the portfolio firms' asset base and thus operating a 'leaner' business. The study suggests that this points towards an inability to realize margin expansions through more permanent measures such as cost efficiencies and improvements of product offerings. This hypothesis is corroborated with the finding that the comparatively better operational performance first observed in the PE-backed firms' flotation year appears to be a short term phenomena and erodes in the three years following the IPO as the sponsor divests.

3.6 Presentation of Hypotheses

Previous research on the topic indicate that our sample of PE-backed offerings would be expected to display comparatively stronger performance along three chosen metrics. Consequently, our first hypothesis is as follows:

Hypothesis 1: *The operating performance of the firms in our PE-backed sample will be significantly better than that of the control-group*

The positive findings of PE-backed firms operating performance have largely been based on studies of earlier time periods and differing markets. We expect our sample to display a comparatively weaker overperformance due to the combination of factors related to the chosen temporal and geographical context. We expect that a part of the period's deal activity was driven by favorable capital market conditions even though competitive pressure in the industry might have diminished the number of attractive buyout targets. We believe this led to a relevant number of buyouts targeting companies with less promising prospects being performed. The high market liquidity of the period is also likely to have allowed worse performing funds a greater market participation, further contributing a weaker degree of relative operating improvements achieved by the industry as a whole. Finally, we believe that as the sample of PE-backed firms are levered to a higher degree than their non-backed peers

and utilize risky debt structures to a larger extent, they will have been more adversely affected by the economic contraction of the financial crisis. Therefore, our second hypothesis is formulated as follows:

Hypothesis 2: *The operating overperformance of our sample compared to the control group, if confirmed, will on average be less than that found by studies of other periods and contexts*

3.7 Criticism of Sources and Theories

Certain statistics in the study relating to the size and structure of the Private Equity industry have been extracted from organizations such as SVCA[5] and Invest Europe. It should be noted that their status as industry interest organizations does of course introduce the risk of bias gathered from these sources. As the statistics used in the thesis exclusively relate to general, easily quantifiable industry information and intra-industry comparisons however, we consider the reliability of the information to be satisfactory.

An important note regarding the literature cited in the thesis is the differences in the distinction made between Venture and Buyout Capital. As previously noted, while both investment types fall under the broad Private Equity categorization, they can differ substantially. While the studies cited all make the distinction and adjust their data collection accordingly, the exact methodology employed differs. This inevitably introduces the risk that some divergencies in the findings of previous literature, as well as that of our own, might partly be attributable to a difference in approach.

[5] Swedish Private Equity & Venture Capital Association

4. Methodology

This section introduces the research design used, followed by a walkthrough of the employed statistical models. Lastly, the challenges with the methodology are discussed.

4.1 Research Design

Within the area of scientific methods, a research approach can broadly be structured along two dimensions – quantitative versus qualitative and inductive versus deductive (Bryman & Bell, 2013). The deductive approach entails utilizing previous empirical findings and existing theory in order to formulate one or several hypotheses. These hypotheses are then tested through the collection of data and subsequent analysis based on the existing theoretical framework and previous empirical findings (Bryman & Bell, 2013). With regards to the research question studied, this paper rests mainly on the deductive method and utilizes a quantitative approach, using several different regression models to test the hypotheses.

Once the hypotheses are tested, a second review of the previous findings in the examined subject are scrutinized in order to analyze and position the results of the quantitative regression models. The quantitative procedure of testing these hypotheses is outlined in the sections below.

4.2 Linear Regression Model - Ordinary Least Squares

To test our hypotheses, several multiple regressions were performed with each performance measure as its dependent variable. The multiple regression utilizes Ordinary Least Squares (OLS) in order to estimate the unknown parameters. The OLS method achieves this by minimizing the sum of the squared deviation residuals. This is done through finding the best-fitting line describing the relationship between the dependent and explanatory variables (Körner & Wahlgren, 2006).

The equation below describes the general equation for a regression line:

$$\text{Equation 1: } Y = \alpha + \beta x_1 + \beta x_2 \ldots \beta x_n + u_{i,t}$$

where:

(i) Y is the dependent variable
(ii) α is the intercept
(iii) β is the coefficient for the explanatory variables (x_n)
(iv) and u_{it} is the random disturbance term which includes alla determinants of the dependent variable that are not included in the equation

Applying the general equation above to our model gives the following equation:

$$\text{Equation 1.1: } Performance = \alpha + \beta PE\text{-}backed_{it} + \beta z_{1\text{-}5} + u_{i,t}$$

where:

(i) *Performance* is an operational metric constituted by either Sales Growth, EBITDA-margin or ROIC
(ii) α is the common intercept for all cross-sectional units over time
(iii) β is the coefficient for the explanatory variable $PE\text{-}backed_{it}$ and the control variables z_{it} computed as a 1 x k vector that varies over time but not cross sectionally
(iv) $z_{1\text{-}5}$ is the five control variables
(v) u_{it} is the random disturbance term which includes alla determinants of the dependent variable that are not included in the equation

The Gauss-Markov theorem states that if certain assumptions are met, OLS will give the Best Linear Unbiased Estimator of the coefficient (also known as BLUE). The full ideal conditions of the theorem are presented and explained in Appendix A.

4.2.1 Repeated Cross-Section

A pooled-OLS only illustrates an average difference over time and cross-sections, but not specifically at what time period the difference occurs. This is a limitation of the model as it does not distinguish the different time periods for the results and could potentially exclude interesting findings relevant to the purpose of the study. Therefore, we employed three Repeated Cross-Section regressions, one for each time period, in order to isolate each dependent variable for each year after the IPO. This added another layer to the analysis as the results could also be discussed on a yearly basis post-IPO.

4.3 Panel Data

Since the aim of the study is to both examine the effects over time and cross-sectionally, the data was restructured into panel data. The main feature of the panel data is that both the time series of the study and the entities, in this case the firm, are stacked into a single column. The result of which makes a combination of time series and cross-sectional data. This leads to the regression being able to include information both over time and space (Brooks, 2014). In our sample, the time series are made up of t_0 (the fiscal year of the IPO) to t_2 (the fiscal year, two years after the IPO).

The same regression outcome can be achieved through using solely time-series data. However, the advantage of using panel data is that the number of observations is threefolded (because of the three time periods). For time-series data it would therefore require a large number of observations to be able to conduct a hypothesis test of similar significance (Brooks, 2014). By combining cross-section and time-series data in the form of panel data, the power of the test increases (Brooks, 2014). Another benefit of the panel data is that it mitigates the effects of multicollinearity which was found in the data sample. Sampling the dataset into panel data therefore reduces the biased effect from containing multicollinearity (Brooks, 2014).

4.4 Robust Standard Errors

As explained in the assumptions of OLS in Appendix A, the presence of heteroskedasticity invalidates the regression results as it opposes one of the assumptions of the model. In order to detect heteroskedasticity, a White-test was conducted on the variables in the sample. This implied a high likelihood of the sample containing heteroskedasticity (see Appendix B1). It is

typically impossible to isolate the exact cause of the heteroskedasticity leading a technique such as the Generalized Least Squares or Weighted Least Squares to be ruled out since the prerequisites of such a test are not met (Brooks, 2014). One way to resolve the heteroskedasticity problem is to either omit the variables affecting the heteroskedasticity or transform all factors into their natural logarithms. This had no effect on heteroskedasticity since our sample almost exclusively is contained of dummy variables and percentages with the only exception beingen the deal size of the IPO.

However, a model has been computed adjusting the least squares to meet the requirements even in presence of heteroskedasticity and with a dataset not normally distributed (Wooldridge, 2012). This model is called Heteroskedasticity-consistent Standard Errors, or Robust Standard Errors. Practically, this feature recalculates the slope coefficients of the standard errors and increases them relative to the usual OLS standard errors (Brooks 2014). This makes hypothesis-testing more conservative and can sometimes have a diminishing effect on the significance of the test. It is usually used as a compliment to the pooled regressions to deal with the presence of heteroskedasticity. This allows the results to be compared as a measure of having an overview of, or if the heteroskedasticity has an effect on the results (Wooldridge, 2012). Consequently, we used the Robust Standard Errors model as a compliment to our OLS regressions as it allows us to see to what extent the problem of heteroskedasticity found in our dataset affects our results.

4.5 Random Effects Model

According to Brooks (2014), there are two different panel estimators that can be used in financial research in order to isolate the firm specific effects. These are called the Fixed Effects model and the Random Effects model. The Fixed Effects model allows the intercept in the regression to differ cross-sectionally but is fixed over time, while the slope estimates are fixed both over time and cross-sectionally.

The Random Effects model contains a different intercept which is constant over time for each firm (Brooks, 2014). This means that the Random Effects model, similarly to the Fixed Effects model, takes the firm specific effects into consideration. However, in comparison to the Fixed Effects model, the firm specific factors are completely random and not correlated to

the explanatory variables. This causes the Random Effects model to include an intercept for the cross-sectional units that comes from a common intercept referred to as α.

Graphically this is shown as:

$$\textit{Equation 2: } Y_{it} = \alpha + \beta x_{it} + \omega_{it}$$

$$\omega_{it} = \varepsilon_i + \nu_{it}$$

where:

(i) Y_{it} is the dependent variable and where i is the entity in this case the firm and t is the time period

(ii) α is the common intercept for all cross-sectional units over time

(iii) β is the coefficients for the explanatory variable x_{it} where x_{it} is computed as a 1 x κ vector that varies over time but not cross sectionally

(iv) ω_{it} is the composite error term, where:

(v) ε_i is the cross-sectional error term

(vi) ν_{it} is the individual observation error term

The adapted equation specifically to our study is therefore:

$$\textit{Equation 2.1: } Performance_{it} = \alpha + \beta PE\text{-}backed + \beta Z_{it} + \omega_{it}$$

$$\omega_{it} = \varepsilon_i + \nu_{it}$$

where:

(i) $Performance_{it}$ is the dependent variable computed of an operational measure metric constituted by Sales growth, EBITDA-margin or ROIC

(ii) α is the common intercept for all cross-sectional units over time

(iii) β is the coefficient for the explanatory variable $PE\text{-}backed_{it}$ and for the composure of the control variables Z_{it} which are computed as a 1 x κ vector that varies over time but not cross sectionally

(iv) ω_{it} is the composite error term

(v) ε_i is the cross-sectional error term

(vi) ν_{it} is the individual observation error term

It would be bold to just assume that the firm specific effects are completely uncorrelated to the explanatory variables. Brooks (2014) proposes the Hausman test to state whether this assumption is true or not (see Appendix B2 for an overview and the results of the Hausman test). When running the test Sales growth and ROIC passed the test which implies that running a regression with random effects is preferred. EBITDA-margin failed the test and the fixed effects model should be used since the random effects model would induce a biased result.

4.6 Challenges of the Methodology

4.6.1 Validity

In order to obtain unbiased and credible results, the assumptions of the OLS must hold true. A variety of tests were run to ensure that the assumptions were met (for the full list of tests used see Appendix B). In the case where the assumptions did not fully hold, different methods and tools (for e.g. using Robust Standard Errors) were used. The methods either solved the underlying problem or tweaked the equation into making the assumptions hold during the given circumstances where they were initially violated. The results of the different tests and the solution to overcome the presence of possible violations are brought up throughout the thesis.

One of the OLS assumptions is that the error terms are uncorrelated with each other (see Appendix A). If this assumption fails, the error terms are referred to as autocorrelated which creates a bias in the results and must therefore be tested for. To test for autocorrelation a Durbin-watson (DW) test was conducted (Appendix B3). A positive autocorrelation was found in our results with a DW-stat ranging from 0.7-1.4 (see Table 4). This is a result of how the used model of panel data works in which each firm is seen as three consecutive observations paired to the three different time periods. The observations therefore naturally become correlated with each other on the premise that the consecutive observations originate from the previous ones. Hence, the occuring bias created from the autocorrelation is indigenous and our assessment is that it will not have a negative effect on the reliability of the results.

4.6.2 Limitations

Despite there being some differences, the Random Effects model and the Fixed Effects model are somewhat similar and the choice between the two models can be somewhat complicated (Brooks, 2014). The theory states different scenarios and tests to conduct that results in one of the two models being preferable. The Hausman test was chosen and the results implied that the Fixed Effects model would be preferred when regressing EBITDA-margin as a dependent variable. However, as a consequence of how the Fixed Effects model works, only time-varying variables can be used. In the study's data sample, the only explanatory variable used is the dummy variable for PE-backed IPOs which does not change for the specific firms over the time periods. One way for the study to use the Fixed Effects model would be to exclude the dummy variable from the regression, which is not in the interest of the study since the separation of PE firms against non-backed firms is the core of the research question. Following this limitation, the Random Effects model was used instead for all dependent variables as it still provides the necessary firm fixed effects and the robustness affiliated with it. As a result of this, the regression conducted on the EBITDA-margin will contain a biased result and should be carefully interpreted.

5. Data and Descriptive Statistics

The following section describes the data collection process and defines all variables that are used in the methodology described above. The limitations of the collected data are also discussed.

5.1 Sample Selection and Data Collection

Our initial data set of the PE-backed sample group consisted of all financial sponsor backed firms that went through their initial public offering on one of the Nordic stock exchanges between 2006 and 2015. The choice of including several Nordic countries relates to the research question. Due to the relative heterogeneity in terms of exposure to macroeconomic factors as well as in terms of financial market conditions, we foresaw problems in comparability amongst the countries but strove to minimize the effects of these through controlling for them in the model. The data for these IPOs were collected from a combination of the databases Bloomberg, Capital IQ and Zephyr.

In order to secure the quality of the data in relation to the research question, a certain number of companies were further excluded based on several criterias. We excluded any companies mainly backed by either Venture Capital firms or long-term investment companies. The reason for which is that the investing strategy for these types of investment firms deviates too much from the strategy of a PE firm. These behavioral differences would make it hard to assess a robust regression model with the possible outcome of receiving a diluted result. The exclusion was achieved by manually reviewing the nature of the sponsors through the company's annual reports and prospectuses.

Companies beneath an IPO value of USD 10m were excluded from the sample group. The exclusion being motivated by the fact that smaller transaction sizes to a large extent were related to the IPO of younger companies. These generally differ along several important dimensions from the rest of the sample group, with some still being in the startup phase and thus having little to none appreciatable income and highly volatile financials. Including these companies in our sample would thus diminish comparability. Also, a consecutive EBITDA-margin of negative 100% or lower throughout the three time periods were chosen as a standard of exclusion. The exclusion is based on the view in which a company who is generating losses of this magnitude is probably in an early stage in the life cycle or is close to

bankruptcy. In either case, the regression model will view these data points as outliers and it will be hard for the model to assess if the changes in performance derives from the ownership structure or not. The resulting, final sample consisted of 46 companies (see Table 1, Table 2 and Appendix D for a full list of the PE-backed companies). In the cases where financial information for these companies were not available in the databases, it was complemented through manual review of the subject's annual reports and prospectuses.

5.2 Control Group

The benchmark used consists of a control group of non-PE-backed IPOs conducted in the same time period as that of our sample group. As per the methodology adopted by Kaplan (1989), we employed an official industry classification code in the construction of our control group, in our case the Global Industry Classification Standard (GICS). As a first measure, companies classified under a GICS-code not represented in our sample of PE backed IPOs were excluded. The resulting group of companies was finally reduced based on the same size criteria applied to our sample group. This procedure generated a peer-group of 64 companies (see Table 1 and Table 2).

Table 1. Geographic Distribution of the IPOs.
(PE = Private Equity sample, CG= Control Group)

Countries	**PE**	**CG**	**ALL**	***%***
Sweden	31	25	56	*51%*
Denmark	4	5	9	*8%*
Finland	5	10	15	*14%*
Norway	6	24	30	*27%*
Total	**46**	**64**	**110**	***100%***

Table 2. Industry Distribution of the IPOs.
(PE = Private Equity sample, CG= Control Group)

Industry	**PE**	**CG**	**ALL**	***%***
Industrials	16	22	38	*35%*
Consumer	17	17	34	*31%*
Healthcare	5	7	12	*11%*
Information Technology	3	6	9	*8%*
Communication Services	1	0	1	*1%*
Financials	3	8	11	*10%*
Materials	1	4	5	*5%*
Total	**46**	**64**	**110**	***100%***

5.3 Time Span

In order to arrive at the lasting operational impact of the PE firms' involvement, we chose a timespan of three years: t_0, t_1 and t_2. t_0 represents the fiscal year of the IPO and will act as the reference year. The chosen timespan, in the context of measuring post-IPO operational performance, is somewhat shorter than the customary three years used by amongst others Ritter (1991). The reduction of timespan is motivated by the fact that an increase in the time period with one more year would severely decrease the number of observation. This is because the year 2015 contains 31% (see Appendix C, Table C1) of the entire sample and since the annual reports for 2018 are not yet published, the IPOs performed 2016 cannot be included. 2006 is chosen as a starting year as it includes the PE firms entered both before and after the crisis furthermore reflecting buyouts under different market conditions. In this way the difference between PE-backed IPOs and the non-backed peers are scrutinized not only during good market conditions but also during the crisis years of 2008 and 2009. As such, we consider it of great interest to capture the IPOs performed as close to this point as possible. As stated by the BVCA[6] (2018), 85% of Private Equity-backed IPOs display a lock-up period of less than a year and our chosen time span should thus be sufficient to capture operational performance after the sponsors' divestments.

5.4 Measuring Operating Performance

As measures of operating performance development post-IPO, we follow several variables as presented below. The selection of metrics was influenced by those adopted in previous research, including that of Kaplan (1989), Jensen (1989) and Bergström, Grubb and Jonsson (2007) and will be elaborated upon in the sections below. We believe, based on the previous studies conducted, that the choice of using several metrics is further supported by their mutually complementary nature. Isolated, we asses that each metric reflects a certain aspect of performance, but risks failing to provide a holistic view of the company's overall operations.

5.4.1 Net Sales Growth

Net Sales growth represents a measure of the economic output generated by the company, generating value by ultimately expanding the EBITDA (Bergström, Grubb & Jonsson, 2007) and constituting an important measure of performance (Moreira, 2013). Net Sales growth is of

[6] *British Venture Capital and Private Equity Association*

additional interest in the context of this paper due to the previously presented findings that there exists a dynamic of balancing expansionary capital expenditures and debt-related payment obligations during the PE firms holding period, potentially having implications on the growth rate of the firm.

$$Net\ Sales\ Growth = \frac{\left(Net\ Sales_{t_0} - Net\ Sales_{t_1}\right)}{Net\ Sales_{t_1}}$$

5.4.2 EBITDA-margin

As our central measure of profitability, we adopt the EBITDA-margin, defined as below. The choice of this metric has two reasons. Firstly, the EBITDA-margin as a measure of operating income excludes the effect of changes in capital structure and subsequent interest expenses. As changes to capital structure are frequent in the context of buyouts, the EBITDA-margin thus provides a clearer measure of underlying operational performance. The use of the EBITDA-margin also allows us to exclude the impact of potential tax shields in our assessment, which as previously noted by Barber and Lyon (1996) and Kaplan (1989), can be substantial. Finally, the EBITDA-margin is not affected by Goodwill recognitions and should thus be relatively insulated from the effects of add-on acquisitions, which are frequently performed in the PE-space (Bergström, Grubb & Jonsson, 2007; Kaplan & Strömberg, 2009).

$$EBITDA - margin = \frac{Earnings\ Before\ Interest, Tax, Depreciation\ and\ Amortisation}{Revenue}$$

5.4.3 Return On Invested Capital

Return On Invested Capital, as defined below, captures both capital efficiency and profit margin levels. While affected by differing accounting practices, Bergström, Grubb and Jonsson (2007) note that it should provide the most neutral view of cross-industry operating profitability. ROIC is furthermore relevant specifically to the activities conducted by PE firms. As described by Cao and Lerner (2009), measures improving working capital efficiency could use the freed up cash to pay dividends and sustain higher leverage. These additional distributions would not affect cash flow performance, but would potentially be captured by ROIC. As opposed to measures such as Return on Equity, ROIC is less subject to factors relating to the studied firms' capital structure, being based on operating income as opposed to net income. This fact helps to further facilitate its use in our study as it excludes

any impact of currency fluctuations, a desirable property with regards to our inclusion of companies from several different countries (see Table 3).

$$Unlevered\ Net\ Income = EBIT - Tax$$

$$ROIC = \frac{Unlevered\ Net\ Income}{(Fixed\ Assets + Working\ Capital)}$$

5.5 Explanatory Variable

Since the research question isolates "Private Equity-backed IPOs" as the examined factor of the operational performance, it is the main explanatory variable. Size, country and industry are added to the equation as control variables in order to add robustness to the outcome.

Whether an IPO is represented by a PE firm or not is categorical instead of numerical which renders it to be impossible to add to an equation. In order to overcome this issue, data was recoded to a numerical variable where non-PE-backed IPOs were recoded to a 0 and PE-backed IPOs recoded to a dummy variable with the numeric value of 1.

The presence of multicollinearity among the explanatory variables violates one of the assumptions of OLS and must therefore be tested for. Testing for multicollinearity is most easily done through a correlation table. This was performed and no sign of multicollinearity could be detected due to the relatively small correlation between the variables (see Appendix B4 for results and an overview of multicollinearity).

5.6 Control Variables

5.6.1 Deal size

In most previous studies referred to in this paper, size has been scrutinized as a variable affecting the outcome and therefore a key factor in what drives the results. Size can be measured in several ways (e.g. revenue, net assets, number of employees) with different advantages and disadvantages (Hart & Oulton, 1996). In this study the choice of size is the deal size of the IPO which is motivated by the fact that all size measures are included into the initial IPO deal size. However, included in the size of the IPO are other factors such as future

expected performance and credit risk. Even though these factors are not measures of size they still possess a correlation with the operating performance which in itself is useful as the role of a control variable. The relative size of the firm as a determinant of operational performance is further corroborated by the findings of Jelic & Wright (2011), who concluded that smaller PE-backed offerings are more likely to achieve efficiency and output gains.

Table 3. Descriptive Statistics for All Variables.

(*PE = Private Equity sample, CG= Control Group)*

Characteristics		**PE**	**CG**	**ALL**
Sales Growth	Mean	13,13%	38,93%	28,14%
	Median	7,64%	15,51%	12,62%
	Std. Dev.	0,24	1,04	7,92
EBITDA-margin	Mean	13,99%	19,41%	17,15%
	Median	11,18%	14,91%	13,23%
	Std. Dev.	0,11	0,24	0,20
ROIC	Mean	9,92	10,05	10,00
	Median	9,59	8,48	8,88
	Std. Dev.	9,84	14,32	12,62
Deal Size ($m)	Mean	331	157	230
	Median	221	74	120
	Std. Dev.	421	231	334
Leverage	Mean	31,22	22,54	24,00
	Median	31,78	20,92	24,91
	Std. Dev.	15,68	19,10	17,73

Due to factors of data availability, our control group diverges somewhat from the sample group in terms of median and average transaction size. This impact is captured by the inclusion of size as a control variable.

There might be benefits from including other size measures as control variables but when balancing the benefits from the disadvantages through the regression framework, we found that this had a negative effect due to multicollinearity. As a consequence of the relatively small sample size, we refrained from controlling for other size measures.

Before adding the size variable to the regression, a normality test was conducted using the Bera-Jarque test. The Test showed that for the deal size the P-value was 0,00 and the null-hypothesis of normal distribution was rejected (see Appendix B5). To solve this, the deal size was converted into its natural logarithm which makes it behave more normally distributed (Brooks 2014).

5.6.2 Leverage

Private Equity-backed firms going through an IPO frequently employ a significantly larger degree of leverage than non-backed comparable offerings (Kaplan & Strömberg, 2009). Our sample group of PE firms display a higher degree of leverage amounting to approximately ten percentage points when compared to the peer group companies (see Table 3). As previously noted and found by amongst others Levis (2011), Moreira (2013) and Jensen (1989), leverage can be expected to have a substantial effect on the operational results of the firm. This effect can be realized through in both indirect mechanisms such as disciplining effects and in more direct ways, improving certain profitability metrics through the tax shields it creates. As the employment of leverage tends to fall substantially post the flotation date, its operational effects have similarly been found to dissipate (Levis, 2011; Harris, Murray & Niu, 2006). Nonetheless, its potential effects on operating performance are substantial and will thus be controlled for using the ratio of Total-Debt-to-Total-Assets as a metric and is defined as per Bloomberg's definition below:

$$Leverage\ Ratio = \frac{Total\ Debt}{Total\ Assets} \times 100$$

5.6.3 Country

The study sample is extracted from Nordic countries. Due to cultural differences, regulations and other country specific divergences in capabilities it is crucial to include country as a control variable for its obvious impact on the changes of the different dependent variables. The effect from the differences of the countries will dilute the results from the regression and an optimal approach would be to instead only include one country in our sample. This would however vastly decrease the sample size and have a negative effect on the significance of the results.

5.6.4 Industry

The differences between industries potentially have a similar damaging effect on the result as the differences in countries. Different industries can be affected differently by a specific event (eg. a rise in oil price will have a negative effect on the Airline industry while the Oil industry will flourish). Similarly, industry as a control variable is included in most previous studies referred to in this paper. The choice not to control for industry would most likely distort the result.

In this study, the firms were primarily divided into their GICS-code industry which for some industries resulted in very small sample sizes. In order to be able to include these samples in the regression, some industries with palpable resemblance were merged together. The merging consisted of Consumer Staples with Consumer Discretionaries, Industrials with Material and Energy, Information Technology with Communication services and lastly Healthcare and Financials were merged into "Others". If this redistribution wasn't done, the industries with a low sample size would have to be excluded from the regression and from the study as a whole. An optimal approach would be to only include one industry and hence remove the effects of the industry specific differences but due to the negative effects on significance of the already relatively small sample size this would not be feasible.

5.7 Challenges with the Data Collection

5.7.1 Reliability

The foundation for the data collection was extracted from the financial database Bloomberg which is one of the most commonly used databases in the financial industry. In order to make sure that a complete dataset as possible was achieved, Capital IQ and Zephyr was used as a complement to Bloomberg. Relying solely on the information from Bloomberg would not have generated as a comprehensive and complete dataset on its own and cross-checking the data with the other databases increases the reliability of the data quality. All mentioned databases are widely accepted in both the finance industry as well as in the academic arena.

5.7.2 Definition of Private Equity

One of the problems with the dataset is the distinctinction between Private Equity, Venture Capital and other investment companies. Despite there being some differences to the way

these firms operate, the overlap in their investing activities makes this distinction problematic. We acknowledge the ambiguous and vague distinction between the industries and that the databases used in the screenings interpret these definitions differently. Consequently, we are aware that the dataset may contain some portfolio companies that could arguably be defined as a both a Private Equity or Venture Capital owned firm. In order to not solely rely on the databases definition, we also conducted searches for cases where the ownership was questionable. An illustrative example of this dilemma is the IPO of Inwido in 2014, which was owned by the investment company Ratos. One could define Ratos as an investment company. However, their investment strategy, board involvement and holding periods are in line with the definition of Private Equity. Therefore, we decided to include Inwido's IPO in the dataset.

5.7.3 Financial Data Collection

Where financial information was missing, we used both prospectuses and annual reports to manually complement the missing data points. The problem that arises is that the data collection becomes somewhat inconsistent as automatic extraction of data from databases is complemented with manual input of information from annual reports. Since the databases also are of non-Nordic origin, we are aware that there are potential discrepancies between the financial data collected from the databases versus the company's annual reports due to different accounting principles. For example, Bloomberg uses GAAP for the extraction of the financial data whilst the manually complemented data from the annual reports for the Nordic companies is IFRS. Therefore, if a company was partly missing some financial data, we decided to use only annual reports or prospectuses for all three years and not mix the sources of data. This in order to maintain a level of data consistency for each company. Since the three operational metrics between the companies are measured on a relative basis and not in absolute terms, the potential inclusion of some data discrepancy is not as significant.

5.7.4 Sample Size

Due to the amount of outliers and time period, we are aware that the sample size of 46 PE backed companies can be considered at the smaller end of the spectrum. This could potentially affect the statistical significance of the results. However, together with benchmarking the sample group against 64 companies in the control group, we deem a total of 110 companies to be large enough to achieve a significant result.

5.7.5 Control Group

In the effort to create a control group that would be used as a benchmark against the sample group of Private Equity-backed companies, we matched the industries to the best extent possible. This also meant that companies in the initial control group screening were dropped that were active in industries not found in the sample group. This could possibly be seen as problematic as there is an essence of adjusting the dataset too much from its original raw state. However, we believe that this method creates an apples-to-apples benchmark since companies in different industries have different financial characteristics. Therefore, comparing a large amount of Consumer companies with Oil and Gas companies does not create a fair test when looking at the financial metrics as a proxy for operational performance.

5.7.6 Normality

Before running the regression on the different operational metrics and numeric control variables, a Bera-Jarque test was conducted to test the normal distribution for the variables (see Appendix B5 and Appendix C2 for the descriptive statistics including the Jarque-Bera coefficient). For all variables, the P-value was below 0.05 resulting in the null-hypothesis of a non-normal distribution being accepted. To cope with this, all variables were winsorized on the 99th and 1st percentile in order to minimize the effects of any immediate outliers. Practically, this reshapes the 1st percent of the top and bottom values into the closest value outside of the percentile. This had a positive effect on some of the numeric variables' normal distribution but did only marginally affect the regression statistics which is why the original non-winsorized sample was used instead.

Brooks (2014) states that the larger observation size the more redundant is the assumption of normal distribution. With the 330 observation points of the sample used, this is assessed to be enough to offset the bias from not having a normally distributed data set.

6. Results

This section presents the results from each of the employed statistical models. Lastly, the challenges of the results are discussed.

6.1 Regression Results

6.1.1 Pooled Ordinary Least Squares (OLS)

Initially, a simple pooled regression was conducted on the biased sample and the results can be seen in Table 4. Another set of regression with the Robust Standard Error-model was conducted as a measure to diminish the negative effects of the present biases.

Table 4. Results from Pooled OLS.

*(The Standard Errors are presented within parentheses. *, ** and *** indicate the statistical significance at the 10%, 5% and 1% levels, respectively)*

	Pooled OLS					
	Sales Growth	**Sales Growth**	**EBITDA-margin**	**EBITDA-margin**	**ROIC**	**ROIC**
PE-Backed	-0,227**	-0,227***	-0,049**	-0,049**	-3,349**	-3,349**
	(0,102)	*(0,079)*	*(0,022)*	*(0,021)*	*(1,464)*	*(1,717)*
Size	-0,034	-0,034	0,024***	0,024**	1,421**	1,421**
	(0,041)	*(0,035)*	*(0,009)*	*(0,012)*	*(0,583)*	*(0,550)*
Leverage	-0,007**	-0,007**	0,003***	0,003***	-0,170***	-0,170***
	(0,003)	*(0,003)*	*(0,001)*	*(0,001)*	*(0,041)*	*(0,044)*
Country	Y	Y	Y	Y	Y	Y
Industry	Y	Y	Y	Y	Y	Y
Time	Y	Y	Y	Y	Y	Y
Robust	NO	YES	NO	YES	NO	YES
R^2	0,181	0,181	0,373	0,373	0,303	0,303
Adjusted R^2	0,116	0,116	0,324	0,324	0,248	0,248
Durbin-Watson	1,422	1,422	0,779	0,779	0,776	0,776
Observations	330	330	330	330	330	330

For all dependent variables, the result on the explanatory dummy variable PE-backed is significant and has a negative coefficient. The significance is maintained when using Robust Standard Errors for all variables and even improved to the 1st percentile for Sales growth. The statistically significant results show a negative trend on the operational performance over all time periods for the Private Equity-backed companies, concluding that the PE-backed firms underperform the benchmark over time after their exit. As Sales growth and EBITDA-margin are presented in percentages, the result shows that PE-backed companies on average have roughly 0.227% less Sales growth than non-PE-backed companies and roughly 0.049% lower

EBITDA-margin. ROIC is presented in its numerical value rendering a lower ROIC of 3,349 for the PE-backed sample.

The Adjusted R^2-coefficient ranges from circa 12% to 32% and shows how much of the changes in the dependent variables are explained by the explanatory and control variables used in the regression.

6.1.2 Repeated Cross-Section

The pooled OLS found statistically significant evidence that the Private Equity-backed sample underperformed the non-PE backed control group. As previously explained, in order to isolate in what or which time periods the underperformance took place, another set of regressions were conducted on a yearly basis (see Table 5).

In the fiscal year (seen as t_0 in Table 5) of the IPO, the results indicate no statistical significance in the difference between the PE and non-PE backed companies in any of the regressions. However, the coefficients remain negative which shows implications of underperformance in this time period.

The results from the first fiscal year (t_1) after the IPO show statistical significance in the fifth percentile for Sales growth which decreases to the tenth percentile using Robust Standard Errors. On average, the PE-backed companies display a 0.27% less Sales growth than the control group for the Cross Sectional-regression. The coefficient remains negative for both of the other variables with an almost doubled decrease compared to t_0 for the EBITDA-margin and with marginal changes for ROIC. None of these regressions were statistically significant.

From the second fiscal year (t_2) after the IPO, no statistically significant results are derived. Nevertheless, all coefficients remain negative with a high increase in the coefficient for Sales growth, implying that the underperformance in Sales growth could be diminishing after the first year of the IPO. The coefficients for EBITDA-margin and ROIC remained stable only deferring marginally from the time period before.

Table 5. Results from Repeated Cross-Section

*(The Standard Errors are presented within parentheses. *, ** and *** indicate the statistical significance at the 10%, 5% and 1% levels, respectively)*

			Panel A (t_0)			
	Sales Growth	**Sales Growth**	**EBITDA-margin**	**EBITDA-margin**	**ROIC**	**ROIC**
PE-Backed	-0,319	-0,319	-0,027	-0,027	-3,279	-3,279
	(0,263)	*(0,208)*	*(0,041)*	*(0,038)*	*(2,413)*	*(2,607)*
Size	-0,059	-0,059	0,033**	0,033	1,402	1,402
	(0,104)	*(0,090)*	*(0,016)*	*(0,027)*	*(0,955)*	*(0,915)*
Leverage	-0,015	-0,015**	0,002**	0,002	-0,198***	-0,198**
	(0,007)	*(0,009)*	*(0,001)*	*(0,001)*	*(0,066)*	*(0,076)*
Country	Y	Y	Y	Y	Y	Y
Industry	Y	Y	Y	Y	Y	Y
Time	Y	Y	Y	Y	Y	Y
Robust	NO	YES	NO	YES	NO	YES
R^2	0,294	0,294	0,364	0,364	0,364	0,364
Adjusted R^2	0,095	0,095	0,184	0,184	0,184	0,184
Observations	110	110	110	110	110	110
			Panel B (t_1)			
	Sales Growth	**Sales Growth**	**EBITDA-margin**	**EBITDA-margin**	**ROIC**	**ROIC**
PE-Backed	-0,272**	-0,272*	-0,055	-0,055	-3,073	-3,073
	(0,136)	*(0,104)*	*(0,037)*	*(0,039)*	*(2,669)*	*(3,284)*
Size	-0,087	-0,087*	0,008	0,008	1,127	1,127
	(0,054)	*(0,047)*	*(0,015)*	*(0,020)*	*(1,071)*	*(1,053)*
Leverage	-0,001	-0,001	0,005***	0,005***	-0,172**	-0,172**
	(0,004)	*(0,004)*	*(0,001)*	*(0,001)*	*(0,081)*	*(0,084)*
Country	Y	Y	Y	Y	Y	Y
Industry	Y	Y	Y	Y	Y	Y
Time	Y	Y	Y	Y	Y	Y
Robust	NO	YES	NO	YES	NO	YES
R^2	0,426	0,426	0,531	0,531	0,368	0,368
Adjusted R^2	0,264	0,264	0,399	0,399	0,189	0,189
Observations	110	110	110	110	110	110
			Panel C (t_2)			
	Sales Growth	**Sales Growth**	**EBITDA-margin**	**EBITDA-margin**	**ROIC**	**ROIC**
PE-Backed	-0,065	-0,065	-0,064	-0,064	-3,593	-3,593
	(0,057)	*(0,051)*	*(0,040)*	*(0,042)*	*(2,909)*	*(3,527)*
Size	0,030	0,030	0,028	0,028*	1,642	1,642
	(0,023)	*(0,020)*	*(0,016)*	*(0,016)*	*(1,160)*	*(1,099)*
Leverage	-0,001	-0,001	0,003***	0,003***	-0,104	-0,104
	(0,002)	*(0,002)*	*(0,001)*	*(0,001)*	*(0,082)*	*(0,098)*
Country	Y	Y	Y	Y	Y	Y
Industry	Y	Y	Y	Y	Y	Y
Time	Y	Y	Y	Y	Y	Y
Robust	NO	YES	NO	YES	NO	YES
R^2	0,261	0,261	0,400	0,400	0,319	0,319
Adjusted R^2	0,053	0,053	0,231	0,231	0,127	0,127
Observations	110	110	110	110	110	110

The underperformance in Sales growth is statistically significant in the fiscal year after the IPO. No other significant results can be derived from the regressions and it can not be stated when the PE-backed companies underperform in relation to the control group in terms of ROIC and EBITDA-margin. The fact that the coefficient still stays negative throughout all the time periods could imply that the underperformance is not set to a specific time period but rather spread across all of them.

In the Repeated Cross-Section regressions, the adjusted R^2-coefficient ranges from 5% for Sales growth in the last time period to 40% for EBITDA-margin in the second time period.

6.1.3 Random Effects Model

The last set of regressions were conducted using the Random Effects model as a measure to control for the firm-specific effects. As shown in Table 6, the results from this set of regressions further validated the the previous results.

Table 6. Results from Random Effect Model

*(The Standard Errors are presented within parentheses. *, ** and *** indicate the statistical significance at the 10%, 5% and 1% levels, respectively)*

	Panel Data Random Effects		
	Sales Growth	**EBITDA-margin**	**ROIC**
PE-Backed	-0,225*	-0,046	-3,331
	(0,124)	*(0,035)*	*(2,331)*
Size	-0,031	0,029**	1,455
	(0,049)	*(0,014)*	*(0,923)*
Leverage	-0,008**	0,001	-0,185***
	(0,003)	*(0,001)*	*(0,046)*
Country	Y	Y	Y
Industry	Y	Y	Y
Time	Y	Y	Y
Hausman	YES	NO	YES
R^2	0,137	0,162	0,168
Adjusted R^2	0,069	0,096	0,103
Observations	110	110	110

Sales growth was found statistically significant in the 10th percentile with a coefficient of -0.225 which is in line with the pooled regression. The results of which can be interpreted as the firm specific effects not having a major influence on the change in Sales growth. For the other two variables no statistically significant results is found but the coefficients are negative and in line with the first pooled regression made on both the variables. The results from the regression on the EBITDA-margin should be carefully interpreted as it failed the Hausman

test and is therefore biased. Finding no significance further implies that the results should be interpreted conservatively.

In the Random Effects model, the adjusted R^2-coefficient is slightly lower and ranges from around 14%-17% explaining less of the changes in the dependent variable caused by the explanatory variables than for the other regressions.

6.2 Leverage

The effect of leverage on the dependent variables were varied but in total had a very small effect on Sales growth and EBITDA-margin. As shown in Table 4, an increase of leverage by 1% decreased the Sales growth by 0.007% and EBITDA-margin 0.003%. Leverage had a slightly higher impact on ROIC as an increase of one percent in leverage increases the ROIC by 0.17. All of the variables was statistically significant in the 1st percentile. Cross-sectionally, no remarkable changes in operational performance are shown for an increase in leverage. However, with a diminished statistically significance in some of the variables. Finally, leverage has no immediate effect on the operational performance on average for the whole sample with the exception of ROIC, where an increase in leverage relates to a small decrease in ROIC.

6.3 Size

Size has an, although not statistically significant, negative effect on Sales growth. Where, derived from the pooled regression, an increase in size by USD 1m decreases Sales growth on average by 0.031 percent. For the two other operational metrics, size has a positive effect. An increase in size by USD 1m increases EBITDA-margin on average by 0.024 of a percent and ROIC by 1,421. The two variables have a statistical significance in the 5th percentile.

6.4 Hypothesis Results

Hypothesis 1: *The operating performance of the firms in our PE-backed sample will be significantly better than that of the control-group*

The results of our study rejects the hypothesis, failing to show any correlation between superior operating performance in firms post their IPO and being backed by a Private Equity firm.

Hypothesis 2: *The operating overperformance of our sample compared to the control group, if confirmed, will on average be less than that found by studies of other periods and contexts*

Our results do not only show a weaker comparative overperformance, but fail to evidence any overperformance what so ever and we thus consider the hypothesis to hold true.

6.5 Problematization of Results

The relatively low adjusted R^2 coefficient might provide a problem as ideally the independent variables should explain as much as possible of the changes in the dependent variable. There is obviously a large amount of factors explaining the changes in these operational performances. Given the difficulty controlling for them and the short time span at our disposal adding more control variables to the model were not feasible in regards to the high quantity of variables needed to be added in order to provide significant changes to the R^2-coefficient and the results as a whole. Also adding to many variables endangers the robustness of the result as it adds problems such as a high possibility of multicollinearity among others. When screening the previous studies in the literature review chapter of the thesis, approximately the same magnitude of the R^2-coefficient was observed. Since the control variables were based on the previous studies conducted on different markets, different circumstances and different time periods we assess that no immediate violation of validity towards the results derives from the relatively small R^2-coefficient.

As explained throughout the thesis some of the assumptions of the OLS were violated due to the general behaviour of the sample or the methodology used. This would in theory lead to the regressions not being efficient. However, we have used a number of tools and methods at our disposal to either prevent the OLS from being inefficient, or to tweak the models into holding the assumptions under the given circumstances. The effect of this should provide the framework with enough robustness to achieve efficient results. Since the results from the three different regression models points at a common direction with only a difference in coefficients, more validity towards the results are endorsed.

By using these tools and methods, the degrees of freedom of the regression has diminished. Practically, this has led to the significance factor for both ROIC and EBITDA-margin to have

been worn off. To cope with the significance problem a larger sample size would have been preferred but given the relative small markets and essentiality of using 2006 as a starting year the possibility to increase the sample was not given.

7. Analysis and Discussion

The following section gives an analysis of the results and a discussion of the implications of the study's findings.

As the aim of the study was explicitly to scrutinize the PE-industry's value creation ability in a context specifically chosen to challenge it, our sample's comparatively worse performance to those in previous literature such as Holthausen and Larcker (1996) and Kaplan and Strömberg (2009) is not exceedingly notable in itself. Other studies of the period, such as Guo, Hotchkiss and Song (2009), also fail to find as strong evidence of value created by PE-activity.

However, our results do not only fail to support the notion that PE-backed firms show improved operating performance post-IPO but actually indicate that they performed somewhat worse along all three metrics in the fiscal year following flotation when measured against the control group, albeit only the weaker Sales growth showed statistical significance. This is particularly interesting when compared to the findings of Cao and Lerner (2009), who found this to be the year of strongest positive performance discrepancy between PE-backed and non-backed IPOs.

These results, their implications, significance and persistence will be elaborated upon from the perspective of previous studies and literature along with possible interpretations in the following sections.

7.1 EBITDA-margin

Our results suggest that the chosen sample of PE-backed firms failed to display any significantly superior EBITDA-margins in the year following the IPO. As we consider the EBITDA-margin to be the main proxy for profitability of the companies' core operations, we consider this a strong indicator of the failure to create operational value by the firms in our sample, in contrast to those studied by amongst others Kaplan (1989), Levis (2011) and Bergström, Grubb and Jonsson (2007).

The contrast between the findings presented by these previous studies and that of this thesis' lends support to a possible interpretation of the results. As the EBITDA-margin is a vital

metric in the PE-sphere due to its central role in firm multiple valuation methods, one would expect there to be strong incentives for the PE firms to implement all possible measures in order to strengthen it in connection to their exit and subsequent divestment. As previously noted and as stated by amongst others Kaplan and Strömberg (2009) and Jensen (1989), the PE firm has a multitude of tools at their disposal in order to achieve this. Besides direct operational interjections, mechanisms related to governance and financial engineering and their implications of reduced agency costs have previously been found to substantially and significantly work in the favor of operational improvements.

We interpret the fact that the studied firms were not able to display any improvement despite the mechanisms described above brings credence to the hypothesis formulated by Acharya, Franks and Servaes (2007). The authors suggest that a significant proportion of PE activity might have been motivated by factors other than the prospect of operational improvements, such as favorable market conditions and relative supply of debt capital. This is corroborated by the fact that our findings correspond to those of Moreira (2013). While that study focused on a different market context, it did examine buyout activity in a similar timespan and arrived at similar results.

Another overarching interpretation of the results is that they are an effect of the relative ease of raising capital during the period. As Kaplan and Strömberg (2009) note, this fact might quite simply have allowed worse performing PE firms to engage in buyouts during the period, achieving worse results and in turn affecting the average performance of the sample of PE-backed firms.

7.2 Net Sales Growth

The lack of any positive difference in Net Sales growth is, like the results regarding the EBITDA-margin, equally at odds with a significant amount of previous findings on the matter. It should be noted that Sales growth could be considered a less appropriate measure of value creation as it does not directly impact operating results (Bergström, Grubb & Jonsson, 2007). However, its determinant effect on our other two chosen metrics and subsequent strong indication of performance nonetheless means that the lack of stronger development in our sample carries strong implications. Of special note is once again the fact that we did not only find to fail a significant relative overperformance in our sample, but actually

underperformance in the first post-IPO year.

In light of previously discussed findings and literature, as well as the chosen context of the study, these results can be interpreted in several different ways.

One potential influencing dynamic could be the increased competitive pressure in the PE-space around the 2000's boom in combination with the excessive availability of capital. As competition increases the availability of "easy pickings" in the form of clear-cut growth cases would naturally become sparser. Simultaneously, the availability of cheap capital and the ease of raising funds for the PE firms would incentivize buyouts targeting firms with less clear growth trajectories being performed (Mattson & Mårild, 2006).

Furthermore, the market conditions might have had implications on the sample firm's Sales growth by the limiting effect the employment of leverage creates on long-term investment capacity, as described by amongst others Harford and Kolanski (2012) and Kaplan (1989). As previously noted, high levels of leverage risks necessitating a diversion of funds from capital expenditure projects to debt-related payment obligations, hindering long term growth potential. As the PE-backed firms in the studied period generally employed substantial amount of leverage, this dynamic becomes highly relevant when interpreting our results. The rapidly deteriorating macroeconomic conditions that the firms were subsequently subjected to in connection to the financial crisis would plausibly have a significant impact on the burden of debt-related obligations. The employment of instruments such as PIKs and other relatively risky debt structures would further compound the intensity of this effect.

An important factor affecting the result to a certain degree could potentially be the nature of our study and the chosen sample itself. As Kaplan and Strömberg (2009) note, IPOs constitute the tertiary exit strategy for the average PE firm, pursued primarily in the absence of a fitting strategic and financial buyer. As such, one might suspect our sample to be subject to some degree of adverse selection. Furthermore, as strategic divestitures and other asset restructuring measures are frequently part of PE firms' strategies to create operational efficiency, we want to once again emphasize the fact that Net Sales growth should be viewed as a complementing metric to profitability measures.

7.3 Return on Invested Capital

Our results do not point towards an improved ROIC in the sample group and like with the other metrics, points towards a negative correlation to PE involvement. This result is once again in odds with the findings of Bergström, Grubb and Jonsson (2007) as well as the theoretical effects of the PE firm involvement reduction of agency costs. The agency theory would suggest that as Agent-Principal interests are aligned through increased management equity stakes, the incentive to keep a rationalized capital base and subsequently maximize ROIC, should be greater in PE-owned firms. This effect would be expected to dissipate post the sponsor's divestment, but is in our sample not apparent in any of the studied years, including those that fall within the lockup periods generally employed in the industry.

As noted by Guo, Hotchkiss and Song (2009), asset restructuring and capital employment efficiencies furthermore constitute a typical operating measure employed by Private Equity firms in the operational engineering activities. Realizing these efficiencies and boosting ROIC is however frequently in direct conflict with pursuing a more aggressive growth strategy. In lieu of any evidence of overperformance in terms of Sales growth in our backed sample however, we do not find this to be a plausible explanation for these results.

Another factor to take into account is of course the inter-industry differences in the measure, with more asset-light business models generating significantly different levels of ROIC than their more capital intensive peers. Due to the study's model design and the fact that our control group has been matched by industry to our sample group, we do find it highly unlikely that this would be the main underlying reason for our results. Rather, we suspect that this result further corroborates our findings related to the other studied metrics to suggest that our PE-backed sample simply does not display a significantly superior operational performance.

7.4 Leverage

We find the fact that leverage as a variable yielded a statistically significant negative, albeit very small, correlation to operational performance to be surprising. While the relationship between leverage and Sales growth might be interpreted as described in the above section, the lack of a positive correlation between profitability measures and leverage levels har further implications. An interesting interpretation is that the negative effects of carrying leverage

during rapidly deteriorating market conditions such as during the financial crisis mitigates the positive mechanisms brought up by amongst others (Jensen, 1989; Kaplan, 1989)

An important note is that the results could in part be explained by the fact that our study, like that conducted by Bergström, Grubb and Jonsson (2007), does not benchmark debt in relation to specific industry leverage levels. Innate industry factors such as capital intensity and needs are thus not considered and the relative effects of leverage might therefore be obscured.

7.5 The Effect of the Nordic Context

As previously noted, the reduction of agency costs constitutes one of the most significant performance improving effects of PE-involvement and is put forth by amongst others Jelic and Wright (2011) as the chief factor for creating value. We would argue that the generally large ownership concentration of Nordic public firms potentially dilutes the relative advantage otherwise achieved by PE firms in terms of increased monitoring and control in comparison to their non-backed peers. This speculation is somewhat refuted by the fact that other studies in the Nordic and Swedish context, such as that conducted by Bergström, Grubb and Jonsson (2007), found significant overperformance of PE-backed companies. We would however argue that as this study is dedicated specifically towards public firms where the impact of a difference in ownership concentration would be realized, the relative dissipation of the effect would be intensified.

8. Conclusion

This section gives a brief summary of the main findings of the study as well as its interpretations. Lastly, suggestions of further research emerging from the implications of the study's findings are presented.

8.1 Summary of Findings

This thesis aims to compare the operational performance of PE-backed IPOs versus non-backed IPOs in the time span 2006-2015 in the Nordic markets. Through deploying three operational metrics (Sales Growth, EBITDA & ROIC) as a proxy for operational performance, we can conclude that the studied PE-backed companies do not present better operational performance than non-PE-backed companies in the time span of two fiscal years after the IPO year. Moreover, PE-backed firms showed an underperformance in operational performance compared to the control group that is statistically significant when it comes to all variables in the pooled OLS. The study shows that this outcome is heavily present one fiscal year following the issue date for Sales growth specifically.

Overall, we interpret these results as suggestive to the sensitivity of the operational value creation of PE-activity to factors systemic to the industry, such as credit market conditions and supply of capital. As such, the results do not necessarily contradict the notion that PE-activity generally achieves operational value creation. Rather, it suggests that when other factors than the prospect of operational improvements drive activity, the aggregated value created by PE activity might be diminished.

Since the findings of this study to an extent diverge from that of the majority of previous research of the area, we have explored possible interpretations of its result in order to provide a basis for further research into the subject.

8.2 Further Research

We believe that further research dedicated towards the impact of prevailing industry conditions in the PE-sphere on operating performance improvements would be of great interest. The fairly limited scope of the thesis leaves several potentially important aspects unscrutinized and places constraints on what conclusions can be drawn from it. We do

however believe that it's implications provide an interesting contribution to existing literature, primarily by introducing prospects for further research.

Due to data availability, this study was limited to the operating performance of PE-deals exited through IPOs specifically. IPOs have greatly decreased in prevalence as a preferred exit strategy by PE firms and thus might display a certain element of adverse selection (Kaplan & Strömberg, 2009). The inclusion of firms exited through other channels would greatly serve to determine whether the results of this study are tied to IPO-specific factors or are persistent regardless of chosen exit strategy.

Also, the choice of operational performance indicators was derived from previous studies and sifted down to the three performance indicators we found most interesting for our research question. However, since operational performance can be defined and measured in numerous ways, we highly encourage any further research to be conducted on other performance indicators as the results might give a different outcome.

Furthermore, the operating performance of any individual firm is of course dependent on a plethora of variables. As suggested by our study's fairly low R^2-coefficient, the inclusion of more variables both tied to specific PE-dynamics and general determinants of firm performance would likely be of great benefit. An interesting example would be to quantify and measure the impact of the relative prominence of the involved PE firms. Previous literature has established that these factors have a significant impact on portfolio company performance. As such, it would be of interest to examine the degree of this impact in the context of detatoriating market conditions. Larger firms with a greater industry reputation would plausibly be better positioned to counter worsening credit terms both due to possessing greater capital resources and due to stronger relationships with credit institutions.

Finally, further research establishing a more direct connection between credit market conditions and the operational performance of PE-backed firms would be of great interest. This could be achieved by examining the causality between variables such as prevailing interest rates and other credit market conditions with operating metrics in PE-backed firms.

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Appendix A – The Gauss-Markov Ideal Conditions

(The statements in the following section is referred to Brooks (2014) "Introductory Econometrics for Finance", Second Edition")

(1) The errors have a zero mean

For the assumption to hold, the error in the regression should have a conditional mean of zero and have no correlation with the regressors. Adding a constant to the equation forces the error's mean to equal zero and thus makes this assumption hold.

(2) The variance of errors is constant and finite over all values of X

Also referred to as homoscedasticity which implies that the variance in the residuals is the same regardless of the differences in the X-axis. If there is a difference in variance the sample contains heteroskedasticity and the Gauss-Markov theorem does not hold leading to a biased result.

(3) The errors are linearly independent of each other

This implies that the covariance of the error terms needs to be zero or in other words that they are uncorrelated with each other over time or cross sectionally. If they are not uncorrelated the errors proceed to be autocorrelated which creates a bias in the test. Since it is not possible to test this on the error terms a test would have to be conducted on the residuals instead.

(4) The regressors are non-stochastic

This assumption states that in a regular regression if the regressors are stochastic the results are biased. However, running an OLS with a stochastic regressor still preserves consistency and brings an unbiased outcome provided that the regressors are not correlated with the error term of the estimated equation.

(5) The errors are normally distributed

The last assumption states that the error terms needs to be normally distributed. This means that the residuals, when plotted in a histogram, should be bell shaped and symmetric about its mean. To test this a Bera-Jarque test was used in which a significance factor is given which if over 0.05 accepts the null-hypothesis and the sample is considered normally distributed.

Appendix B – Regression Diagnostics

B1: White's Test

(The statements in the following section is referred to wooldridge (2012) "Introductory Econometrics: A Modern Approach", Fourth Edition)

The purpose of the White's test is to examine whether there is a relationship between the variance of the error term and the explanatory variables. A main problem with testing for heteroskedasticity is that the variance of the error term can not be observed. Instead the white test adds the squares and cross products of all explanatory variables in the regression equation. In this way the test can explicitly test for forms of heteroskedasticity that violates the assumptions of the OLS (see Table 7)

Table 7. Results from White's Test

	White's Test	
	Value	**Probablility**
Sales Growth	1084,22	0,00
EBITDA-margin	697,99	0,00
ROIC	563,65	0,00

B2: Hausman Test

(The statements in the following section is referred to Brooks (2014) "Introductory Econometrics for Finance", Second Edition")

The Hausman test shows if there exists a correlation between the firm specific effects and the explanatory variables. The test results in a chi-coefficient and a significance factor (P-value). If the P-value is below 0.05%, the null-hypothesis of presence of correlation between the firm specific effects and the explanatory variable is accepted. If this is shown to be true, the Random Effects model is biased and should not be used. If it doesn't, the Random effects model is the prefered of the two models (see Table 8).

Table 8. Results from Hausman Test

Hausman Test		
	Chi Sq.	**Probablility**
Sales Growth	3,73	0,05
EBITDA-margin	0,15	0,69
ROIC	15,44	0,00

B3: Durbin-Watson Test

(The statements in the following section is referred to Brooks (2014) "Introductory Econometrics for Finance", Second Edition")

A Durbin-Watson tes" aims to test the relationship between an error and its previous value. The test results in a DW-stat that ranges from 0 (perfect positive autocorrelation) to 4 (perfect negative autocorrelation) and a test results of close to 2 shows of no signs of autocorrelation.

B4: Multicollinearity Test

(The statements in the following section is referred to Brooks (2014) "Introductory Econometrics for Finance", Second Edition")

A main assumption that is made for a reliable OLS estimation is that the explanatory variables are not correlated. If one or more of the explanatory variables are correlated the OLS cannot disentangle which of the variable has the ultimate effect on the dependent variable. Practically there will always be a small amount of correlation between the explanatory variables and it is when the correlation is almost perfect that problems arises. Testing for multicollinearity is most easily done through a correlation table (see Table 9).

Table 9. Correlation Matrix

Correlation Matrix										
	Denmark	**Finland**	**Norway**	**Sweden**	**EBITDA-margin**	**Leverage**	**Deal Size (Log)**	**PE-Dummy**	**ROIC**	**Sales Growth**
Denmark	100%	-	-	-	-	-	-	-	-	-
Finland	-12%	100%	-	-	-	-	-	-	-	-
Norway	-18%	-24%	100%	-	-	-	-	-	-	-
Sweden	-30%	-40%	-62%	100%	-	-	-	-	-	-
EBITDA-margin	3%	-4%	12%	-9%	100%	-	-	-	-	-
Leverage	-8%	-11%	9%	4%	34%	100%	-	-	-	-
Deal Size (Log)	14%	-22%	0%	7%	18%	18%	100%	-	-	-
PE-Dummy	2%	-7%	-27%	28%	-13%	3%	34%	100%	-	-
ROIC	0%	20%	-7%	-7%	22%	-26%	8%	-1%	100%	-
Sales Growth	17%	-3%	-8%	0%	0%	-13%	-17%	-16%	-2%	100%

B5: Bera-Jarque Test

(The statements in the following section is referred to Brooks (2014) "Introductory Econometrics for Finance", Second Edition")

The purpose of the Bera-Jarque test is to estimate the normal distribution of the error term. The test also measures the sample's skewness and kurtosis and the result is based on the phenomenon that a normally distributed error term is not skewed and that the kurtosis coefficient should be equal to three. In practice this mean that a normally distributed error term is symmetric about its mean value and that the ends of the distribution are not too "fat" or too "thin". The test results in a significance factor (p-value) on the basis of the null-hypothesis of a non-normally distributed error term. If the p-value is above 0.05 the null hypothesis is rejected and the test shows presence of a normally distributed error term.

Appendix C – Additional Tables and Graphs

Table C1

Annual Distribution of IPOs in the Data Set

PE = Private Equity sample, CG= Control Group

Year	PE	CG	ALL	%
2006	6	8	14	*13%*
2007	4	10	14	*13%*
2008	1	1	2	*2%*
2009	0	0	0	*0%*
2010	5	7	12	*11%*
2011	2	4	6	*5%*
2012	1	1	2	*2%*
2013	1	7	8	*7%*
2014	9	9	18	*16%*
2015	17	17	34	*31%*
Total	**46**	**64**	**110**	***100%***

Table C2

Summary Statistics

	Sales Growth	ROIC	Deal Size ($m)	Leverage	EBITDA-margin
Mean	28,14%	10,00	230	24,00	17,15%
Median	12,62%	8,88	120	24,91	13,23%
Maximum	7,92	65,30	2387	86,08	0,98
Minimum	-0,69	-39,13	10	0,00	-1,10
Std, Dev,	0,81	12,62	334	17,73	0,20
Skewness	6,72	0,27	4	0,34	0,15
Kurtosis	55,72	6,92	20	2,88	10,39
Jarque-Bera	40699,99	215,6423	1563	6,42	751,67
Probability	0,00	0,00	0	0,04	0,00
Sum	92,87	3298,793	25322	9241,53	56,60
Sum Sq, Dev,	217,85	52430,01	12145419	103476,40	13,24
Observations	330	330	110	330	330

Appendix D – List of Private Equity-Backed IPOs

Company Name	IPO Year
Alimak Group AB	2015
Attendo AB	2015
BE Group AB	2006
Bufab AB	2014
Bulten AB	2011
Byggmax Group AB	2010
Capio AB	2015
Chr. Hansen Holding A/S	2010
Com Hem Holding AB	2014
Consti Yhtiöt Oyj	2015
Coor Service Management Holding AB	2015
Dometic Group AB	2015
Duni AB	2007
Dustin Group AB	2015
Eltel AB	2015
Europris ASA	2015
Gant Company AB	2006
Hoist Finance AB	2015
Inwido	2014
ISS A/S	2014
KappAhl AB	2006
Kotipizza Group Oyj	2015
Lindab International AB	2006
Matas A/S	2013
MQ Holding AB	2010
NEAS ASA	2007
Nederman Holding AB	2007
Nobina AB	2015
Nordax Group AB	2015
Pandora	2010
Pihlajalinna Oyj	2015
Pronova BioPharma ASA	2007

Company Name	IPO Year
RenoNorden ASA	2014
Salcomp	2006
ScandBook Holding AB	2010
Scandi Standard AB	2014
Scandic Hotels Group AB	2015
Scanfil Oyj	2012
Swedish Orphan Biovitrum AB	2006
Thule Group AB	2014
Tobii AB	2015
Transmode AB	2011
Troax Group AB	2015
WeSC AB	2008
XXL ASA	2014
Zalaris ASA	2014