Specialization, competitive advantage or not?

Evidence from the Nordic PE market

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Abstract

In this thesis we examine whether PE-backed buyouts experience greater post-buyout operating performance than comparable private companies and whether relative specialization by either industry or stage compose a competitive advantage or not. Specifically, we study a sample of 110 leveraged buyouts, and a matched control group, on the Nordic PE market during 2008-2015. By applying an index of competitive advantage using portfolio composition, each observed PE firm is classified as either a specialist or a generalist. We measure post-buyout performance as *Turnover growth, EBIT/Sales* and *EBIT/Assets*, over a time period of three years following the buyout. We identify differences in performance using bivariate analysis. In addition, we run multiple OLS regressions while controlling for a number of factors that potentially impact post-buyout performance.

Our findings suggest that; (i) PE-backed companies experience greater post-buyout performance measured as *Turnover growth* and *EBIT/Assets*, confirming the alleged superiority of the PE organizational form; (ii) relative specialization by either industry or stage does not impact the performance. Lastly, we note that initial turnover and profitability play an important role when assessing future performance. This suggests that skilled target selection might be more important than investment strategy, in terms of specialization.

Key words: Private equity; Post-buyout performance; Specialization; Nordics

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Chapter 1 Introduction

Prior to the financial crisis, debt was easily obtained and the money flowing through the banks fueled a boom in the buyout market (Kaplan & Strömberg, 2009). In the wake of the financial crisis many private equity firms (PE firms) suffered a credit crunch making it difficult to raise capital to fund big buyouts (ibid.). Investigating important value drivers in PE, Gompers, Kaplan and Mukharlyamov (2016) find that PE investors view leverage as less important. Along with increased competition and historically low leverage ratios, it may reflect the new PE environment (ibid.) Additionally, Bishop (2012) argues that the financial crisis forced PE firms to re-invent themselves to find new strategies in order to overcome skepticism among investors. Supporting these claims, Gompers et al. (2016) find that more than 50% of PE investors are specialized by industry while almost 70% are considered deal specialists. Notable is that only 37% are organized as generalists. Once again, these numbers might give a reflection of the new PE environment as most PE firms were largely generalists during the 1980s (ibid.).

In support of these arguments a report from The Swedish Private Equity and Venture Capital Association (2017), henceforth SVCA (2017), shows similar development on the Nordic PE market. The Nordic buyout market has shown strong growth and established itself as the largest in Europe given its size of the economy (ibid.). In addition, Castellaneta and Gottschalg (2016) show that PE firms are quite heterogeneous by investment strategy and ability to implement value creation levers. The authors argue that future literature should be devoted to identifying the factor variables that recognizes differences among PE firms´ ability to add value to portfolio companies (PCs). However, few attempts have been made to further investigate this topic.

During the initial decade of the 21st century, PE investing increased in popularity and established itself as an important component of the corporate finance industry (Kaplan & Strömberg, 2009). PE firms are active investors who try to create value and increase productivity in a unique manner compared to other investment vehicles such as investment funds and the public capital market (ibid.). Additionally, PE firms seek to invest in companies with unrealized potential, enabling quick operational and financial

improvements. Together with good reputation, PE firms are viewed as guarantors of quality advice and quick improvements (ibid.).

Historically, research within the area of PE has focused on the effects of active management by PE firms and the difference in performance between PE-backed versus non-PE-backed companies[1] (see e.g. Kaplan, 1989; Lichtenberg & Siegel, 1990; Kaplan & Schoar, 2005; Harris, Siegel & Wright, 2005). The aforementioned research studies the effect of PE ownership by looking at post-buyout performance of PCs after being acquired.

Kaplan (1989) was among the first to study post-buyout performance and consistent with "The Jensen hypothesis"[2], the author finds that industry-adjusted cash flow was significantly higher three years following the buyout. Together with an increased firm value, the results indicate an improvement in operating performance. Supporting Kaplan (1989), Lichtenberg and Siegel (1990) show that productivity of buyout firms increased from 2% to 8% in the first three post-buyout years. Overall, the results show that PE firms are able to add value to their investors and PCs by using the means of tight corporate governance, improving the operational and financial efficiency of the acquired companies.

As prior research indicates, PE firms have been praised as an efficient investment vehicle with the ability to generate economic performance and superior returns through a controlled governance framework which includes financial and operational engineering (Jensen, 1986; Jensen, 1989; Kaplan & Strömberg, 2009; Acharya, Gottschalg, Hahn & Kehoe; 2013). On the other hand, PE firms often get criticized for being "corporate raiders" that strip company assets and profit from re-selling within a short time period. While PE firms benefit from restructuring of PCs, employees are negatively affected in terms of remuneration and employment (Shleifer & Summers, 1988). Furthermore, Kaplan and Strömberg (2009) argue that the various forms of debt used in the buyout transaction can be questioned as it puts substantial financial constraints on PCs. Similar arguments are made by Axelson, Strömberg and Weisbach (2008) suggesting that the compensation structure of PE firms incentivizes target firms to take on more debt

[1] Non-PE-backed companies and non-buyouts are used interchangeably. In Chapter 3 and forward, non-PE-backed companies are also referred to as control companies when discussing the matched peer group.
[2] The Jensen hypothesis argues that operating performance of companies backed by PE firms should be greater than those of comparable non-buyout companies due to its superior organizational form.

than optimal. Moreover, research indicates that PE firms force PCs to increase short-term cash flow to service the debt and interest payments following the transaction. Kaplan and Strömberg (2009) argue that this could potentially negatively affect long-term performance. It is clear that the debate still exists with proponents and critics having different views regarding the pros and cons of PE firms' way of operating.

While a majority of the research focuses on post-buyout performance of PCs, independently of the characteristics of PE firms, research considering the degree of specialization among PE firms and its impact on the performance of the acquired PCs is rather scarce. Cressy, Munari and Malipiero (2007) was among the first to take a firm-level perspective studying the specialization effect among PE firms. The authors investigate whether specializing in certain industries or stages of financing, relative to its peers, provide PE firms with a competitive advantage. Using a sample of 122 UK buyouts over the period 1995-2000, their findings indicate that greater industry specialization is associated with improved post-buyout performance. Conversely, the authors could not identify any evidence supporting the hypothesis that stage specialization is beneficial for post-buyout performance of the PCs.

Similar to Cressy et al. (2007), Knill (2009) suggests that by specializing within an industry or stage of financing, PE firms are able to increase the quality and speed of the value adding process through better provision of corporate governance and quality advice. The author argues that this is possible due to higher degree of sector-specific knowledge and an increased pool of skills. The arguments made by Knill (2009) are further supported by Gompers, Kovner, Lerner and Scharfstein (2009) who find a strong positive relationship between industry specialization by individuals and firm success. However, Knill (2009) also argues that by specializing, PE firms are constrained when seeking new investment opportunities which may induce costs or delay the investment process. Thus, the conclusion is somewhat unclear regarding the effects of specialization. On one hand, it has positive effect on firm value by increasing the quality and speed of the value adding process, while on the other hand it works as a constraint by delaying and avoiding promising investment opportunities.

The lack of external validity, i.e. generalizability of the findings, is one of the main concerns raised by Cressy et al. (2007) as their analysis relies on data from one single developed market. However, the authors argue that it is important that the market of interest is sufficiently developed to ensure that both types of investors, i.e. specialist and generalist, have the ability to exercise their expertise. Therefore, current research studying performance differences of PE-backed versus non-PE-backed companies is primarily dominated by data on the US and UK PE markets (see e.g. Gejadze, Giot & Schwienbacher, 2016; Harris et al., 2005; Knill, 2009; Wright, Thompson & Robbie, 1992). Hence, as highlighted by Cressy et al. (2007) it is important that future research is devoted to investigate performance differences and potential specialization effects on other markets.

1.1 Problem statement

Cressy et al (2007) proposed that specialized PE firms possess a deeper knowledge of the industry and its competitive environment relative to its peers. Therefore, it is believed that specialized PE firms are able to increase the quality of monitoring and advice. Building on the findings of Cressy et al (2007), Le Nadant, Perdreau and Bruining (2018) further argue for a correlation between specialized PE firms and superior post-buyout performance of the acquired PCs. In line with Jensen (1986, 1989), Cressy et al (2007) also proposed that the PE organizational form, irrespectively of its degree of specialization, should deliver superior performance compared to non-PE-backed companies. To the best of our knowledge, only a few articles have taken a firm-level perspective studying the specialization effect in the PE industry. Furthermore, as highlighted in the introduction, there is little agreement regarding the effect of specialization within the academia.

As suggested by Cressy et al. (2007) different financial and institutional environments may cause the results to differ from previous findings. Hence, using a different developed PE market may further strengthen or question the prior evidence. In the light of the development on the Nordic PE market during the past decade, it can be perceived as a suitable market to study. Furthermore, PE firms differ extensively in terms of size, years of experience, age, managerial style, industry focus and stage of investment (Cressy et al.

2007). Supported by previous research (Cressy et al., 2007; Gompers, Kovner, Lerner & Scharfstein, 2008; Gompers et al. 2009; Le Nadant et al., 2018), specialization can be studied through two dimensions; specifically, investment focus by stage and industry. The two dimensions can be viewed as factors that make PE firms more or less capable of adding value to their buyouts, enriching the research gap highlighted by Castellaneta and Gottschalg (2016).

1.2 Research question

With the above reasoning in mind, the purpose of this study is to investigate the alleged superiority of the PE organizational form on the Nordic market and shed some light on the specialization effect within PE. This leads us to the following research question:

"Is there a difference in post-buyout performance between PE-backed companies and non-PE-backed companies, and how does PE firm specialization by industry or stage affect post-buyout performance among PE-backed companies in the Nordics?"

The present paper addresses i) the impact of the value creation process associated with the PE organizational form and ii) the impact of strategic differences between PE firms on post-buyout performance of PCs. To answer our research question, we test our formulated hypotheses on a manually constructed dataset of 110 transactions over the period 2008-2015 in the Nordics (Denmark, Finland, Norway and Sweden). The sample of PE-backed companies are matched with a sample of non-PE-backed private companies. The second dimension of the research question, treating strategic differences, focuses on specialization by industry or stage[3]. A number of control variables are adopted to control for factors that might influence post-buyout performance and target selection.

Furthermore, this research paper delivers a qualitative overview and quantitative study that together address the above research question in a step-by-step approach. An introduction of basic concepts of buyouts, followed by a review of the value creation process and historical performance forms the qualitative part of the thesis. To understand

[3] Stage refers to the PE firms´ focus on stage of investment. This study exclusively investigates the buyout-form versus "the rest". The rest refers other investment stages such as: early stage, seed capital and expansion.

what motivates PE firms to specialize, the literature review also highlights the development of strategic differences among PE firms and their performance. To further address the research question, the second part of this thesis emphasize on an empirical study to assess the potential effect of specialization on the Nordic PE market. This study adopts a similar methodology as previous research within the field to increase its comparability with literature covered in the first part of the thesis.

1.3 Delimitation

In order to create a clear scope of interest, certain boundaries are set as it relates to the research design. First, even though our hypotheses are in part deduced from literature related to the Venture capital (VC) industry, this study will not include VC-backed transactions. However, much of the literature covering specialization is tied to the VC industry and is assumed by the academia to be relative applicable to the PE industry. Hence, literature related to VC investing will be covered in the literature review.

The decision to exclude VC-backed transactions is supported by differences in characteristics between VC-backed- and PE-backed buyouts. VC firms tend to focus on companies in the startup phase and usually take a minority ownership stake and have longer holding periods. Whereas PE firms usually invest in mature and large companies by acquiring a majority ownerships stake. In line with Cressy et al. (2007), we predict that the specialization effect is better studied in a setting where a PE firm holds a majority stake in the PC in order to substantially influence the decision making and strategy.

Secondly, consistent with the argumentation above, all secondary- and tertiary buyouts are excluded in order to ensure that any performance effects are caused by the primary sponsor. Furthermore, all syndicate deals where the lead PE firm did not acquire a majority stake were excluded. Previous research shows that syndicate deals might dilute the value adding effect created by a single PE firm as it is difficult to differentiate between multiple PE firms´ contribution.

Finally, our investigation on post-buyout performance of PE-backed buyouts will not elaborate on PE firms´ fund-performance, as this paper takes a firm-level perspective

studying performance of PCs. Additionally, fund-performance has been covered in much of the previous research studying the PE industry. Nevertheless, related literature will be covered to provide a wide body of research of PE investing. For further argumentation for delimitations see section *4.1 Sample*.

1.4 Disposition

Chapter 1 Introduction

This chapter introduces the topic of PE and the growth of specialization among firms. Furthermore, the chapter describes the problem statement, the identified research gap and motives for studying specialization effects with a firm-level perspective on the Nordic PE market. In addition, the research question is presented, and delimitations are provided.

Chapter 2 Empirical & Theoretical Framework

The second chapter of the thesis elaborates on the theoretical framework regarding leveraged buyouts and post-buyout performance of PE-backed companies. The literature provided focuses on the importance of financial, operational and governance engineering. The chapter also highlights how strategic differences among PE firms can affect the performance of PE funds and their PCs. Lastly, the deduced hypotheses are presented.

Chapter 3 Methodology

This section of the paper describes the methodology used to analyze the collected data. First, we present the research approach before arguing for the variables, the statistical tests and models applied in this paper.

Chapter 4 Data

The fourth chapter presents an overview of the collected data. To strengthen our selection of data we described the sampling process and the used criteria for selection. The overview is followed by descriptive statistics, normality tests and regression diagnostics.

Chapter 5 Results

This chapter presents the results uncovered in the thesis. The result section is divided into two parts; bivariate analysis and regression results.

Chapter 6 Discussion & Analysis

This chapter focuses on discussion and analysis of the results. Furthermore, we discuss how our findings relate or differ to the previous literature covered in chapter two.

Chapter 7 Conclusion

The conclusion summarizes the literature focus, choice of research design and more importantly answers the research question.

Chapter 8 Limitations & Future Research

We briefly discuss the discovered limitations of the study before turning to potential avenues for future research.

Chapter 2 Empirical & Theoretical Framework

The chapter presents a qualitative breakdown of multiple dimensions of leveraged buyouts (LBOs), prior research on post-buyout performance and specialization within PE. The objective is to explain the theoretical and practical basics of LBOs and PE investing.

2.1 Structure of the literature review

This chapter is divided into four sections. The first second covers the introduction to LBOs and PE investing. The second section focuses on a three-dimensional conceptual framework introducing the value creation process of LBOs along with evidence from prior research on post-buyout performance of PE firms. The three dimensions i) operational engineering, ii) financial engineering and iii) governance engineering are extensively analyzed in prior research and are considered to be important components of the value adding process in buyouts. The third section of the chapter elaborates on the specialization effect within PE. Focus lies on understanding what drives the decision to specialize in certain stages of financing or industries. Conclusively, to synopsize the first three subsections, a table summarizing the key theories is presented towards the end (see Table 1). In the final section, the hypotheses deduced from the literature are presented.

2.2 Introduction to leveraged buyout and private equity investing

The use of LBO as investment vehicle became increasingly popular after it emerged in the 1980s, as an efficient way to make large transactions without committing a lot of capital (Kaplan & Strömberg, 2009). Today LBO is the most common investment vehicle used by PE firms to acquire a majority stake in target companies. This is accomplished by using a small portion of equity and a relatively large portion of outside debt financing (ibid.). According to Jensen (1989) the combination of highly leveraged capital structure, concentrated ownership stakes, tight governance framework and high-powered incentives should make PE the dominant corporate organizational form. Furthermore, Jensen (1989) argues that the structure of an LBO is greater than the typical structure of public companies characterized by lack of leverage, weak governance and dispersed ownership. Whether Jensen (1989) was right cannot simply be answered by looking at

the transaction volume over the years. According to Kaplan and Strömberg (2009), PE firms are sensitive to market turmoil and following the boom in the 1980s and the more recent financial crisis 2007-2008, the transaction volume dropped. However, Kaplan and Strömberg (2009) further argue that PE firms are becoming more sophisticated and specialized. Hence, a significant part of the PE activity might become more permanent and less sensitive to financial turmoil in the future.

2.2.1 Private equity structure and leveraged buyout basics

The typical PE transaction is financed by 60-80% debt provided by a bank or an investment bank. The PE firm together with the management team (new or existent) cover the remaining part of the purchase price (Kaplan & Strömberg, 2009). Hence, the term LBO stems from the capital structure of the deal. Using high levels of debt provides the benefit of fixed return on debt. Additionally, it increases the risk profile of equity holders which naturally incentivize management and lastly, it enables large returns on equity without having to commit a lot of capital (Kaplan & Strömberg, 2009). While debt is provided by large financial institutions the equity is typically raised through a PE fund. The funds are structured as "closed-end" investments which mean that investors commit capital to pay for investments and management fees. Moreover, the investors cannot withdraw the funds until the fund is terminated (ibid.).

The structure of the PE fund enables investors to pool their capital and essentially diversify their investment into a variety of companies. The investment itself is done by the PE firm, referred to as the general partner (GP), while investors provide the capital. The investors´ legal responsibility is limited, and they have no right to influence the fund operations, hence the term limited partner (LP). The typical LP is an institutional investor such as insurance companies, public pensions funds, foundations and wealthy individuals. After capital has been committed, the PE firm invests the capital over three to five years and return it to the investor over the following five to eight years. Hence, PE firms invest for the long-term and often have an active role in the management team of the acquired company (Kaplan & Strömberg, 2009). Bergström, Nilsson and Wahlberg (2006) argue that the ownership period from investment until divestment is long enough to improve performance, implement changes and short enough to incentivize management to fulfil

the suggested restructuring. Divestments can be done in several arrangements, such as sale to a strategic buyer and initial public offering (IPO) to mention a few (Anson, 2004).

The basic principle of an LBO is that, while debt is paid down over the years, the amount of equity increases. By improving operations, the cash flow increases which allows PCs to service their interest expenses and pay down debt (Kaplan & Strömberg, 2009). The strategic decision to use high levels of debt is motivated by the leverage effect previously described. The leverage effect makes up a great part of the financial engineering used by PE firms and has been of great importance along the rise of PE investing. However, today financial engineering is only one of the important components associated with the value creation process in an LBO. Buzilă (2016) argues that the importance of operational and governance engineering has increased along with fiercer competition. Furthermore, for an LBO to be successful there are multiple factors that PE firms need to consider. Earlier research highlights the importance of target selection, paying the right price, exit options and improving PC performance.

2.2.2 Critical elements of a leveraged buyout

Ultimately several factors can contribute to the success of an LBO. However, the majority of former research focuses on the four elements previously mentioned: (i.) target selection, (ii.) price, (iii.) exit options, (iv.) PC performance. The following section provides a more detailed explanation why these factors are to be considered when buying a company.

2.2.2.1 Target selection

For PE firms to be successful with an LBO, the target company must be a suitable candidate for a takeover. Osborne, Katselas and Chapple (2012) show that firm-specific characteristics are more important when selecting a target than external variables. Firstly, one of the most debated characteristics regarding target selection is the financial slack of the target company. For example, Bruner (1988) argues that an acquirer with high liquidity is more likely to target companies with low liquidity and high leverage. However, Smith and Kim (1994) contradict Bruner (1988) by showing that highly

leveraged buyers target firms with great liquidity, strong cash flow and solid revenue base which can be used to service debt used in an LBO. This is further supported by Aslan and Kumar (2011), who show that PE firms select targets that exhibit greater liquidity and lower market-to-book ratio. The authors argue that this may indicate undervalued assets which can be used for potential tax benefits or indicate room for improvement.

Buzilă (2016) argues that given the development in the PE market after the most recent financial crisis, PE firms can no longer solely rely on the power of the leverage effect. Therefore, when selecting a target, PE firms need to look for companies which have opportunities to improve growth rates and profit margins. Supporting these arguments, a study by Gompers et al. (2016) show that PE investors rank operational improvements and governance structure as more important return drivers than leverage. The result suggests that PE firms invest in PCs with room for improvement of operation. Alcalde and Espitia (2003) study PE target selection on the UK, US and Spanish markets and their findings support the arguments previously made by showing that firms with lower profitability and market-to-book ratio have a higher likelihood to receive a bid from a PE firm. Hence, simply looking at the liquidity and the capacity for debt is not enough to determine whether the target is a suitable candidate.

Furthermore, when acquiring companies, PE firms tend to prefer targets with highly competent and motivated management (Gompers et al., 2016). If target companies already have a management in place, PE firms can benefit from this by capitalizing on their expertise and faster implement changes. Acharya, Hahn and Kehoe (2009) find that targets with motivated management in place before the acquisition delivers the highest improvements. The importance of aligned management is further supported by Brown and Da Silva Rosa (1997). The authors show that by realigning incentives between management and shareholders, PE firms can increase firm value. However, Siriopoulos, Georgopoulos and Tsagkanos (2006) argue that improving managerial efficiency is not an important motive which makes targets more or less attractive.

Lastly, PE firms tend to target companies with a robust financial profile. Consequently, Oppler and Titman (1993) argue that large and mature companies with predictable revenue streams make good targets. The study provides evidence suggesting that

companies with a strong revenue base and high free cash flow are more likely to be targeted for an LBO. Chapple, Clarkson and King (2010) find similar results when investigating the link between accounting data and PE bids in Australia. The authors find that both size and greater free cash flow are positively associated with the likelihood of receiving a bid from a PE firm. The findings are supported both in US and European contexts (see e.g. Boone & Mulherin, 2009; De Maeseneire & Brinkhuis, 2012). The evidence provided in this section links back to the arguments made by Smith and Kim (1994), that with high free cash flow, the target company can easier service the debt payments and interest expenses following the transaction. Extending the discussion, Becchetti, Castelli and Hasan (2010) argue that stability in cash flows is positively associated with experience, in terms of age, and size.

To summarize the discussion on target selection, the typical target suitable for an LBO would be a mature and highly liquid company with motivated and competent management able to generate a predictable revenue stream. However, as the discussion also highlights, there are no conclusive answers as to what the sought-after characteristics are.

2.2.2.2 Price

Kaplan and Stein (1990) argue that overpaying for the company assets is dangerous, since overpaying may increase the risk of financial distress, independently of the capital structure. Furthermore, the price also lowers the return to investors as it increases relative to the fundamental value of the acquired company's assets. The authors also find that overpaying can have a negative impact on ex post-buyout performance. Meaning that the target company is unable to meet debt payments over time. The evidence provided by Kaplan and Stein (1990) highlight some important costs associated with overpaying for the target.

When examining what determines the level of debt in LBO transactions, Axelson, Jenkinson, Strömberg and Weisbach (2013) make similar findings as Kaplan and Stein (1990). The authors find that higher deal leverage is associated with higher prices and consequently lower returns. They further argue that PE firms may overpay when access

to credit is easy. Along with the recent trends showing that PE firms focus on operational and governance engineering instead of relying on the leverage effect, it also suggests that the risk of financial distress should be lower (Buzilă, 2016). Going back to the previous discussion about target selection and the ability to take on leverage being something positive, this section highlights the risks associated with taking upon too much leverage and overpaying for the assets.

2.2.2.3 Exit options

When acquiring companies, PE firms need to consider their exit options as the divestment phase is important to the overall value generated from the transaction. Anson (2004) highlights a few exit opportunities commonly used by PE firms, namely; IPO, sale to a strategic buyer and write-offs. Strategic sale can be subdivided into secondary buyout (i.e. selling to another PE firm) and sale to a non-financial buyer (i.e. corporation). According to Kaplan and Strömberg (2009) these two options account for 62% of all exits. The higher requirements for IPO have been portrayed as one of the reasons for the increased popularity of the strategic sale option (Plagborg-Møller & Holm, 2017). In excess of the complexity associated with an IPO, the strategic sale option provides PE firms with a rather quick and simple solution compared to an IPO (Kaplan & Strömberg, 2009).

The majority of the literature studying PE divestments focuses on the more complex and lucrative exit route, IPO. The exit option allows PE firms to sell its shares to the public and is mainly used with relatively large and profitable PCs (Kaplan & Strömberg, 2009). However, the reported evidence on IPO as exit route varies significantly depending on the sample size (see e.g. Jelic, 2011; Nikoskelainen & Wright, 2007). The differences in results make it difficult to determine the importance of IPO as exit option for PE firms.

Lastly, write-off is only considered an exit option when the PCs are underperforming and the investment has a negative impact on the fund's performance and the firm's reputation. Easterwood, Seth and Singer (1989) argue that announcing a write-off will signal failure of investment and potentially cast doubt on future deal-making as the PE firm's capabilities are questioned. However, Schmidt, Steffen and Szabo (2010) claim that a write-off signals ability to distinguish between good and bad investments. Thus, on one

hand it might be best to divest the company early on to signal ability to distinguish between good and bad investments. While on the other hand it might negatively affect PE firms´ reputation and future deal-making.

2.2.2.4 PC performance

The last and perhaps most critical factor that contributes to the success of an LBO is the improvement of PCs performance following an acquisition. The literature covering post-buyout performance of PCs broadly defines three categories of value creation; financial engineering, governance engineering and operational engineering. Together these tools enable rapid changes in capital structure, organizational form and governance framework guiding the acquired company (Kaplan & Strömberg, 2009). Over the years, PE firms have been accused of being "corporate raiders" that "flip" their investments by accelerating short-term performance at the expense of long-term performance. However, Kaplan and Strömberg (2009) negate this by providing evidence showing that PE firms´ have increased their investment horizon and only 12% of deals are divested within 24 months.

The results presented above suggest that PE firms use more time to carefully improve financial performance while maintaining control. The three above mentioned tools can have both negative and positive impact on the post-buyout performance which makes it difficult to cover all grounds. Therefore, to better understand how these three levers of value creation can impact the value of PCs the following section will provide an overview of how PE firms create value by using financial, operational and governance engineering.

2.3 Value creation in a leveraged buyout

PE firms' ultimate goal with an LBO is to acquire the company, borrow a majority of the financing, improve the performance of the PC and later on divest the company hoping to make a substantial profit from the transaction (Kaplan & Strömberg, 2009). The success of LBO transactions in the 1980s increased the interest among investors to pursue buyouts (ibid.). The years following the first wave of LBOs, prices rose and the deals became less profitable. According to Kaplan and Stein (1993), an estimated 27% of buyouts between 1985 and 1989 defaulted due to the aggressive capital structure and

easy access to risk capital. Naturally, the interest in PE investing and LBOs increased, and more researchers started to examine fund performance. A majority of the research argues for abnormal returns and significant increases in post-buyout performance. Yet, there is little agreement regarding what drives the value creation process.

Groh and Gottschalg (2011) argue that the specific disclosure requirements and information asymmetry explain the gap in the literature. Furthermore, Cumming and Walz (2010) argue that the decision to disclose the funds' performance is motivated by performance, as this affects PE firms´ future deal-making and reputation. Hence, lack of transparency and standardization of disclosure requirements has turned PE investing into a self-regulated field of practice making it difficult to study the performance of PE firms. Consequently, researchers increased their effort to study the value creation process to understand how PE firms add value to their PCs. Jensen (1989) among others argues that PE firms use three types of engineering to enhance the performance of the PCs: (i.) financial, (ii.) governance and (iii.) operational engineering. The effectiveness of the different levers of value creation has been broadly analyzed in numerous studies with partly contrary findings. Hence, the following subsection elaborates on the three methods which PE firms use to create value. Secondly, to further understand the value creation process and the implication of using these tools, related literature covering post-buyout performance and PE firm specialization will be discussed.

2.3.1 Financial engineering

Over the years PE firms have been criticized and blamed by the public for using too much debt. The usage of additional debt to acquire a company is one of the most acknowledged mechanisms of value creation that PE firms practice. The goal with financial engineering is to optimize the capital structure of the target company and decrease its after-tax cost of capital, effectively increasing tax savings (see e.g. Berg & Gottschalg, 2005; Harris et al., 2005; Jensen, 1989). The importance of financial engineering was at its peak prior to the financial crisis as the access to debt financing made it possible for PE firms to finance transactions with large portions of debt (Gompers et al., 2016; Kaplan & Strömberg, 2009).

Kaplan (1989) was among the first to study the benefits of tax shields associated with an LBO. The findings show that the incremental tax shields[4] account for 11-35% of enterprise value. The potential benefits highlighted by Kaplan (1989) are further supported when Newbould, Chatfield and Anderson (1992) show similar findings studying deal premiums in the U.S before 1986. However, Kaplan (1993) claims that it is not the main source of value generated by financial engineering. A more recent study by Jenkinson and Stucke (2011) show that after the first wave of LBOs in the 1980s, incremental tax shields became less important and only account for 8-11% of enterprise value. Furthermore, Oppler and Timan (1993) also show evidence that cost of capital is not affected by leverage as the benefit of tax-saving is offset by the increase in cost of debt. Little consensus has been reached regarding the importance of incremental tax shields.

Bull (1989) claims that even without potential tax benefits, PE firms would still use LBOs as investment vehicles. He further argues that, with a competitive PE market and fewer potential targets, the tax savings resulting from additional debt will be accounted for in the form of a higher price. Referring back to the arguments made by Buzilă (2016), as access to credit becomes tighter and competition fiercer, PE firms cannot rely solely on financial engineering and the incremental tax shield. Hence, there are more benefits associated with financial engineering that better explain its extensive use than potential tax savings.

The second mechanism of value creation associated with financial engineering is described by Jensen (1989) as reducing agency costs. By using a substantial amount of debt and changing the capital structure of PCs it creates pressure on management to use the company funds wisely. PCs must service debt and interest payments resulting from changes in capital structure following an acquisition. This limits managers´ discretion and ability to spend money on inefficient expenditures (see e.g. Kaplan, 1989; Oppler & Titman, 1993). Critics of financial engineering and the usage of leverage argue that instead of reducing agency costs, it rather increases the risk of financial distress. According to Lowenstein (1985), the risk becomes even more prominent when the economic environment is changing rapidly. Extending the discussion, Berg and Gottschalg (2005)

[4] The tax savings stemming from the additional debt used in the transaction to finance the deal.

argue that along with increased risk of financial distress, leveraging the capital structure of PCs may enhance short-term focus rather than long-term performance.

Lastly, Kaplan (1989) argues that by increasing leverage, PE firms create an environment that reduces the agency costs of having misalignment between managers and owners. The pressure to service debt payments and interest expenses facilitates managers focus and help PE firms to realign incentives (see e.g. Brown & Da Silva Rosa, 1997; Jensen, 1989). Summarizing the above section, the bulk of research studying financial engineering focuses on the potential tax benefits resulting from changing the capital structure. However, along with the recent trends forcing PE firms to depend more on the ability to improve operating performance, softer values have become more prominent. The following section emphasis on governance engineering and how PE firms monitor and control the operations of PCs.

2.3.2 Governance engineering

Governance engineering is the second lever of the value creation process and the framework used by PE firms to control the boards and management teams of PCs. Theory suggests that PE firms operate as active owners and use more governance practices than non-PE-backed peers (Jensen, 1986, 1989). Prior literature studying governance engineering has highlighted the practice of majority ownership. As mentioned in the introduction to LBOs, one element that made LBOs popular in the 1980s was the ability to acquire a majority stake without committing a lot of capital (Kaplan & Strömberg, 2009). The importance of having concentrated ownership is highlighted as Jensen (1986) argues that a dispersed ownership can be costly as it increases the risk of misalignment between owners and managers. Furthermore, providing incentives for managers to avoid misuse of free cash flows can be costly because of the diffused ownership. According to Holmström and Kaplan (2001) going private via LBOs can reduce the agency costs presented by Jensen (1986) through improved monitoring, concentrated ownership, high powered incentives and the pressure of servicing debt and interest payments.

To concentrate ownership, it is important that the PE firms control the board seats of their PCs. A study performed by Guo, Hotchkiss and Son (2011) show that PE firms on average

control half of the board seats in the acquired PCs, thereby improving the ability to monitor the process and practice used by management. In a more recent study, Acharya et al. (2013) take a different approach by studying differences in governance framework used by boards of buyout companies and boards of similar non-PE-backed companies. The authors show that boards in PE-backed companies focus, relatively, more on value creation whereas the boards of the control group emphasize compliance and risk management.

According to Cronqvist and Fahlenbrach (2013), PE firms commonly use powerful incentive schemes to align owners and managers. The incentive scheme can take the form of equity investment together with the PE firm or option-based equity, making the management team, or other employees, exposed to similar upside and downside as the new owners (see e.g. Cronqvist & Fahlenbrach, 2013; Kaplan, 1989). Gompers et al. (2016) show that 61% of the PE firms in their sample expect to create value by improving (read aligning) incentives. By using high powered incentive schemes, PE firms can reduce agency costs as it increases the motivation and alignment among managers and owners. The provided evidence supports the arguments by Holmström and Kaplan (2001), that by having concentrated ownership, motivated managers and aligned incentives, agency costs can be reduced. Hence, the potential improvements associated with majority ownership and active monitoring should, according to Groh and Gottschalg (2011), directly compensate for the increased leverage risk resulting from an LBO.

If the above governance practices are implemented without any efficient result, PE firms have via its majority ownership the ability to replace them (Kaplan & Strömberg, 2009). Acharya et al. (2013) show evidence suggesting that a majority of CEOs are replaced at some point during the holding period. This is further supported by Siriopoulos et al. (2006) arguing that improving managerial efficiency is important. Similar results are found by Gompers et al. (2016), arguing that PE investors expect to create value by changing out the management team in roughly one third of their investments. Overall, the existing literature covering governance engineering indicates that the PE organizational form and ownership structure often have positive effect on management practices.

The above theory suggests that PE firms' ability to generate abnormal performance and positive returns can to some degree be explained by the active ownership and substantial use of leverage executed by PE firms. After the first LBO wave in the 1980s financial engineering and governance engineering became extensively analyzed. Following the expansion of LBOs, markets became more developed and competition tighter, forcing PE firms to develop other ways to add value (Berg & Gottschalg, 2005). The next section of value creation highlights the latest lever of value creation used by PE firms to increase the performance of their PCs, namely operational engineering.

2.3.3 Operational engineering

Operational engineering has proven to be the main differentiator of success among PE firms. Kaplan and Strömberg (2009) argue that during the past decade, operational engineering has become a key input for PE firms to improve PCs´ performance. Consistent with Kaplan and Strömbergs (2009) analyses, Lichtenberg and Siegel (1990) show evidence that PE firms create value by improving the operating performance of the PCs. Hence, it is clear that if PE firms want to stay competitive, they need to develop operating capabilities and not rely on financial and governance engineering.

The existing body of literature covering operational engineering focuses on the PCs´ adoption of lean manufacturing, improvement of processes and performance documentation (see e.g. Bloom, Sadun & Van Reenen, 2009; Bruining, Bonnet, & Wright, 2004). Other ways to enhance operational efficiency might include firm specific improvements such as margin improvements, cost-cutting and divestment of unproductive assets (see e.g. Acharya et al., 2013; Kaplan, 1989). The previously mentioned studies show that, compared to other ownership forms, PE firms are better at operational management and margin improvements relative to its sector peers.

Kaplan and Stein (1990) support the cost-cutting argument and show evidence that PE firms successfully can improve operational efficiency by cutting down on fixed costs or divesting unproductive assets. However, a more recent study by Gompers et al. (2016) suggests that improving growth is more important than reducing costs. Considering that both cutting costs and increasing sales is part of the value creation process, the results

would indicate a shift in focus from agency cost reductions, highlighted by Jensen (1989), to growth improvements.

PE firms actively try to participate in business decisions and the strategic work of the acquired PCs by taking a hands-on approach. In order for PE firms to improve the operating performance of the PCs they need a broad set of skills. When studying the performance and capital inflows of PE funds, Kaplan and Schoar (2005) find evidence suggesting that mature PE firms add value to their PCs by using skills that are, attributable to the background of the GPs, and accumulated over time. If the PE firm does not have the industry or operational expertise required at hand, they often use internal or external consulting groups to assist the management team or employ operating partners that already possess the skills and experience needed (Kaplan & Strömberg, 2009).

Antoni, Maug and Obernberger (2019) show, in a more recent study, consistent results with Kaplan and Strömberg (2009). The evidence suggests that roughly half of buyout related separations are replaced by new hires with different skill sets. Yet, some PE firms still take a more hands-off approach and let the management team run the business. Nevertheless, based on the discussion above and literature covered in *2.2.2 Governance engineering* one can imagine that if operations do not run as expected, PE firms will not hessite to replace management teams. Hence, theory suggests that, irrespectively if PCs possess the required knowledge or expertise, PE firms make sure that it is provided. The following subsection elaborates on empirical evidence of post-buyout operating performance. It also provides a review of how successful PE firms use the three levers of value creation.

2.3.4 Performance of PE-backed versus non-PE-backed companies

The bulk of research within the field of PE focuses on documentation of post-buyout operating performance and the value creation previously covered. Jensen (1986, 1989) predicts that, due to its superior governance framework, the PE-organizational form should become the dominant corporate organizational form. Proponents of PE would argue that Jensen is right as the empirical evidence studying post-buyout performance is largely positive. Kaplan (1989) was among the first to study this prediction when

investigating operating performance of 48 buyouts that occurred during the first LBO wave in the 1980s. The evidence is consistent with the Jensen hypothesis, and suggests that PE firms are able to significantly increase the industry-adjusted cash flow in the three years following the buyout comparing with the last year before the buyout occurred.

Furthermore, Kaplan (1989) also shows that, by improving operating income and cutting costs, PE firms are able to increase PCs´ firm value. Using a larger sample than Kaplan (1989), Smith (1990) shows similar evidence. The author argues that the improved post-buyout operating performance is attributable to the changes in capital- and ownership structure and not undervaluation pre-transaction. Supporting the arguments that PE firms are able to improve the cash flow generation, post-buyout, Smith (1990) shows that a main source of value creation appears to be consistent reduction in inventory-holding period and shorter account-receivable collection period. The results indicate that via better management of working capital, PE firms can improve the operating performance of the acquired PCs.

The previously mentioned studies are restricted to buyout firms and not applicable to division and carveouts, which represents almost half of the major LBOs (Lichtenberg & Siegel, 1990). Taking a different approach than Kaplan (1989) and Smith (1990), Lichtenberg and Siegel (1990) study the total factor productivity level[5] and related variables using a sample of manufacturing plants in the US, subject to buyouts during 1981-1986. The study shows that the productivity level increased from 2% to 8.3% above industry mean in the three years following the buyout. By looking at lower level unit production productivity, Lichtenberg and Siegel (1990) are not only able to further strengthen the results presented by Kaplan (1989) and Smith (1990), but also provide a different perspective on value creation in an LBO. In a more recent study, taking a similar approach, Harris et al. (2005) show that plants involved in buyouts in the UK experience a significant increase in total factor productivity level subsequent to the transaction. According to the authors, the substantial increase in productivity appears to be created by practices undertaken by new owners, such as reducing labor intensity of production and more efficient use of intermediate goods and materials. The results are consistent

[5] Specifically, they measured productivity level as the total output per unit of total input.

with previous literature, which suggests that, via ownership changes and more efficient use of resources, PE firms can reduce agency costs and enhance economic efficiency.

Prior to the aforementioned studies, Lowenstein (1985) raised some concerns regarding the restructuring of PCs following an LBO. In excess of the increased risk of financial distress, also highlighted by Berg and Gottschalg (2005), he argues that shareholders (read new owners) gain from market misvaluation, tax benefits and rent expropriation from other corporate stakeholders such as employees and suppliers. Furthermore, he argues that the value created by the PE firm is private but creates little to no social value. Similar arguments are made by Shleifer and Summers (1988) who argue that LBOs increase the wealth of the new owners while employees are negatively affected in terms of remuneration and employment. The arguments made by Shleifer and Summers (1988) extend the discussion by Lowenstein (1985) and highlight some of the criticism associated with the superior post-buyout performance. However, Kaplan (1989) negates these arguments by showing that the median change in number of employees before and after the buyout is not significant and therefore no evidence supporting the wealth transfer theory presented by critics. Smith (1990) and Lichtenberg and Siegel (1990) find similar results, supporting the claims made by Kaplan (1989).

Together, the literature provided shows significant performance improvements following buyouts. However, the results are based on data collected from a period characterized by relative prosperity in the UK and US, and critics argue that the risk of financial distress is higher for LBOs in a recession (Lowenstein, 1985). Furthermore, Berg and Gottschalg (2005) argue that the substantial use of leverage may enhance short-term focus rather than long-term performance potentially harming PCs during times of unstable economic conditions. Supporting these arguments, Guo et al. (2011) show that buyouts completed after the first LBO wave during the 1980s experience lower post-buyout performance compared to the aforementioned studies. The findings indicate that performance is greater when PE firms can use more leverage to finance the transaction.

Contradicting Gou et al. (2011), Wilson, Wright, Siegel and Scholes (2012) show empirical evidence that PE-backed buyouts achieve superior performance before, during and after the most recent global recession. The study investigates a substantial number of

observations between 1995-2010 in the US and the results imply a positive impact of PE ownership with a 5-15% increase in productivity relative to non-buyout firms. Furthermore, the authors also argue that PE-ownership does not have a negative impact on employment growth as PE-backed firms show positive employment development over the sample period. Supporting the arguments made by Wilson et al. (2012), Harris, Jenkison and Kaplan (2014) study performance of US buyouts over a different time period and find post-buyout performance to be even better than documented in prior research. Acharya et al. (2013) find similar results, complementing the prior evidence on PE firms´ ability to generate abnormal returns.

The findings presented above indicate that PE firms are largely successful with the implementation of financial, governance and operational engineering. In addition, the literature also covers some of the most debated topics and criticism regarding LBOs and PE in general. Together, the above literature focuses on post-buyout operating performance and PE firms´ ability to generate value to the PCs and funds investees. Hence, it builds on the existing body of literature addressing the issue of the PE organizational form ("The Jensen hypothesis"). However, the literature seems to bypass the discussion of strategic differences among PE firms and their potential effects on performance. In excess of investigating the impact of the alleged superior governance of the PE organizational form, this thesis also investigates whether the impact on post-buyout performance can be explained by PE firms´ degree of specialization. Therefore, the following section will focus on prior research that emphasizes on differences in investment strategy and the motives for PE firms to differentiate themselves.

2.4 The specialization effect in the private equity industry

As mentioned in the introduction, after the first LBO wave, competition increased and access to financing became more difficult especially following the crisis in 1987 (Black Monday). According to Bishop (2012), the financial crisis forced PE firms to re-invent themselves to find new strategies in order to overcome the skepticism among investors. Furthermore, Harper and Schneider (2004) argue that, as competition increased it created pressure on PE firms to change strategy to gain competitive advantage over their peers. In line with argumentation above, Gompers et al. (2016) show that only 37% of the

investigated PE firms are organized as generalists. The authors argue that prior to the financial crisis, PE firms were largely categorized as generalists. Hence, financial instability and ensuing competition jointly forced PE firms to find new ways to attract capital and potential deals.

The literature presented below suggests that some PE firms started to focus on specific industries or stages of financing (specialist) while other PE firms stuck to a more diversified investment strategy not excluding specific industries or stages (generalist). The motives behind diversifying investments build on the ideas presented in the modern portfolio theory (Markowitz, 1952), arguing that diversification decreases the unsystematic risk. While theory presents strong evidence supporting the idea of diversification and risk minimization following a "non-specialization" approach, the theoretical reason for specialization is rather uncertain. Hence, the next subsection elaborates on possible reasons motivating specialization and the impact on investment strategy and target selection.

2.4.1 Specialist versus generalist - investment strategies

Prior research shows that specialists can gain competitive advantage by capitalizing on two main sources of specialization, with the first one being reduced information asymmetry. Eisenhardt (1989) argues that by specializing in specific industries or stages, PE firms can increase their informational advantage by learning more "private" information about the probability of success in that particular stage or industry. The second source that specialized PE firms can benefit from is the reduced uncertainty (via increased probability of success) as they gain more knowledge of competition, market developments and technology in which they are specialized in (Barney, 1991). Cressy et al. (2007) support this theory and argue that, with reduced uncertainty and information asymmetry, specialized PE firms should have superior knowledge that positively affects target selection and PCs´ performance.

Meuleman, Amess, Wright and Scholes (2009a) support the target selection improvement by showing that industry-specialized PE firms are better at picking profitable targets and negotiating prices for the targets. Extending the discussion, Gompers et al. (2016) argue

that a successful track record in certain industries or stages is expected to intensify the PE firm's investment focus. Furthermore, specialized PE firms are expected to deliver more effective governance by improving the quality of monitoring and advice (Cressy et al., 2007). As a result of these competitive advantages, a specialist is able to better control and leverage the buyout firm's human capital and financial resources. According to the aforementioned authors, specialization helps PE firms to make better decisions and increase the value creation via deep industry knowledge.

In a more recent study, Le Nadant et al. (2018) find similar advantages and further argue that, with greater sector-specific cost management, specialized PE firms can more efficiently and effectively improve profitability margins and operating performance. In addition, the deep industry knowledge increases the probability of effective management of sector-specific activities (i.e. deals with suppliers and customers) and treatment of market information (ibid.). These arguments are supported by Hochberg, Ljungqvist and Lu (2007), claiming that specialized PE firms have greater industry specific network which increases PCs´ access to new potential clients, suppliers and markets. According to Meuleman et al. (2009a), specialized PE firms may capitalize on specific industry or stage knowledge to ease and improve the organizational changes following an LBO. Hence, specialized PE firms may use this knowledge to improve their financial, governance and operational engineering framework (ibid.). The authors claim that the sector-specific knowledge increases the specialist's ability to identify potential divestments or acquisitions for buy-and-build strategies (i.e. adding companies together).

Fundraising is a critical element of PE investing since GPs set clear investment criteria for how funds should be allocated (Kaplan & Strömberg, 2009). Furthermore, it is important that these criteria/characteristics are in line with the LPs´ own investment objectives in order to attract fundraising (Gejadze et al. 2016). Using a sample US PE firms, Gejadze et al. (2016) study specialization effect on fundraising using a three-dimensional framework; stage, industry and geo-location. The authors find that specialized PE firms have a competitive advantage by raising funds more quickly than not so-specialized PE firms (i.e. generalist).

The literature presented so far suggest that via specialization, PE firms can gain competitive advantage relative to their peers. The advantages reflect a more effective engineering of financial, operational and governance structures of PCs. As a result, specialization within stages of financing or industries should return superior post-buyout performance relative to the generalist. However, critics of specialization argue that several of the potential advantages, lack consensus and other evidence should be considered. First, Gejadeze et al. (2016) show that even if specialization accelerates the fundraising it also works as a constraint during the selection process. The constraint induces costs for specialized PE firms as they are restricted to certain industries or stages, reducing the speed of investment selection (Knill, 2009). On the other hand, the quick fund-raising process indicates that the benefits of specialization dominate the investment selection constraint (Gejadeze et al., 2016).

Second, Humphery-Jenner (2013) argues that by specializing in certain industries PE firms may lack sufficient diversification which might increase the portfolio risk. Hence, the specialization arguments go against the modern portfolio theory which advocates that investors should diversify across industries in order to reduce the idiosyncratic risk of the portfolio (Markowitz, 1952). Furthermore, Stein (1997) argues that specialized PE firms will be more sensitive to market movements compared to not so-specialized PE firms, invested in multiple industries. The author claims that PE firms with efficient industry diversification can offset the poor investments by reallocating capital to other industries. However, Le Nadant et al. (2018) argue that specialized PE firms can counterbalance the risk associated with low diversification, via its active ownership and informational advantage compared to less informed generalists. Yet, the authors recognize the value of diversification, and further argue that even if specialists can reduce the idiosyncratic risk via deep industry knowledge and active ownership it may explain why specialized PE firms decide to diversify to some extent.

Third, several authors argue that the generalist can compensate for the lack of industry specific knowledge by hiring industry experts/consultants to partner the PE firm on the deal (see e.g. Berg & Gottschalg, 2005; Kaplan & Strömberg, 2009). The authors argue that by using outside hiring and the knowledge/expertise of industry experts, the PE firm can

compensate for the informational disadvantage and remove the constraint associated with specialization in the selection process. Additionally, the generalist PE firm can syndicate on deals with other PE firms, taking advantage of their knowledge and expertise. Furthermore, by syndicating PE firms are able to decrease the financial risk by diversifying the risk among the partners (Meuleman, Wright, Manigart & Lockett, 2009b). Lastly, in section *2.2.2 Critical elements of a leveraged buyout i) target selection*, Acharya et al. (2009) argue that PE firms like to target firms with a competent management team. Hence, the authors claim that PE firms can reduce the information asymmetry by targeting competent management teams. Therefore, the need for outside hiring or expert knowledge is lower as the management team already possesses the expertise required.

Summarizing the above literature, specialization may provide PE firms with informational and management advantages. The discussion also questions the potential effect of strategic variables such as stage and industry. However, Le Nadant et al. (2018) argue that not all specialists have the same ability to capitalize on specialization as investment strategy. Therefore, the following section will focus on how strategic differences impact post-buyout performance and empirical evidence of the specialization effect in PE.

2.4.2 Specialist versus generalist - performance

This chapter has highlighted the superior performance of PE-backed buyouts and the value creation process. Evidence supports the Jensen hypothesis (Jensen, 1986, 1989), suggesting that via its tight governance framework PE firms can increase economic performance and operating efficiency of their PCs. However, the ensuing competition has forced PE firms to develop new strategies to, attract capital from investors and gain competitive advantage in the growing PE industry (Cressy et al., 2007). The empirical evidence on post-buyout performance following the development of specialization is rather limited. Research focusing on the specialization effect is more extensively covered in literature related to VC. Hence, to shed some light on the impact of specialization on performance, related literature is provided.

Norten and Tenenbaum (1993) were among the first to study the specialization effect among VC firms. The study shows that VCs specialized in certain industries or stages, experience higher returns due to the deep industry knowledge and technical expertise. The authors argue that by focusing on particular industries or stages VCs can lower portfolio risk instead of using diversification as traditional finance theory would suggest. Similar findings are found when Gompers et al. (2009) examine the performance of different types of VC organizations in the US. The paper supports the specialization hypothesis by demonstrating a strong positive relationship between degree of specialization and firm success. Moreover, the study also shows that VCs with more industry-specific experience respond quicker to new investment opportunities, supporting the probability of successful investments. In line with Gompers et al. (2009), Knill (2009) shows that VCs specializing in certain industries or stages can increase the quality and speed of the value adding process. However, the author finds that neither diversification strategy nor specialization strategy optimizes growth or performance. According to Knill (2009), this highlights the need for clear investment criteria to achieve the fund objectives.

The above covered literature suggests that the cost of insufficient diversification is low for PE firms. The arguments are supported by Norten and Tennebaum (1993) and Stein (1997), who argue that specialization might reduce risk as managers invest more in industries or stages which they have more experience and knowledge in. In line with the aforementioned literature Aigner, Albrecht, Beyschalg, Freiderich, Kalepky and Zagst (2008), does not find any significant impact of industry diversification on PE fund performance. However, the authors find that, diversification over stages can significantly improve fund performance as it decreases the financial risk. In addition, the authors claim that PE firms are highly specialized within the own organization and often have different investment objectives for each fund. Nonetheless, the results provided by Aigner et al. (2008) contradict the specialization hypothesis.

The findings regarding diversification versus specialization and its impact on fund performance is inconclusive. Furthermore, the literature provided (Norten & Tennebaum ,1993; Stein ,1997; Gompers et al. 2009; Knill 2009) focuses on VCs performance and not

performance of buyout firms. Overall, the literature highlights different aspects of specialization and its impact on fund performance. However, all papers consistently ignore the impact of specialization on the performance of PCs. According to Gompers et al. (2009) this makes it difficult to determine whether the superior performance of PE firms stems from target selection or value creation. The number of papers that investigate post-buyout performance taking firm-level perspective and specialization into account is rather scarce.

Cressy et al. (2007) was among the first to investigate specialization in the PE industry. By using a sample of 122 UK buyouts and 122 comparable non-PE-backed peers, the authors are able to find evidence supporting the Jensen hypothesis as well as the specialization hypothesis. Cressy et al. (2007) define specialization by looking at the relative specialization within stage and industry among PE firms. According to the paper, PE-backed firms have, over the first three years following the buyout, 4.5% higher operating profit compared to the non-PE-backed peer group (confirming the Jensen hypothesis). In addition, taking industry specialization into consideration the difference in operating profit is 13%, thus supporting the specialization hypothesis. However, the authors were not able to find any significant effect of stage specialization on post-buyout performance. In a later study, Meuleman et al. (2009a) study how post-buyout performance is related to the development of the PE industry. Compared to Cressy et al. (2007), Meuleman et al. (2009a) use a larger sample of UK buyouts over a longer time period. The study shows no evidence supporting the specialization hypothesis when controlling for PE industry specialization. The authors use similar performance measurements as Cressy et al. (2007), yet they find no support for the earlier findings.

The lack of generalizability of the findings is highlighted by Cressy et al. (2007) as the analysis relies on data from one single developed market. The evidence provided by Meuleman et al. (2009a) questions the findings provided by Cressy et al. (2007). However, in a more recent study, Le Nadant et al. (2018) find similar evidence as Cressy et al. (2007) when studying buyouts in France completed between 2001 and 2007. Different to prior studies the authors decide to ignore specialization by stage and focus solely on industry specialization. The results show that PCs backed by industry specialized PE firms have

profit increases of 7.5% greater than PCs backed by not so-specialized PE firms, over the initial three years following a buyout. The authors claim that industry specialization is positively correlated with target growth, even more so when the performance of the PCs is weak or strong prior to the buyout. This suggests that industry specialized PE firms can contribute to growth in times when improving performance is the most difficult.

To summarize the above literature, Section *2.4.1 Specialist versus generalist - investment strategies* suggest that increased specialization is positively related to superior performance. However, as presented in this section the papers by Cressy et al. (2007), Meuleman et al. (2009a) and Le Nadant et al. (2018) show that little agreement on the impact of PE specialization on post-buyout performance has been reached.

Table 1
Summary of important theory presented

Section	Author(s)	Theory
	Financial Engineering	
2.2.1	Kaplan (1989)	Changing the capital structure of PCs, creates pressure on management to service the debt and interest payments following the acquisition. This reduces the "free cash flow" costs presented by Jensen (1989), by limiting the managers discretion and ability to spend money on inefficient expenditures.
2.2.1	Berg & Gottschalg (2005), Harris et al. (2005)	Via financial engineering PE firms use leverage to optimize the capital structure and the after-tax cost of capital, effectively increasing tax savings.
	Governance Engineering	
2.2.2	Holmström & Kaplan (2001)	Privatization via LBOs can reduce agency costs presented in Jensen (1986) through improved monitoring, concentrated ownership, high powered incentives and the pressure of servicing debt and interest payments.
2.2.2	Guo et al. (2011)	PE firms tend to control board seats in the acquired PCs and have concentrated ownership. This improves PE firms´ ability to monitor the process and practice used by management.
	Operational Engineering	
2.2.3	Bloom et al. (2009), Bruining et al. (2004)	PE firms can improve operating performance by adoption of lean manufacturing, improvement process and performance documentation.
2.2.3	Acharya et al. (2013)	Operational engineering includes firm specific improvements such as margin improvements, cost-cutting and divestment of unproductive assets.
2.2.3	Gompers et al. (2016)	The increased focus on growth improvements, rather than agency cost reductions, indicates a shift in focus from the previously established arguments made by Jensen (1989).
2.2.3	Kaplan & Strömberg (2009)	PE firms often use internal or external consulting groups to assist the management team or employ operating partners that are already possess the skills and experience needed.

Arguments Supporting Specialization		
2.3.1	Eisenhardt (1989), Barney (1991)	Specialized PE firms can increase its informational advantage by learning more "private" information about the probability of success in that particular stage or industry. They also benefit from reduced uncertainty as knowledge of competition, market developments and technology are superior relative generalized PE firms.
2.3.1	Cressy et al. (2007)	Specialized PE firms deliver more effective governance by improving the quality of monitoring and advice.
2.3.1	Hochberg et al. (2007)	Specialized PE firms have greater industry specific network which increases the PCs access to new potential clients, suppliers and market.
2.3.1	Le Nadant et al. (2018)	Sector-specific cost management improves with specialization and enhance the PE firm's ability to efficient and effectively improve profitability margins and operating performance.
Arguments Against Specialization		
2.3.1	Gejadeze et al. (2016)	Specialization works as a constraint during the selection process as they are restricted to certain industries or stages, when looking for investment opportunities, which reduces the speed for investment selection.
2.3.1	Berg & Gottschalg (2005), Kaplan & Strömberg (2009)	By using outside hiring and the knowledge/expertise of industry experts the PE firm can compensate for the informational disadvantage and remove the constraint associated with specialization in the selection process.
2.3.1	Acharya et al. (2009)	PE firms like to target firms with a competent management team which reduces the informational asymmetry and increases industry knowledge.
2.3.1	Aigner et al. (2008)	PE firms are highly specialized within the own organization and often have different investment objectives for each fund. Secondly, diversification across stages can significantly improve fund performance as it decreases the financial risk.

2.5 Hypotheses

This study is based on a deductive approach; hence the hypotheses have been deduced from existing theories, research and empirical findings. The following section presents and argues for the hypotheses used. For further explanation of variables presented in the hypotheses see section *3.2 Variables*.

Empirical findings largely support Jensen's (1986, 1989) claims that the PE-organizational form is superior to other public or privately held companies. The Jensen hypothesis argues that operating performance of companies backed by PE firms should be greater than those of comparable non-buyout companies due to its superior organizational form. Along with the ability to generate economic performance and abnormal returns though a controlled governance framework we believe that PE-backed buyouts should outperform comparable non-buyouts. On the back of these arguments and literature covered in the section above, the following hypotheses have been deduced covering the first dimension of the research question. Hypothesis 1 - "The Jensen hypothesis" is divided into three dimensions covering post-buyout performance. Hence, the three dimensions of Hypothesis 1 reads:

H 1: "The Jensen hypothesis"

a) PE-backed buyouts experience greater post-buyout *Turnover growth* than non-PE-backed comparable companies.
b) PE-backed buyouts experience greater post-buyout operating profitability, measured as *EBIT/Sales*, than non-PE-backed comparable companies.
c) PE-backed buyouts experience greater post-buyout operating profitability, measured as *EBIT/Assets*, than non-PE-backed comparable companies.

The decision to study "The advantage to specialization hypothesis" by stage and industry is motivated by the previous literature (see e.g. Cressy et al., 2007; Meuleman et al., 2009a; Le Nadant et al., 2018). Furthermore, as the current body of literature seems to bypass the potential effect of heterogeneity among PE firms, the two dimensions can be viewed as factors that make PE firms more or less capable of adding value to their buyouts. The

literature studying PE firm specialization with a firm-level perspective is rather scarce and inconclusive. However, in line with Cressy et al. (2007) and Le Nadant et al. (2018) we believe that greater specialization by industry or stage is associated with an improvement in post-buyout performance. With a different dataset and time frame this study will, irrespectively of its result, contribute to the existing body of literature covering specialization. Similar to Hypothesis 1 - "The Jensen hypothesis", the two subsequent hypotheses below are divided into three dimensions of post-buyout performance. Hence the three dimensions of Hypothesis 2 and 3 reads:

H 2: "The advantage to specialization by stage hypothesis"

a) An improvement in post-buyout *Turnover growth* is associated with greater relative specialization by stage.
b) An improvement in post-buyout operating profitability, measured as *EBIT/Sales*, is associated with greater relative specialization by stage.
c) An improvement in post-buyout operating profitability, measured as *EBIT/Assets*, is associated with greater relative specialization by stage.

H 3: "The advantage to specialization by industry hypothesis"

a) An improvement in post-buyout *Turnover growth* is associated with greater relative specialization by industry.
b) An improvement in post-buyout operating profitability, measured as *EBIT/Sales*, is associated with greater relative specialization by industry.
c) An improvement in post-buyout operating profitability, measured as *EBIT/Assets*, is associated with greater relative specialization by industry.

Chapter 3 Methodology

The following chapter will discuss the used research approach, variables and the adopted methodology to investigate the aforementioned research question.

3.1 Research approach

This study adopts a similar methodology as previous research studying performance differences between PE-backed buyouts and non-buyouts (see e.g. Cressy et al., 2007; Le Nadant et al., 2018; Meuleman et al., 2009a). Among other reasons, this decision is believed to increase the comparability between the studies, while contributing to the exciting body of literature. Further on, this study adopts a deductive approach meaning that the hypotheses have been deduced from existing theories, research and empirical findings. Following Cressy et al. (2007) and Le Nadant et al. (2018), the hypotheses will be tested using OLS regression. As an initial step, before turning to the OLS regression, we will assess the data using bivariate analysis. This will enable our understanding of whether there is a statistically significant difference between the observed groups or not, before pursuing the OLS regressions. A more detailed discussion on these matters is provided at the end of this chapter.

In order to improve the reliability of the results produced in this study, i.e. ensuring that the results are consistent under similar conditions (Bryman & Bell, 2011), the sampling process follows a clear set of requirements, which are described in section *4.1 Sample*. Another important factor is the validity of the study, which can be described as either internal or external (Bryman & Bell, 2011). The internal validity, i.e. ensuring that the study measures what it is said to measure, is obtained as the data fulfills the requirements for using bivariate analysis and OLS regression. The external validity, meaning to which degree the results are generalizable, is perceived to be obtained as the methodology follows similar patterns as previous research. Additionally, the research is conducted on a market with similar characteristics as previous research (see e.g. Cressey et al., 2007; Le Nadant et al., 2018).

3.1.1 Performance measurements and time span

In order to answer the stated research question, and measure post-buyout performance of PCs, three different measurements of operating performance have been adopted. These are:

- *Turnover growth* (Sales)
- Operating profitability scaled by sales (*EBIT/Sales*)
- Operating profitability scaled by assets (*EBIT/Assets*).

These variables have been used in previous studies (Cressy et al., 2007; Alperovych, Amess and Wright, 2013; Le Nadant et al., 2018) and have been described as the base of value creation for PE firms (Gompers et al., 2016). Le Nadant et al. (2018) discuss the fact that turnover growth might not always be linked to value creation, as it can be achieved through acquisitions and buy-and-build cases. However, it is nevertheless important as turnover growth may be converted into market share, which has been proved to be important when considering exit- strategies and multiple (Gompers et al., 2016).

Further on, the use of EBIT, i.e. earnings before interest and taxes, shields the performance indicator from increased interest payments due to higher leverage. Previous studies (Acharya et al., 2009; Acharya et al., 2013) have argued along this line, claiming that these types of cash flow measurements, apart from net income, are not influenced by non-operating expenses, such as taxes and interest.

A three-year time window has been adopted as the investigated time frame following a buyout. There are a number of motives behind this decision. First, the time span has been frequently used in previous research studying performance differences between buyouts and non-buyouts (Lichtenberg and Siegel, 1990; Cressy et al., 2007; Le Nadant et al., 2018). Kaplan (1989) shows that performance efficiency is higher in buyouts, compared to non-buyouts, during the three post-transaction years. Alperovych et al. (2013) take a similar approach and finds that the majority of the improvements, following a buyout, occur in the two subsequent years. This suggests that expanding the time span to three years will improve the opportunity of observing any potential effects. Apart from being

chosen due to the extensive use in previous research, the three-year time span serves the total sample and the total time window of the study, as historical data is partially limited. By including a longer time span, following a buyout, the total time span of the study would decrease, thus eliminating several observations. A more detailed discussion on the sample and the data limitations is provided in section *4.1 sample*.

Similar to previous studies (Cressy et al., 2017; Meuleman et al., 2009a), we are using the buyout year as a reference for estimating the performance development following the buyout. Arguably, PE firms might look further back to assess the target firm, but in the light of previous research and the chosen performance measurements, we perceive this method to be appropriate. Additionally, each buyout is matched with a peer based on performance at year 0. Hence, including e.g. a mean of multiple years as a reference would aggravate the process of identifying suitable peers.

3.1.2 Industry adjustments and control companies

Following previous research (Cressy et al., 2007; Alperovych et al., 2013), we address the first dimension of the research question using a matched peer group. The peer group will also serve this paper as it allows us to control for any systematic risk. Firm performance can arguably be affected by macroeconomic factors that influence an entire industry. The peer group will thus enable us to isolate the changes in operating performance, to a certain degree, and potentially detect abnormal returns. Cressy et al. (2007) and Alperovych et al. (2013) controlled for industry related factors by including a match peer group based on industry[6], size, sales and geography. Both used the performance of a single company as a reference for the industry, compared to using e.g. the median of multiple companies within each industry. This study adopts a similar approach, based on a number of reasons.

Arguably, an industry adjustment based on a single company will increase the risk of observing firm specific rather than broad industry effects. However, by narrowing the search using 4-digit NACE code and a tight performance range, both companies possess

[6] Alperovych et al. (2013) used 4-digit UK SIC code and Cressy et al. (2007) used 4-digit NACE code, identical to this study.

similar opportunities to operate in the industry. Adding to that, a sufficiently large sample to calculate an industry median for all observations could not be found given the search criteria discussed in section *4.1 Sample*. On one hand, the search criteria could have been more laxus in terms of industry or financials, in order to find a large number of peers. However, that could potentially mean including several industries and/or factors not affecting all observed companies. Lastly, as this approach has been adopted by previous research, we find it to be proven and accepted.

3.2 Variables

The following section describes the adopted variables, divided by dependent variables, independent variables and control variables, and the motives behind the usage.

3.2.1 Dependent variables

The previously discussed performance indicators are outlined as the dependent variables in this study. This indicates that these measurements will be tested against a number of variables that will be further discussed in this section. *Turnover growth* is measured as the geometric mean growth of sales in the three years following the buyout. Operating profitability on the other hand, is measured as the mean of EBIT in the three years following the buyout, scaled by assets or sales (*EBIT/Sales* and *EBIT/Assets*).

3.2.2 Independent dummy variables

Three independent dummy variables have been constructed in order to capture any potential effect caused by either organizational form or strategic differences between PE firms by industry or stage. This methodology follows the same approach as previous research (Cressy et al., 2007; Aperovych et al., 2013; Le Nadant et al., 2018). Each dummy variable will be explained in the following subsections.

The independent dummy variable *Private equity* is designed to capture any potential effect caused by organizational form, linked to the first dimension of the research question. It takes the value of 1 for every observation that is backed by a PE firm and 0 elsewhere (all companies in the peer group). Further on, this variable allows us to test

whether there are any industry related systematic effects potentially affecting the performance indicators. This has previously been discussed in section *3.1.2 Industry adjustments and control companies*.

(i.) *Private equity* – A dummy variable taking the value of 1 for all PE-backed observations, and 0 elsewhere.

In order to capture any specialization effect by industry or stage, two separate dummy variables have been computed. The variables, *PE industry specialist* and *PE stage specialist*, are based on the PE firms´ portfolio composition and relative specialization. The method is adopted from the literature on technology and international trade (Archibugi & Pianta, 1994), and has been used in previous research on PE specialization as well (Cressy et al., 2007; Le Nadant et al., 2018). The following explanation on how to compute the index of competitive advantage (ICA) is based on the description by Cressy et al. (2007) on the same topic.

$$ICA_{ij} = \left(\frac{C_{ij}}{C_{.j}}\right) / \left(\frac{C_{i.}}{C_{..j}}\right) \qquad \text{(Eq. 1)}$$

Where a dot notes summation of the relevant subscript and:

Cij is the number of PCs held by PE firm i in industry/stage j

C.j is the total number of PCs held in industry/stage j by all PE firms

Ci. is the total number of PCs held by PE firm i

C.. is the total number of PCs held by all PE firms, across all industries/stages

The resulting ICA will thus measure the relative specialization in either industry or stage compared to the other PE firms observed in this study. It should also be mentioned that the ICA variable is treated as a binary variable. A firm can either be a specialist or a generalist, there are no dimensions in between. Depending on whether the target company was acquired by a specialized PE firm or not, the dummy variables takes a value of 1 or 0. The ICA allows for three scenarios, which are illustrated in the equation below.

$$ICA_{ij}\begin{cases}\frac{C_{ij}}{C_{.j}} \geq \frac{C_{i.}}{C_{..}} \rightarrow 1 \\ \frac{C_{ij}}{C_{.j}} < \frac{C_{i.}}{C_{..}} \rightarrow 0 \\ C_{ij} = 0 \rightarrow 0\end{cases} \quad \text{(Eq. 2)}$$

The characteristics of the equitation indicate that a given PE firm can be a specialist in multiple industries. A given PE firm can also be classified as a specialist in regard to a certain investment, and a generalist in regard to another investment. However, given the construction of the stage classification, a PE firm is either a specialist or a generalist in terms of stage specialization[7].

(ii.) *PE stage specialist* – A dummy variable taking the value of 1 for all observations backed by a stage specialized PE firm, and 0 elsewhere.

(iii.) *PE industry specialist* – A dummy variable taking the value of 1 for all observations backed by an industry specialized PE firm, and 0 elsewhere.

3.2.3 Independent control variables

In order to control for any underlying or systematic effects caused by circumstances prior to the buyout, separate from those previously described, eight control variables are adopted. All of these variables have been used in previous research (see e.g. Alperovych et al., 2013; Cressy et al., 2007; Le Nadant et al., 2018; Meuleman et al., 2009a), and have been described in the literature to potentially influence the PE firm´s investment decisions when it comes to picking targets (Chapple et al. 2010; Oppler & Titman 1993). Certain firm characteristics influencing the profitability and performance in the years following a buyout, such as initial turnover and profitability, have also been discussed in the literature (see e.g. Cressy et al., 2007; Kaplan, 1991; Meuleman et al., 2009a). On the back of this notion, two specific control variables are included.

(i.) *Turnover_0* – measured as the sales in the buyout year

[7] The stage specialization index is constructed as "buyouts vs the rest", meaning that a PE firm is either a buyout specialist, in regard to all its investments, or it is not. "The rest" includes stages such as seed, expansion and early stage investments.

(ii.) *Profitability_0* – measured as EBIT scaled by assets in the buyout year

Prior research suggests that the size of PE firms, in terms of assets under management (AUM), might influence their ability to raise large funds and create substantial economies of scale (Cressy et al., 2007; Kaplan & Schoar, 2005). These abilities are in turn, associated with higher returns (Kaplan & Schoar, 2005). In order to control for this potential effect, *PE size* is included as a control variable.

(iii.) *PE size* – measured as the total AUM at the year of the buyout

As previously discussed in *Chapter 2 Empirical & Theoretical Framework*, LBOs are commonly used by PE firms as a mean of carrying out large transactions while avoiding large capital commitments. Jensen (1989) also discussed the benefits of high levels of debt as it eliminates certain issues concerning free cash flow, e.g. funding unsuccessful projects and private benefits. Furthermore, high levels of debt commonly incentivize companies to reward management with ownership stakes (Holmström & Kaplan, 2001). Although the financial implications of high debt and gearing are netted out in the used dependent performance measurements, the effects caused by changed management incentives may remain. In order to control for this potential effect, the control variable *Gearing_0* is included.

(iv.) *Gearing_0* – computed as total liabilities over total equity at the buyout year

A number of previous studies (Gompers et al., 2008; Meuleman et al., 2009a; Alperovych et al., 2013) have noted that the experience of PE firms, in terms of number of investments, has proven to positively influence the performance following the years after a buyout. Meuleman et al. (2009a) argue that experienced PE firms have developed superior monitoring competencies, allowing them to minimize agency costs, and are better at picking investments. In order to control for this potential effect, the control variable *PE experience* has been included.

(v.) *PE experience* – measured as the number of current and terminated investments at the time of the buyout

Adding to the discussion on the experience of PE firms in terms of number of investments, Meuleman et al. (2009a) also discuss how experienced PE firms, in terms of age, might have it easier to secure new funding compared to young inexperienced PE firms. In turn, this might cause inexperienced PE firms to invest in companies with more risk. Following prior research (Meuleman et al., 2009a; Alperovych et al., 2013), the potential effect caused by experience in terms of age will be controlled for in the regressions using the variable *PE age*.

(vi.) *PE age* – measured as the difference between buyout year and year of incorporation

Similar to the idea that the age of PE firms might influence the outcome, the age of target companies will also be controlled for. Following the line of argumentation by Brown, Goetzmann, Ibbotson and Ross (1992), younger companies might be able to grow faster and thus show a higher growth rate. Experienced companies are, on the other hand, perceived as more stable and are less likely to show a fast and steep decline in growth (Becchetti et al., 2010). Similar to Cressy et al. (2007), this effect is controlled using the variable *Target age*.

(vii.) *Target age* – measured as the difference between buyout year and year of incorporation

Controlling for market state and business cycles are common practice and has been adopted by several of the articles studied in this paper (see e.g. Cressy et al., 2007; Knill, 2009). In order to control for any potential recovery effects present between 2009-2011[8], we include the dummy variable *Bubble*.

(viii.) *Bubble* – a dummy variable taking the value of 1 if the buyout occurred between 2009-2011, and 0 elsewhere

[8] These years are decided based on data provided by Trading Economics (2020). The link can be retrieved from the bibliography.

3.2.4 Variable overview

A complete summary of all included variables is presented in the table below.

Table 2
Variable overview

Dependent variables	
Turnover growth	Measured as the geometric mean growth of sales in year t+1 to t+3.
EBIT/Sales	Measured as the mean operating profitability in year t+1 to t+3, scaled by sales.
EBIT/Assets	Measured as the mean operating profitability in year t+1 to t+3, scaled by assets.
Independent dummy variables	
Private equity	Takes the value of 1 for all PE-backed companies and 0 elsewhere.
PE industry specialist	Takes the value of 1 if the acquiring PE firm scored >1 in the ICA for industry specialization, and 0 elsewhere.
PE stage specialist	Takes the value of 1 if the acquiring PE firm scored >1 in the ICA for stage specialization, and 0 elsewhere.
Control variables	
Turnover_0	Measured as the total turnover at year 0, given by the total sales.
Profitability_0	Measured as the profitability at year 0, calculated as the EBIT-margin (EBIT/Total assets).
Gearing_0	Measured as the gearing at year 0, calculated as debt over equity (Total liabilities/Equity).
PE size	Measured as the total AUM, in EUR, at year 0.
PE experience	Measured as the PE firms´ experience. Given by the total number of current and terminated investments at year 0.
PE age	Measured as the age of the PE firm at year 0.
Target age	Measured as the age of the target company at year 0.
Bubble	Takes the value of 1 if the buyout occurred between 2009-2011 and 0 elsewhere.

Table 2. Summary of the variables used in the OLS regressions.

3.3 Bivariate analysis

As an initial step of testing the previously described hypotheses on the constructed dataset, a bivariate analysis is conducted. This is done using t-tests and ANOVA. When using bivariate analysis, two important assumptions regarding the data distribution have to be assessed, namely (i) the data should be normally distributed and (ii) the dataset should not consist of any extreme outliers (Brooks, 2014). The methodology for the associated assumptions and the bivariate analysis are described in the following subsections. The results are presented in section *4.3 Testing for normality* and *5.1 Bivariate analysis*.

3.3.1 Testing for normality

The normality assumption is tested using the Kolmogorov Smirnov test. Given the test´s null hypothesis, that the data is non-normally distributed, if the largest deviation exceeds the critical value the null hypothesis cannot be rejected. However, if the observed deviation is less than the critical value, the null hypothesis can be rejected, meaning that the data is assumed to be normally distributed.

In addition to the Kolmogorov Smirnov test, the distribution of the data is also assessed based on the observed kurtosis and skewness, and by a visual evaluation using Q-Q plots. In a normally distributed dataset the skewness is 0 and the kurtosis is 3. The occurrence of outliers could cause the kurtosis and skewness to deviate. Brooks (2014) explains that this can be avoided by excluding extreme outliers. In addition, if the sample size is sufficiently large, there is virtually no harm in violating the normality assumption (Brooks, 2014). Normality evaluation using Q-Q plots has been discussed in the literature as perhaps one of the most common methods of assessing distribution (Loy, Follett & Hofmann, 2016).

3.3.2 Levene´s test

Before proceeding with the t-tests and ANOVA, the equality of the variances has to be determined. This is achieved by using Levene´s test. The insight regarding variance equality is an important factor to assess before continuing the analysis, as the result from

Levene´s test will determine which t-test or ANOVA is most appropriate. Usage of the most appropriate test will increase the strength of the results. Levene´s test assumes that the variances are equal, meaning that a significant result indicates that the null hypothesis, of equal variance, is rejected. In contrast, if the result is insignificant, the null hypothesis cannot be rejected meaning that it can be assumed that the variances between the subgroups are equal.

3.3.3 T-test and ANOVA

In order to determine whether there are any differences between the groups in the sample (PE-backed buyouts, non-buyouts, buyouts backed by specialists and buyouts backed by generalists), t-tests and ANOVA are conducted. The t-test is used to explore the differences between two groups, in this case, between PE-backed buyouts and non-buyouts. The ANOVA, on the other hand, is used to explore any differences between three groups, in this case, between non-buyouts, buyouts backed by specialists and buyouts backed by generalists. A significant result indicates that the null hypothesis, i.e. there is no difference between the groups, can be rejected.

Depending on the result in Levene´s test, the t-test is either conducted assuming equal or unequal variances. The usage of ANOVA is also determined based on the result in the Levene´s test. If the Levene´s test suggests that the data violates the assumption of homogeneity in the ANOVA, the usage of Welch ANOVA have proved to be a better approximation. As a robustness check an ANOVA and a Welch ANOVA are conducted if the assumption of homogeneity is violated.

3.4 OLS regression

To further analyze the data and applying a similar test structure as previous studies within the field (Cressy et al., 2007; Meuleman et al., 2009a; Knill, 2009) the potentially observed differences are analyzed using OLS regressions. A total of nine regressions are conducted based on the three different dependent variables and the three independent dummy variables. Eq. 3 below, illustrates how the first regression is structured. The remaining eight regression are illustrated in Appendix A. Similar to the bivariate analysis,

the OLS model makes a number of assumptions, these are discussed in the next subsection.

$$\Delta Turnover\ growth = \beta_0 + \beta_1(Turnover\_0) + \beta_2(Profitability\_0) + \beta_3(Gearing\_0) + Private\ equity\ (dummy) + Bubble\ (dummy) + \varepsilon_i \quad \text{(Eq. 3)}$$

3.4.1 Regression diagnostics

In order for the model to work sufficiently and produce relevant results, the assumptions in accordance with the Gauss Markov theorem need to hold (Brooks, 2014). If these are met, the OLS model is perceived to be suitable. The following four assumptions are being tested in this study:

(i.) The error terms have zero mean
(ii.) The error terms have a constant variance
(iii.) The error terms are normally distributed
(iv.) The independent variables are uncorrelated

The first assumption is met by including the constant in the model, which can be observed if the model produces a y-intercept. In other words, the error terms are assumed to have zero mean, i.e. the model is linear, if the model includes a y-intercept (Brooks, 2014). This assumption is also being checked through residual plots, based on each dependent variable in each regression. These plots are constructed using the standardized residuals and the predicted residuals. As previously noted, this is a common and accepted form of assessing distribution (Loy, Follett & Hofmann, 2016).

The second assumption, the error terms have a constant variance, is initially also checked using the residual plots. In addition to the visual evaluation of the second assumption, a Breusch-Pagan test is conducted. The test is constructed to examine whether the error terms produced in a regression are independent or not. If this is not the case, meaning that the error terms do not have constant variance, the error terms are said to be heteroskedastic. Conversely, if the second assumption proves to hold, the error terms are

said to be homoscedastic, meaning that the variance is not systematic. If heteroskedasticity is detected in the Breusch-Pagan test, robust standard errors are implemented. This is widely used and a common way of handling potential heteroskedasticity (Stock & Watson, 2015).

The third assumption, the error terms are normally distributed, is tested using a similar approach as previously described when analyzing the sample distribution. The previously discussed residual plots are also used to analyze the distribution of the error terms along with an interpretation of the skewness and kurtosis of the standard errors. The fourth assumption is tested using a correlation matrix. The presence of multicollinearity is undesirable as the isolated effect of each independent variable might disappear, causing the variance of the coefficients to become sensitive to even small changes in the model. Brook (2014) suggests that any variables with at least 0.8 (-0.8) correlation should be removed in order for the data to be tested using OLS. The results from the tested assumptions are presented in section *4.4 Regression diagnostics*.

Chapter 4 Data

This chapter contributes with a discussion on the data in terms of sampling, sample loss and a general sample discussion. Further, an overall sample description is presented along with descriptive statistics. Lastly, the results from the normality tests and the regression diagnostics are presented.

4.1 Sample

On the back of the previously discussed methodology, an original dataset was manually constructed in order to test the described hypotheses and answer the research question. The dataset consists of 110 buyouts in the Nordic market during 2008–2015, and a matched pair of privately held companies. As mentioned, the sampling of the data followed a clear approach in order to improve the reliability and to mitigate any systematical biases. However, a few potential biases were discovered during the course of sampling the data, which will be further discussed in section *4.1.3 Sample Discussion*.

The Nordic market was chosen on the back of a number of reasons. As mentioned in the introduction, the Nordic market has grown to become one of the largest PE markets given its size of the economy and has shown a steady increase of specialized PE firms (SVCA, 2017). Additionally, to the best of our knowledge, no previous research focusing on PE specialization has been conducted in the Nordic market, compared to e.g. the UK and French market. While studying the UK market, Cressy et al. (2007) discussed how their findings might lack external validity, given that the UK market is the second largest PE market. However, given the size and maturity of the Nordic PE market, we perceive it as equally mature as markets subjects to previous studies. Lastly, it has previously been discussed how the limited data on private companies, and particularly PE-backed companies, has shaped the current body of literature, as it has been challenging to study certain markets (Kaplan & Strömberg, 2009). However, there is a relatively large amount of data on the Nordic market, which makes us believe that we will be able to contribute to this particular research field.

Furthermore, there are also a number of reasons behind the studied time period. Bryman and Bell (2011) discuss the importance of excluding temporary factors from the sample, e.g. a financial crisis. A longer time period is believed to cancel out such macro trends affecting the performance, in contrast to any activities undertaken by the PE firms in the sample. This requirement is met as the sample includes a sufficient number of years to cancel out any temporary factors. Further on, samples including accounting data for privately held companies might be restricted as most databases limit the available data to the last 10 years. In this case, it means that there is a lack of data prior to 2009. However, in order to include a sufficiently large sample we decided to include 2008 as well. The decision to study performance developments from year 0 to +3 post-buyout, led to 2015 being the last year included in the study. These motives have been previously discussed in section *3.1.1 Performance measurements and time span*.

4.1.1 Sampling process

The data-gathering process followed three main phases. In the first phase, all buyouts in the Nordic market that occurred between 2008 and 2015 were retrieved from Zephyr, a commercial database. The head office of the acquiring PE firm had to be located in the Nordics, and all secondary- and tertiary buyouts were excluded. When looking at the performance differences between secondary- and primary buyouts, Achleitner and Figge (2012) finds evidence of differences in capital structure, price and operating performance. It is, however, difficult to determine whether these differences are caused by the primary or secondary financial sponsor (ibid.), but it indicates that performance effects might linger even after the primary sponsor has exited its investment.

Furthermore, all syndicate deals where a single PE firm did not acquire more than 50% of the company were excluded. The motive behind this decision is based on the discussion by Chapman and Klein (2009) on majority stake. The authors suggest that a given PE firm needs a majority stake in the PC in order to substantially influence the decision making and the strategy[9]. Previous research indicates that syndicate deals might dilute the value adding effect created by a single PE firm (Alperovych et al., 2013; Meuleman et al., 2009b),

[9] Therefore, this decision serves the purpose of this study by focusing solely on PE firms with a majority stake as we are interested in studying the potential effect created by a single PE firm.

as it is difficult to differentiate between multiple PE firms´ contribution. Brander, Amit and Antweiler (2004) find that the "value-added hypothesis" holds for syndicated VC deals, meaning that they create higher rates of return compared to stand alone projects. However, it cannot yet be determined whether the value-added effect is caused by the lead investor or not.

In addition to the list of buyouts between 2008 and 2015, relevant information such as acquiring PE firm, target name, target BvD-ID number[10], buyout date, NACE code[11] and vendor were retrieved. Each NACE code was later crosschecked with the target firm´s website and perceived operation. In several cases target firms were classified as a "holding companies/head office" by the industry classification system. In order to mitigate the risk of "miss-classifying" a firm, we then changed the NACE code to the relevant code based on their actual operation. The initial sample included 868 buyouts. However, several observations were removed from the sample due to the discussed sample criteria. A more detailed discussion regarding the sample loss will follow in section *4.1.2 Sample loss*.

In the second phase, the necessary accounting data for each target company was collected using Orbis[12]. The relevant financials were assets, EBIT, equity and sales. Whenever the relevant accounting data could not be found using Orbis, we retrieved the financials by going through annual reports. In addition to gathering the accounting data for target companies, the second phase included a breakdown of each observed PE firm[13]. This included mapping each PE firm´s portfolio composition by identifying each PC´s NACE code and stage[14]. This is the data used when recalling Eq. 1 and Eq. 2 in section *3.2.2 Independent dummy variables*. In addition to mapping the portfolio compositions, we also gathered data on the year of incorporation and total AUM during the time of the investment. Furthermore, the breakdown did also include a screening of each PE firm´s

[10] A BvD-ID number is a unique identifier assigned to each company based on its national company code.
[11] NACE is short for *Nomenclature des Activités Économiques dans la Communauté Européenne,* which is a standardized industry classification system used within the European Union.
[12] Orbis is yet another commercial databased, and a part of Bureau van Dijk.
[13] This was executed by going through the websites of all observed PE firms and manually gathering the necessary data.
[14] The stages included: early stage, seed capital, buyout and expansion.

divestments to ensure that the PE firm did not divest the studied PC during the first three years of investment.

In the third and last phase of the sampling process, a matched peer group of privately held companies was created. Following previous research (Cressy et al., 2007; Alperovych et al., 2013) the peer group was matched based on industry[15], geography and size during the year of the investment. All companies had to be within a 70-130% range of total assets and sales of the corresponding buyout. A similar approach was used by Alperovych et al. (2013). Whenever a relevant peer could not be identified based on the mentioned criteria, the geographic scope was extended to include all Nordic countries, or the firm with the most similar sales figure during the buyout year was chosen. Following the argumentation of previous research (Alperovych et al., 2013; Cressy et al.; 2007), the peer group is constructed in order to control for systematic risk, due to e.g. industry specific factors. The peer group also allow us to, similar to Cressy et al. (2007), investigate the Jensen hypothesis and the first dimension of the research question.

4.1.2 Sample loss

Several observations fell out of the sample as they did not meet the expressed criteria in this study. Although the drop from the initial sample could be perceived as rather extensive, it does not indicate a decreased reliability or any errors. In contrast, it proves that the observations adopted in this study are all serving the purpose as they meet the discussed and necessary criteria. A majority of the observations fell out of the sample due to the fact that they were secondary- or tertiary buyouts. However, on the back of the discussion on common exit strategies presented by Kaplan and Strömberg (2009), this is not surprising. As previously noted, a substantial number of all exits are executed through strategic sale.

Another factor affecting the size of the sample is the lack of public accounting data. Even though a company has been purchased by a PE firm in a primary buyout during the observed number of years, it does not necessarily mean that it is included in the sample.

[15] Based on the 4-digit NACE code.

This factor has previously been discussed in the literature as a hurdle when studying PE firms (see e.g. Kaplan & Schoar, 2005; Kaplan & Strömberg, 2009). Although it might not necessarily negatively impact the external validity, it indicates that the study might suffer from selection or selective reporting bias. This risk along with a general discussion of the sample and potential biases will be presented in the following section.

Apart from the sample size being reduced based on the aforementioned requirements, a number of observations were excluded when removing extreme outliers. A total of 10 observations were removed at this stage. Even though this number might give the impression of being substantial, the action was necessary and served the purpose of the study as it allowed us to move forward.

4.1.3 Sample discussion

The occurrence of biases is commonly discussed in order to shed light on potentials flaws or aspects impacting the relatability and internal- or external validity. As previously noted, a few potential biases were discovered during the course of sampling the data. Heckman (1979) was among the firsts to discuss the circumstances surrounding sample selection bias, which results from adopting a nonrandomly selected sample. Cressy et al. (2007) avoided this issue by randomly selecting 122 buyouts. Although the 110 buyouts observed in this study were not deliberately selected from a larger pool of buyouts, i.e. no observed buyouts that met the criteria were excluded, we acknowledge the fact that our sample might be subject to selection bias.

Kaplan and Schoar (2005) describe how selective reporting may cause an upward effect in the sample as companies might stop reporting after bad performance. This could indicate that the observations excluded from this study due to the lack of public accounting data, stopped reporting as they were performing poorly. On the flip side it could also indicate that the used sample only includes companies that have performed well. In order to control for this potential bias, we consistently checked whether or not it seemed as if a company had stopped reporting financials after poor performance. On a positive note, this was not the case. No systematical reporting biases could be observed. Arguably we could have followed Cressy et al. (2007) and randomly selected a number of

buyouts that matched our criteria, but in order to ensure that the sample was sufficiently large we decided to include all observations that met our criteria.

Even though the dependent variables used in this study have been widely adopted as measurements of performance (see e.g. Cressy et al., 2007; Kaplan, 1989; Le Nadant et al., 2018), there are advocates of other or similar measurements. Acharya et al. (2013) adopt a similar measurement of operating profitability as they use EBITDA scaled by sales. The authors argue that EBITDA is superior at predicting a company's future operational earning and works as a proxy for cash flow as it, in contrast to EBIT, also excludes costs associated with financial and accounting decisions. Arguably, it could have been beneficial for this study to adopt EBITDA as a performance measure, and it should be noted that this was our initial intention. However, given the fact that only a limited number of companies had reported historical EBITDA in Orbis, we were unable to include the measurement.

4.1.4 Overall sample description

The three tables below illustrate the sample distribution by geography and buyout year. After funneling the initial sample, using the mentioned criteria, we were left with 110 observations (see Table 3). By studying Table 4, we note that 73 (66.36%) buyouts are backed by PE firms specialized by stage, meaning that 37 (33.64%) are backed by not so-specialized PE firms in terms of stage. Table 5 indicates that 59 (53.64%) buyouts are backed by PE firms specialized by industry, and 51 (46.36%) are backed by not so-specialized PE firms in terms of industry. These numbers are similar to the findings by Gompers et al. (2016), suggesting that more than 50% of PE firms are organized by industry and/or stage. This indicates that some PE firms are specialized both in terms of stage and industry since the total number of PE-backed buyouts is 110.

Table 3
Observed PE-backed buyouts between 2008-2015

	2008	2009	2010	2011	2012	2013	2014	2015	Total
Sweden	8	2	9	11	6	6	9	9	58
Norway	2	2	3	4	4	3	4	2	25
Denmark	0	1	0	0	1	2	2	1	7
Finland	3	1	1	6	1	0	7	0	20
Total	13	6	13	21	12	11	22	12	110

Table 3 shows the total number of observed PE-backed buyouts between 2008-2015 distributed by country. The total number of observations in the table is 110. The Nordics is represented by Sweden, Norway, Denmark and Finland.

Table 4
Observed buyouts backed by a stage specialized PE firm between 2008-2015

	2008	2009	2010	2011	2012	2013	2014	2015	Total
Sweden	5	1	7	8	2	5	5	7	40
Norway	2	1	1	4	3	2	3	1	17
Denmark	0	0	0	0	1	0	1	1	3
Finland	1	1	1	5	1	0	4	0	13
Total	8	3	9	17	7	7	13	9	73

Table 4 shows the total observed buyouts backed by a PE stage specialist between 2008-2015 distributed by country. The total number of observations is 73. The Nordics is represented by Sweden, Norway, Denmark and Finland.

Table 5
Observed buyouts backed by an industry specialized PE firm between 2008-2015

	2008	2009	2010	2011	2012	2013	2014	2015	Total
Sweden	3	0	7	6	3	3	6	8	35
Norway	1	1	1	0	2	2	3	1	11
Denmark	0	1	0	0	1	1	1	0	4
Finland	3	0	0	2	0	0	3	0	9
Total	7	2	8	8	6	6	13	9	59

Table 5 shows the total observed buyouts backed by an PE industry specialist between 2008-2015 distributed by country. The total number of observations in the table is 59. The Nordics is represented by Sweden, Norway, Denmark and Finland.

4.2 Descriptive statistics

The following section presents the descriptive statistics, divided into two subsections. The first subsection focuses on the full sample, connected to the Jensen hypothesis, while

the second presents descriptive statistics for the subgroup, connected to the advantage to specialization hypotheses.

4.2.1. Total sample

Table 6 presents a detailed overview of the descriptive statistics for the entire sample of 220 companies, both PE-backed buyouts and their matched control companies included. The table shows that the average (median) *Turnover growth* for PE-backed buyouts is 15.73% (9.93%) and 1.20% (-0.45%) for the matched peer group[16]. Average operating profitability measured as *EBIT/Asset*s, is 9.94% (8.23%) and 6.58% (6.58%) for PE-backed buyouts and control companies respectively. The second operating profitability measurement, *EBIT/Sales*, is lower for both groups, 6.94% (5.56%) and 4.59% (3.72%) respectively. The average initial turnover (*Turnover_0*) is M USD 45.87 and 58.87 for the respective groups. Table 6 also shows that initial profitability (*Profitability_0*), measured as *EBIT/Assets*, is quite similar for both groups, 11.29% and 8.59% respectively. The results are not surprising as the two groups are matched by size (in terms of asset and sales).

Looking at the gearing level, measured as debt/equity, in the buyout year one can see that PE-backed buyouts have an average of 9.86x and 5.94x for control companies. However, looking at the max and min values they indicate outliers, hence the median of 1.72x and 1.61x respectively may be a better approximation. The average age of the target companies and the PE firms are rather similar with target companies being somewhat older at 20 years versus 17 for PE firms. Finally, the average PE firm have completed around 31 deals, with the most experienced one having completed 208 deals and the least experienced one only 1 deal. For a more detailed description of variables see section *3.2 Variables*.

[16] In table 6, both mean and median are presented for each variable. This is due to the distribution of the data. Hence the median might provide a better approximation than the average if the variable data sample is not normally distributed.

Table 6
Descriptive statistics - PE-backed buyout and non-buyouts

		PE-backed buyouts					Non-buyouts (control companies)				
Variable	Obs	Mean	Median	Std.Dev	Min	Max	Mean	Median	Std.Dev	Min	Max
Turnover growth	110	15.73%	9.93%	43.92%	-87.87%	145.09%	1.20%	-0.45%	30.75%	-90.74%	141.50%
EBIT/Sales	110	6.94%	5.56%	11.36%	-22.93%	58.45%	4.59%	3.72%	12.70%	-53.49%	42.27%
EBIT/Assets	110	9.94%	8.23%	12.32%	-15.13%	44.86%	6.58%	6.17%	9.98%	-23.25%	47.25%
Private equity	110	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
PE industry specialist	110	0.54	1.00	0.50	0.00	1.00	N/A	N/A	N/A	N/A	N/A
PE stage specialist	110	0.66	1.00	0.47	0.00	1.00	N/A	N/A	N/A	N/A	N/A
Turnover_0	110	45.87	24.46	61.06	0.15	397.00	58.87	23.79	105.13	0.10	616.90
Profitability_0 (%)	110	11.29%	8.53%	17.82%	-40.63%	65.36%	8.59%	7.64%	12.71%	-25.00%	76.32%
Gearing_0	110	9.86	1.72	31.46	0.02	220.12	5.94	1.61	18.96	0.13	161.69
PE size	110	1331.14	600.00	1540.77	20.00	8000.00	N/A	N/A	N/A	N/A	N/A
PE experience	110	31.12	20.00	37.46	1.00	208.00	N/A	N/A	N/A	N/A	N/A
PE age	110	17.47	14.00	16.96	1.00	82.00	N/A	N/A	N/A	N/A	N/A
Target age	110	20.25	16.00	17.46	1.00	84.00	N/A	N/A	N/A	N/A	N/A
Bubble	110	0.40	0.00	0.49	0.00	1.00	0.40	0.00	0.49	0.00	1.00

Table 6 shows descriptive statistics for the 110 Nordic PE-backed buyouts and their respective control companies over the entire sample period (2008-2015). *Private equity, PE industry specialist, PE stage specialist* and *Bubble* are dummies taking the value of 1 or 0. The *Private equity* variable takes the value of 1 if the company is PE-backed and 0 if control company. The variables *PE industry specialist* and *PE stage specialist* takes the value of 1 if specialized in i) the buyout stage or ii) in its industry and 0 elsewhere. Further definition on PE specialization see section *3.2.2 Independent dummy variables*. *Bubble* takes the value of 1 if the buyout occurred during 2009-2011 and 0 elsewhere (the time period considered is based on the PMI Index for Euro countries). The variables *Turnover_0* (M USD), *Profitability_0, Gearing_0* and *Target age* represent the initial turnover, operating profitability, gearing and age of the target company at the transaction year. For more detailed explanation of measurement see section *3.4.4 Variable overview*. *PE experience*, *PE age* and *PE size* measure respectively, PE firm experience (number of deals), age and size (AUM (M EUR)) at the year of the buyout. The three dependent variables, *Turnover growth*, *EBIT/Assets* and *EBIT/Sales* measure the turnover growth and operating profitability of the buyout and non-buyout companies between year 0 +3.

4.2.2 Subsample

Table 7 provides the descriptive statistics for the dependent variables divided into two panels. Panel A shows statistics for PE firms specialized by stage versus generalists, while Panel B shows statistics for PE firms specialized by industry versus generalists. The total number of buyouts is 110 in both panels and separated by strategic differences in investment strategy (specialist versus generalist).

Panel A shows an average (median) *Turnover growth* of 15.30% (11.38%) for stage specialists and 16.58% (7.05%) for generalists. Furthermore, the average operating profitability, measured as *EBIT/Assets*, for the three years following the buyout is 10.19% (8.92%) and 9.42% (7.56%) for the two groups. The second operating profitability variable, *EBIT/Sales*, shows that generalists have an average operating profitability of 6.38% (4.58%) while the average stage specialist register at 7.23% (6.67%).

In Panel B, we note that the specialists have a higher average (median) *Turnover growth* than the generalists, 17.56% (14.70%) versus 13.62% (7.05%). By contrast, average operating profitability, measured as *EBIT/Assets*, is lower for specialists compared to generalists, 9.66% (7.36%) versus 10.26% (9.57%) for the two groups. Similar results are found for the second operating profitability variable *EBIT/sales.* Panel B shows that specialists have an average operating profitability, scaled by sales, of 5.88% (5.17%) compared to 8.18% (8.34%) for generalists. Since the median is greater than the mean for the average specialists it would indicate that the data is skewed to the left, meaning that it has a long tail with low scores dragging down the mean value relatively more than the median.

Table 7
Descriptive statistics - Specialist versus Generalist

Panel A: Stage specialist		(i) Specialist						(ii) Generalist				
Variable	Obs	Mean	Median	Std.Dev	Min	Max	Obs	Mean	Median	Std.Dev	Min	Max
Turnover growth	73	15.30%	11.38%	45.19%	-87.87%	144.01 %	37	16.58%	7.05%	41.89%	-56.90%	145.09%
EBIT/Sales	73	7.23%	6.67%	10.89%	-22.93%	49.51%	37	6.38%	4.58%	12.38%	-10.71%	58.45%
EBIT/Assets	73	10.19%	8.92%	11.21%	-8.55%	42.07%	37	9.42%	7.56%	14.42%	-15.13%	44.86%
Panel B: Industry specialist		(i) Specialist						(ii) Generalist				
Variable	Obs	Mean	Median	Std.Dev	Min	Max	Obs	Mean	Median	Std.Dev	Min	Max
Turnover growth	59	17.56%	14.70%	36.95%	-66.27%	144.01 %	51	13.62%	7.05%	51.11%	-87.87%	145.09%
EBIT/Sales	59	5.88%	5.17%	10.44%	-22.93%	49.51%	51	8.18%	8.34%	12.34%	-18.17%	58.45%
EBIT/Assets	59	9.66%	7.36%	11.44%	-6.82%	42.20%	51	10.26%	9.57%	13.38%	-15.13%	44.86%

Table 7 shows descriptive statistics for the 110 Nordic PE-backed buyouts divided into two subcategories (specialists and generalists) over the entire sample period (2008-2015). Panel A focuses on specialization by stage while Panel B focuses on specialization by industry. The three dependent variables, *Turnover growth*, *EBIT/Assets* and *EBIT/Sales* measure the turnover growth and operating profitability of the buyout companies between year 0 +3. In the table mean, median, standard deviation, max and min values are presented for all respective variables.

4.3 Testing for normality

The results from the tested assumptions, associated with the bivariate analysis, are presented in Table 8. The Kolmogorov Smirnov test shows that *EBIT/Assets* is the only variable proven to be normally distributed when using a 0,05 alpha. As the test statistic is lower than the critical value, the null hypothesis can be rejected. However, this is not the case for the remaining two variables, *Turnover growth* and *EBIT/Sales*. This indicates that the null hypothesis cannot be rejected.

The observed skewness for *Turnover growth* and *EBIT/Assets* suggests that both distributions are slightly positively skewed, while *EBIT/Sales* is not or slightly negatively skewed. Both *Turnover growth* and *EBIT/Assets* have slightly thin to normal tails, as the kurtosis range from 1.263 to 2.330. In contrast, the tails in *EBIT/Sales* are moderately fat given the kurtosis of 6.147. These traits can also be observed in Table 8. The visual evaluation, based on the produced Q-Q plots, suggests that the three dependent variables are relatively normally distributed. Figure 1 presents the Q-Q plot based on the *Turnover growth* data. The remaining two Q-Q plots are presented in Appendix B.

Table 8
Normality test – dependent variables

		i) Descriptive statistics		ii) Kolmogorov Smirnov	
Variable	Obs	Kurtosis	Skewness	Test statistic	Critical value (α=0,05)
Turnover growth	220	2.330	0.930	0.118	0.093
EBIT/Sales	220	6.147	-0.0519	0.148	0.093
EBIT/Assets	220	1.263	0.510	0.068*	0.093

Table 8 shows the results from the conducted normality tests divided by each independent variable on the full sample, *Turnover growth*, *EBIT/Sales*, *EBIT/Assets*. The descriptive statistics, in terms of kurtosis and skewness, is presented along with the results from the Kolmogorov Smirnov test. The critical values are presented beside the test statistics, based on a 5% alpha. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

Figure 1
Turnover growth Q-Q plot

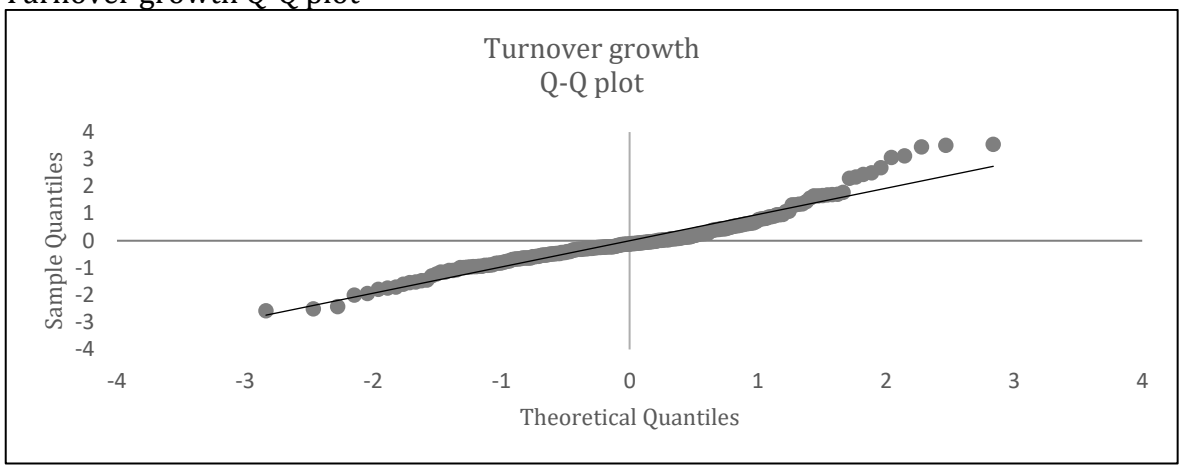

Figure 1 displays a Q-Q plot of the distribution of the variable *Turnover growth* based on the full sample over the entire period (2008-2015). The two remaining Q-Q plots are displayed in Appendix B.

Even though most of our tests suggest that our data is not perfectly normally distributed, there is, according to Brooks (2014), virtually no harm in violating the normality assumption when using a sufficiently large sample. Given that similar studies have used comparable sample sizes and have assumed normality (Alperovych et al., 2013; Cressy et al., 2007; Kaplan, 1989), we perceive that our data is sufficiently normally distributed to continue the research. With this said, the conducted normality tests have not been in vain. The slight deviation from normality observed in two of the three variables contributes to the interpretation of the validity of this study.

4.4 Regression diagnostics

As described in section *3.4.1 Regression diagnostics*, the first three assumptions are initially tested based on a visual evaluation of the residual plots. Figure 2 presents a residual plot and a Q-Q plot which illustrates the distribution in two distinct ways. Observed fan or butterfly shapes are common traits of violations of the first and second assumption (Brooks, 2014). The scatter, in Figure 2, does not seem to create a specific shape, suggesting no violation. The distribution in the Q-Q plot is perceived to follow a rather straight line, indicating that the error terms follow a relatively normal distribution. Figure 2 only displays the residual and Q-Q plot for Regression (6). The remaining plots are presented in Appendix C. However, the second assumption is further analyzed using the Breusch-Pagan test.

Figure 2
Residual and Q-Q plot

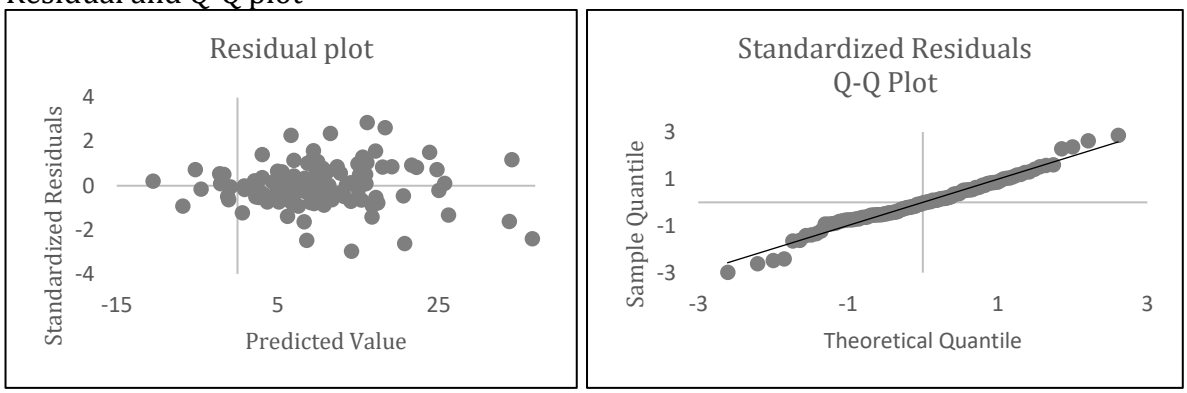

Figure 2 illustrates a residual plot and a Q-Q plot based on data from Regression 6. These were used when evaluating the first three assumptions related to OLS regression. The remaining plots are presented in Appendix C.

Following the methodology described in section *3.4.1 Regression diagnostics*, the third assumption is also tested by interpreting the skewness and kurtosis of the error terms. The skewness and kurtosis from each regression divided by each dependent variable are presented in Table 9. None of the observations deviate notably from the desired values of 3 and 0, in kurtosis and skewness respectively, except from the variable *EBIT/Sales* when testing the full sample. The kurtosis of 6.6544 suggests that the distribution contains fat tails, but at the same time the distribution does not seem to be notably skewed.

Table 9
Normality test OLS regressions – kurtosis and skewness

	PE-backed buyout vs non-buyouts			PE stage specialist			PE industry specialist		
Variable	Obs	Kurtosis	Skewness	Obs	Kurtosis	Skewness	Obs	Kurtosis	Skewness
Turnover growth	220	2.0363	0.6462	110	1.1537	0.3002	110	1.2005	0.3243
EBIT/Sales	220	6.6544	-0.1076	110	2.7498	0.5604	110	3.0159	0.5703
EBIT/Assets	220	1.8922	-0,2201	110	1.2505	-0.0083	110	1.3932	-0.0459

Table 9 presents the kurtosis and skewness for each of the nine regressions divided by three independent variables, *Turnover growth*, *EBIT/Sales*, *EBIT/Assets*. The first three columns represent the total sample used for Regression (1), (2), (3). The second three columns represent the subsample used for Regression (4), (5) and (6). The last three columns represent the subsample used for Regression (7), (8) and (9). See Table 14, 15 and 16 for structure of regressions.

In sum, both assessments of the third assumption suggest that the data is sufficiently normally distributed to accept that the assumption is met. This contributes to the strength of the regressions and increases the internal and external validity.

Table 10 presents a correlation matrix between all independent variables, used in the subsample of 110 PE-backed buyouts, in order to assess if any multicollinearity is present. As shown in Table 10 there is no evidence of multicollinearity as the highest observed correlation is 0.385 between *Turnover_0* and *Gearing_0*. This implies that we are able to draw the correct conclusions from the regression regarding the hypotheses, and no independent variable is dropped. To further investigate the robustness and potential multicollinearity, a correlation matrix including the full sample of 220 observations is presented in Appendix D. Notably, no multicollinearity is present in the full sample.

Table 10
Correlation matrix - Independent variables (subsample - PE-backed buyouts)

	PE industry specialist	PE stage specialist	Turnover_0	Profitability_0	Gearing_0	PE size	PE experience	PE age	Target age	Bubble
PE industry specialist	1									
PE stage specialist	-0.044	1								
Turnover_0	-0.161	0.085	1							
Profitability_0	0.038	0.051	-0.085	1						
Gearing_0	0.046	0.054	0.385	-0.067	1					
PE size	0.122	0.136	0.284	-0.115	0.060	1				
PE experience	-0.016	0.136	0.136	-0.140	-0.049	0.425	1			
PE age	-0.114	-0.026	0.100	-0.019	0.135	0.298	0.191	1		
Target age	-0.057	0.081	0.250	0.039	0.183	0.248	0.164	0.124	1	
Bubble	-0.171	0.149	0.031	-0.038	-0.145	-0.071	-0.171	-0.116	0.013	1

Table 10 presents correlations between the independent variables. The sample used in the correlation matrix is the subsample of PE-backed buyouts. Hence each variable has 110 observations. The variables PE industry specialist and PE stag specialist are dummies taking the value of 1 if the target is acquired by a stage or industry specialist and 0 elsewhere. Bubble is also a dummy variable taking the value 1 if the buyout occurring between 2009-2011, otherwise 0. The following variables, Profitability_0, Gearing_0 and Turnover_0 measures the initial profitability, debt/equity ratio and turnover growth at the buyout year. PE size and PE experience respectively measures the acquiring PE firm's AUM (M EUR) and experience (number of deals) at the year of the buyout. PE age and Target age measures the PE firms´ and target firms´ age in the buyout year.

Chapter 5 Results

The following section presents the results from the conducted empirical study. The results are separately presented and will be used for further analysis in the following chapters.

5.1 Bivariate analysis

This section presents the results from the bivariate analysis. Table 11 shows results from the t-tests, which highlight possible differences in performance of PE-backed buyouts and control companies. Further on, Table 12 and 13 presents the results from the ANOVA and Welch ANOVA to further study differences in the performance, now taking specialization into account.

5.1.1 PE-backed buyouts versus non-PE-backed companies

The bivariate analysis of PE-backed buyouts and non-buyouts was initiated using Levene´s test to compare the equality of variance. The results are presented in Table 11, along with the results from the conducted t-tests. Table 11 also presents the observed group means, separated by the three independent variables and the two subgroups, PE-backed buyouts and non-PE-backed companies.

Table 11 indicates that both *Turnover growth* and operating profitability measured, as *EBIT/Assets*, produce a significant result in the Levene´s test with a test statistic of 13.1478 and 6.8304, respectively. However, *EBIT/Sales* does no produce a significant result. On the back of these results, the t-tests were either conducted assuming equal or unequal variance.

By studying Table 11, one can see that PE-backed buyouts register higher *Turnover growth* (15.73%) and operating profitability, measured as *EBIT/Assets* (9.94%), compared to the control companies (1.20% and 6.58%). The t-test indicates that these differences are significant at the 1- and 5% level respectively. Similar results are found for *EBIT/Sales*. However, the difference is not statistically significant.

Table 11
Differences in post-buyout performance between i) PE-backed buyouts ii) Non-buyouts, using T-test

		Observed means		Levene´s test		T-test	
Variable	Obs	PE-backed buyouts	Non-buyouts	Test statistic	P-value	Test statistic	P-value
Turnover growth	220	15.73%	1.20%	13.1478***	0.0004	2.843***	0.004
EBIT/Sales	220	6.94%	4.59%	0.0313	0.8596	1.446	0.149
EBIT/Assets	220	9.94%	6.58%	6.8304***	0.0096	2.218**	0.027

Table 11 compares mean values of *Turnover growth* and operating profitability (*EBIT/Assets* and *EBIT/Sales*) for the 110 Nordic PE-backed buyouts and control companies over the entire sample period (2008-2015). The method used for comparison is a T-test. The two columns present the group statistic means for all three dependent variables across groups. The following columns present Levene's test for equality of variances followed by the T-test. For more detailed description of category, dependent variables and methodology see section *3.4.4 Variable overview*. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

These results suggest that PE-backed buyouts outperform non-buyouts in terms of *Turnover growth* and *EBIT/Assets* during the studied time period, which lends support to Hypotheses 1a and 1c. Contrary, the findings are not consistent with Hypothesis 1b. To further analyze the data and a potential specialization effect, the following section will cover the bivariate analysis between the PE-backed buyouts, based on their relative specialization, and non-buyouts.

5.1.2 One-way ANOVA

The above section shows that there exist significant differences between the performance of PE-backed companies and non-buyouts. For further investigation, this section highlights the potential differences among PE firms, based on their relative specialization, and non-buyouts. To study the means of the three independent groups a one-way ANOVA is used. The assumptions associated with an ANOVA is discussed in section *3.3.3 T-test and ANOVA* and checked for in section *4.3 Testing for normality*. Similar to the methodology used in the previous section, we use Levene's test for evaluating equality of variances.

Looking at Table 12 and the Levene's test statistics across all groups in both panels we can see that, similar to the results in Table 11, the variables *Turnover growth* and

EBIT/Assets are significant. This indicates that the assumption of homogeneity of variances is violated. Since the one-way ANOVA assumes equal variances across groups the results in Table 12 need to be interpreted with caution. The one-way ANOVA indicates that there are significant differences in two performance indicators across the groups in both panels.

The differences between the groups in terms of *Turnover growth* and *EBIT/Assets*, are statistically significant in both Panel A and B, at the 5- and 10% level respectively. However, the variable measuring operating profitability as *EBIT/Sales*, is not significant across the groups. At the same time, the model is unable to answer whether specialists consistently outperform generalists.

As previously mentioned, the results need to be interpreted with caution given the significant results in the Levene´s test, indicating heterogeneity in variances among the independent variables. Hence, given the circumstances the results will not be further analyzed in this subsection. As elaborated in section *3.3.2 Levene´s test*, a Welch ANOVA provides a better approximation of the true values. Therefore, the following subsection presents the results from the Welch ANOVA along with a discussion on how the results connect to their related hypotheses.

Table 12
Differences in post-buyout performance between i) Specialists, ii) Generalists and iii) Non-buyouts, using One-way ANOVA

Panel A: Stage specialist	Group statistic means			Levene's test for equality of variances		One way ANOVA	
Variable	Specialist	Generalist	Non-buyout	Test statistic	P-value	F-test	P-value
Turnover growth	15.30%	16.58%	1.20%	6.554***	0.001	4.037**	0.018
EBIT/Sales	7.23%	6.38%	4.59%	0.031	0.968	1.102	0.333
EBIT/Assets	10.19%	9.42%	6.58%	4.478**	0.012	2.509*	0.083

Panel B: Industry specialist	Group statistic means			Levene's test for equality of variances		One way ANOVA	
Variable	Specialist	Generalist	Non-buyout	Test statistic	P-value	F-test	P-value
Turnover growth	17.56%	13.62%	1.2%	8.408***	0.000	4.175**	0.016
EBIT/Sales	5.88%	8.18%	4.59%	0.784	0.457	1.544	0.215
EBIT/Assets	9.66%	10.26%	6.58%	3.9978**	0.019	2.409*	0.085

Table 12 compares mean values of turnover growth and operating profitability for the 110 Nordic PE-backed buyouts divided into two subcategories (specialists and generalists) and control companies over the entire sample period (2008-2015). The method used for comparison is a one-way ANOVA. Panel A focus on stage specialization and the sample size is 73 specialists, 37 generalists and 110 control companies (non-buyouts). Hence, the three dependent variables have 73, 37 or 110 observations depending on the category i) specialist, ii) generalist or iii) non-buyout. Panel A focus on industry specialization and the sample size is 59 specialists, 51 generalists and 110 control companies (non-buyouts). Hence, the three dependent variables have 59, 51 or 110 observations depending on the category i) specialist, ii) generalist or iii) non-buyout. The first three columns present the group statistic means for all three dependent variables across groups. The following columns present Levene's test for equality of variances followed by the ANOVA. Both panels follow this structure. For more detailed description of category, dependent variables and methodology see section *3.4.4 Variable overview*. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

5.1.3 Welch ANOVA

Table 13 provides the results from the Welch ANOVA. Similar to the one-way ANOVA, Table 13 is divided into two panels. Panel A focuses on stage specialization while Panel B emphasize industry specialization. Again, all assumptions for using a Welch ANOVA are being met. The results in Table 13 do not diverge much from the results in Table 12, suggesting that the results were not far from the true values.

While studying Table 13 and Panel A, one can see that in the case of *Turnover growth*, the average growth is greater for generalists (16.58%) than specialists (15.30%) and non-buyouts (1.20%). Again, all differences being significant at the 5% level. The results are consistent with Hypothesis 1a and the superiority of the PE organizational from. However, the results contradict Hypothesis 2a since generalists register greater *Turnover growth* than specialists.

Looking at *EBIT/Assets* we find support for Hypothesis 1c as both stage specialists (10.19%) and generalists (9.42%) have higher returns than non-buyouts (6.58%). The findings are also consistent with Hypothesis 2c, since specialists show higher average return than generalists. Differences across groups are statistically significant at the 10% level. The results for the second profitability measurement *EBIT/Sales* are similar to *EBIT/Assets* with specialists having higher average return than generalists and non-buyouts, although not statistically significant. Hence, we find no support for Hypothesis 1b and 2b in Panel A.

Studying the case of specialization by industry (Table 13, Panel B), we again find support for Hypothesis 1a and the superiority of the PE organizational form as both industry specialists (17.56%) and generalists (13.26%) have higher *Turnover growth* than non-buyouts (1.20%). Different from the results in Panel A, the results are consistent with the specialization Hypothesis 3a, as specialist register higher growth than generalists. All differences being significant at the 5% level.

By contrast, in the case of profitability measured as *EBIT/Assets*, generalists (10.26%) register higher returns than specialists (9.66%) contradicting Hypothesis 3c. Yet,

supporting Hypothesis 1c and the PE organizational form as both specialists and generalists show higher average return than non-buyouts. All differences being significant at the 10% level. Similar results are found studying *EBIT/Sales* in Panel B. However, these differences are not statistically significant, meaning that we find no support for Hypothesis 1b and 3b in Panel B. To further study the differences across the groups and what drives the variances, the next section will cover the results from the OLS regressions.

Table 13
Differences in post-buyout performance between i) Specialists, ii) Generalists and iii) Non-buyouts, using Welch ANOVA

Panel A: Stage specialist	Group statistic means			Welch ANOVA	
Variable	Specialist	Generalist	Non-buyout	F-test	P-value
Turnover growth	15.30%	16.58%	1.20%	4.036**	0.021
EBIT/Sales	7.23%	6.38%	4.59%	1.145	0.322
EBIT/Assets	10.19%	9.42%	6.58%	2.643*	0.076

Panel B: Industry specialist	Group statistic means			Welch ANOVA	
Variable	Specialist	Generalist	Non-buyout	F-test	P-value
Turnover growth	17.56%	13.62%	1.20%	4.470**	0.011
EBIT/Sales	5.88%	8.18%	4.59%	1.437	0.241
EBIT/Assets	9.66%	10.26%	6.58%	2.433*	0.092

Table 13 compares mean values of turnover growth and operating profitability for the 110 Nordic PE-backed buyouts divided into two subcategories (specialists and generalists) and control companies over the entire sample period (2008-2015). Since heterogeneity in variances is assumed by looking at the Levene's test statistic in Table 12, the method used for comparison in Table 13 is the Welch ANOVA which assumes unequal variances. Panel A focuses on stage specialization and the sample size is 73 specialists, 37 generalists and 110 control companies (non-buyouts). Hence, the three dependent variables have 73, 37 or 110 observations depending on the category i) specialist, ii) generalist or iii) non-buyout. Panel B focuses on industry specialization and the sample size is 59 specialists, 51 generalists and 110 control companies (non-buyouts). Hence, the three dependent variables have 59, 51 or 110 observations depending on the category i) specialist, ii) generalist or iii) non-buyout. The first three columns present the group statistic means for all three dependent variables across groups. The following columns present Levene's test for equality of variances followed by the ANOVA. Both panels follow this structure. For more detailed description of category, dependent variables and methodology see section *3.4.4 Variable overview*. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

5.2 OLS regressions

The following sections provide the results from the OLS regressions. The results are divided into two subsections. The two subsections present the results from the regressions on i) PE and non-PE-backed companies using the total sample, and ii) PE firm specialization using the subsample. All tables provide a summary of the OLS regression and its variables. The dependent variables are *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. The independent variables, *Private equity*, *PE stage specialist* and *PE industry specialist* study the effect of the PE organizational form or specialization. The remaining independent variables control for other factors potentially influencing post-buyout performance of the PE-backed companies. For all variables, regression coefficients and its respective standard error is presented. In excess, the adjusted R-squared, F-statistic, number of observations and BP-statistic can be found in all tables. The BP-statistic indicates whether robust standard errors are used to address the issue of heteroskedasticity among residuals

5.2.1 Buyouts versus non-buyouts

Table 14 shows the results for the initial three regressions which are designed to test Hypotheses 1a-c ("The Jensen Hypothesis"). Specifically, the regressions test whether there is a relationship between the *Private equity* variable and the three dependent variables *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. Given that the BP-statistic is significant for both Regression (1) and (3), these regressions were conducted using robust standard errors, as described in section *3.4.1 Regression diagnostics*, to avoid heteroskedasticity.

In regard to Regression (1) and Hypothesis 1a, the *Private equity* variable shows a significant relationship at the 5% level with a coefficient of 0.137. This result offers support to Hypothesis 1a predicting a positive relationship between *Private equity* and *Turnover growth* in the three years following a buyout. Regression (3) shows a similar result, as the *Private equity* variable is significant at the 10% level with a coefficient of 1.955. Although less significant, the coefficient is higher, predicting a stronger effect on the dependent variable *EBIT/Assets*. This result lends support to Hypothesis 1c predicting

a positive relationship between *Private equity* and *EBIT/Assets*. However, Regression (2) does not lend any support to the Hypothesis 1b.

Looking at the independent control variables, *Profitability_0* shows a highly significant relationship, at the 1% level, in both Regression (2) and (3). The coefficients of 0.395 and 0.497, respectively, indicate that a higher initial profitability level is an important factor when assessing future operating profitability measured as either *EBIT/Sales* or *EBIT/Assets*. The variable *Turnover_0* in Regression (1) proves to have a significant effect at the 5% level, but with virtually no effect given the low coefficient. The independent control variable *Bubble* shows a significant result at the 5% level in Regression (3) with a coefficient of 2.151. None of the other two regressions show a significant result for this independent control variable.

All three regressions show significant explanatory power given the significant F-statistics. Regression (1) being significant at the 5% level and the remaining two (Regression (2) and (3)) at the 1% level. However, given the relatively low adjusted R-squared in Regression (1) (0.045), it suggests that the model only explains a fraction of the variance in *Turnover growth*.

Table 14
OLS Regression - PE and non-PE-backed firms' turnover growth and operating profitability

Organizational form	Dependent variable (1) Turnover growth		Dependent variable (2) EBIT/Sales		Dependent variable (3) EBIT/Assets	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	0.021	(0.045)	0.587	(1.320)	1.883*	(1.027)
Private equity	0.137**	(0.055)	1.228	(1.418)	1.955*	(1.068)
Turnover_0	-0.000**	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Profitability_0	-0.002	(0.002)	0.395***	(0.046)	0.497***	(0.049)
Gearing_0	0.002	(0.001)	-0.002	(0.028)	-0.007	(0.018)
Bubble	0.064	(0.054)	2.294	(1.434)	2.151**	(1.096)
Adjusted R-squared	0.045		0.258		0.486	
F statistic	3.047**		16.268***		42.430***	
N. obs in regression	220		220		220	
BP-statistic	16.024***		3.6886		19.626***	

Table 14 reports the results of OLS regression for PE-backed companies and control companies. Coefficients and its associated standard errors are presented for every variable. Adjusted R-square, F-statistic, number of observations and BP-statistic is also provided. The dependent variables are *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. Independent variable is *Private equity* which is a dummy taking the value of 1 if the company is PE-backed and 0 if control company. The control variables *Turnover_0*, *Proftiability_0* and *Gearing_0* measure turnover, debt/equity ratio and operating profitability at the year of the buyout. *Bubble* is a dummy taking the value 1 if the company was acquired between 2009-2011 and 0 elsewhere. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

5.2.2 Specialization effect

This section presents the results of the regressions studying the specialization effect using the subsample of 110 PE-backed buyouts. Table 15 and its results study the impact of stage specialization and relates to Hypotheses 2a-c, while Table 16 focuses on industry specialization and Hypotheses 3a-c. Looking at Table 15 and Table 16, one can see that the BP-statistic for the regressions on *EBIT/Sales* and *EBIT/Assets* is significant in both tables. Hence, these regressions were conducted using robust standard errors.

5.2.2.1 Stage specialization

Considering Hypothesis 2a, and the effect of stage specialization on post-buyout *Turnover growth*, Table 15 and Regression (4) show that the variable *PE stage specialist* is negative (-0.010) in sign and its effect not significant. However, the variables *Turnover_0*, *PE age* and *Target age* are significant at the 5-, 10- and 5% level respectively. The negative (-0.000) coefficient on *Tunrover_0* indicates that lower initial turnover has positive impact. Furthermore, the coefficient for *Target age* is also negative (-0.005) which suggests that *Target age* has a negative impact on *Turnover growth*. Given the relatively low coefficients, the variables are assumed to have a moderate to little impact on *Turnover growth*. Overall, the regression results should be interpreted with some caution as the regression has low statistically significant explanatory power at 10% ($F = 1.769$). Additionally, the low adjusted R-squared of 0.06 suggests that the regression model explains 6% of the variance in *Turnover growth*. Conclusively, the results in Table 15 and Regression (4) lend no support for Hypothesis 2a.

Further investigating stage specialization and Hypothesis 2b, which predicts greater post-buyout profitability improvement in *EBIT/Sales*, Regression (5) in Table 15 has significant explanatory power at the 1% level with a F-statistic of 5.342. The model presents an adjusted R-squared of 0.264, which indicates that it explains 26.4% of the variance in *EBIT/Sales*. Similar to Regression (4) we again find a negative (-1.172) coefficient for *PE stage specialist* with no statistically significant effect. Hence, we find no support for Hypothesis 2b in Regression (5). However, *Proftiability_0* is positive (0.346) and statistically significant at the 1% level, which suggests that initial profitability has

positive impact on post-buyout operating profitability. Furthermore, *Bubble* is positive (4.662) and significant at the 10% level.

Finally, looking at the second operating profitability measurement *EBIT/Assets* and Regression (6) the model has strong explanatory power at the 1% level (F-statistic = 9.467) and explains 46% of the variance in post-buyout *EBIT/Assets* (Adjusted R-squared = 0.460). Again, no support for stage specialization is found as the coefficient is negative (-0.208) in sign with no statistically significant effect. Hence, there is no evidence that stage specialization has positive impact on post-buyout improvement in *EBIT/Assets*. Though, the effect of initial profitability is once again positive (0.454) and highly significant at the 1% level. Summarizing Regression (4), (5) and (6) we find no support for stage specialization and its related hypotheses. However, initial profitability appears to have positive impact on post-buyout improvement in both profitability measurements.

Table 15
OLS Regression - PE-backed firms' turnover growth and operating profitability - Stage Specialist

Stage specialization	Dependent variable (4) Turnover growth		Dependent variable (5) EBIT/Sales		Dependent variable (6) EBIT/Assets	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	0.181*	(0.102)	0.915	(2.376)	5.560**	(2.376)
PE stage specialist	-0.010	(0.090)	-1.172	(2.050)	-0.208	(2.349)
Turnover_0	-0.000**	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Profitability_0	-0.002	(0.002)	0.346***	(0.054)	0.454***	(0.079)
Gearing_0	0.002	(0.001)	0.030	0.034	0.016	(0.028)
PE size	0.000	(0.000)	0.000	(0.001)	-0.001	(0.001)
PE experience	0.002	(0.001)	0.061	(0.062)	0.018	(0.062)
PE age	0.004*	(0.003)	-0.024	(0.052)	0.013	(0.052)
Target age	-0.005**	(0.002)	0.006	(0.066)	-0.049	(0.066)
Bubble	0.068	(0.088)	4.662*	(2.770)	2.591	(2.770)
Adjusted R-squared	0.060		0.264		0.460	
F statistic	1.769*		5.342***		9.467***	
N. obs in regression	110		110		110	
BP-statistic	10.071		22.205***		17.286**	

Table 15 reports the results of OLS regression for PE-backed companies. Coefficients and its associated standard errors are presented for every variable. Adjusted R-square, F-statistic, number of observations and BP-statistic is also provided. The dependent variables are *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. Independent variable is *PE stage specialist* which is a dummy taking the value 1 if the company is acquired by a stage specialist and 0 if generalist. The control variables *Turnover_0*, *Proftiability_0* and *Gearing_0* measure turnover, debt/equity ratio and operating profitability at the year of the buyout. *PE size*, *PE experience* and *PE age* measure the PE firm's AUM (M EUR), cumulative number of investments, and age at the year of the buyout. *Target Age* is the target companies age at the year of the buyout. *Bubble* is a dummy taking the value 1 if the company was acquired between 2009-2011, 0 elsewhere. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

5.2.2.2 Industry specialization

Moving on to industry specialization and Hypotheses 3a-c, Table 16 shows the results of Regression (7), (8) and (9). Examining Regression (7), one can see that similar to Regression (4) we again have rather low explanatory power as the model is statistically significant at the 10% level (F-statistic = 1.775). The adjusted R-squared register at 0.060, suggesting that the model explains only 6% of the variance in post-buyout *Turnover growth*. Furthermore, the variable *PE industry specialist* is positive (0.021) and insignificant, lending no support for Hypothesis 3a. Similar to Regression (4), the variables *Turnover_0*, *PE age* and *Target age* are once again significant. However, as the model has low explanatory power no further analysis will be conducted on the individual relationship among variables.

Studying Regression (8), one can see that the model has high explanatory power at the 1% level (F-statistic = 5.663) and explains 27.8% of the variance in post-buyout improvement in *EBIT/Sales* (Adjusted R-squared = 0.278). The variable *PE industry specialist* is negative (-2.921) in sign and not significant. Hence, we find no support for Hypothesis 3b and industry specialization in the regression. Initial profitability is once again positive (0.346) and significant at the 1% level. *Turnover_0* is also significant at the 10% level with a small and negative (-0.000) coefficient. Other independent variables are not significant.

Lastly, examining Regression (9) in Table 16 we find no support for Hypothesis 3c as the coefficient on *PE industry specialist* is once again negative (-1.615) and not significant. The model has a significant explanatory power at the 1 % level (F-statistic = 9.616) and explains 41.6% of the variance in post-buyout improvement in *EBIT/Assets* the three years following the buyout. Not surprisingly, we find initial profitability to be positive and significant at the 1% level. Summarizing the above results from Regression (7), (8) and (9), we once again fail to find support for the associated hypotheses. Again, initial profitability seems to play an important role in post-buyout performance of PE-backed companies. The following chapter will analyze the results more in-depth and discuss how the findings relate to prior studies and literature.

Table 16
OLS Regression - PE-backed firms' turnover growth and operating profitability - Industry Specialist

Industry specialization	Dependent variable (7) Turnover growth		Dependent variable (8) EBIT/Sales		Dependent variable (9) EBIT/Assets	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	0.161	(0.111)	2.430	(2.926)	6.695**	(2.685)
PE industry specialist	0.021	(0.085)	-2.921	(1.951)	-1.615	(1.863)
Turnover_0	-0.000**	(0.000)	-0.000*	(0.000)	-0.000	(0.000)
Profitability_0	-0.002	(0.002)	0.346***	(0.074)	0.455***	(0.067)
Gearing_0	0.002	(0.001)	0.034	(0.025)	0.018	(0.033)
PE size	0.000	(0.000)	0.000	(0.001)	-0.001	(0.001)
PE experience	0.002	(0.001)	0.062	(0.061)	0.019	(0.021)
PE age	0.004*	(0.003)	-0.032	(0.048)	0.008	(0.083)
Target age	-0.005**	(0.002)	0.004	(0.062)	-0.049	(0.068)
Bubble	0.069	(0.088)	3.992	(2.647)	2.301	(2.092)
Adjusted R-squared	0.060		0.278		0.416	
F statistic	1.775*		5.663***		9.616***	
N. obs in regression	110		110		110	
BP-statistic	13.812		21.310***		17.720**	

Table 16 reports the results of OLS regression for PE-backed companies. Coefficients and its associated standard errors are presented for every variable. Adjusted R-square, F-statistic, number of observations and BP-statistic is also provided. The dependent variables are *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. Independent variable is *PE industry specialist* which is a dummy taking the value 1 if the company is acquired by an industry specialist and 0 if generalist. The control variables *Turnover_0*, *Proftiability_0* and *Gearing_0* measure turnover, debt/equity ratio and operating profitability at the year of the buyout. *PE size*, *PE experience* and *PE age* measure the PE firm's AUM (M EUR), cumulative number of investments, and age at the year of the buyout. *Target age* is the target companies age at the year of the buyout. *Bubble* is a dummy taking the value 1 if the company was acquired between 2009-2011, 0 elsewhere. Levels of significance reported: * p<.10, ** p<.05, *** p<.01

Chapter 6 Discussion & Analysis

This *chapter elaborates on the results and the related literature covering post-buyout performance, value creation and the specialization effect. The first section focuses on the results connected to "The Jensen Hypothesis" (our Hypotheses 1a-c). The second section focuses on the results connected to "The advantage to specialization hypotheses" (our Hypotheses 2a-c and 3a-c).*

6.1 Buyouts vs non-buyouts

The following section of the analysis will focus on the results connected to Hypotheses 1a-c. Specifically, the effect on performance measurements and the effect of target selection, capital structure and macro effects will be covered.

6.1.1 The effect on performance measurements

In line with much of the previous research, the results observed in Table 14 confirms the hypothesis that PE firms are able to add more value to their PCs compared to a matched sample of privately held companies, adjusted for industry. The hypothesis, based on Jensen (1989), familiarly suggests that this is enabled through the superior governance framework created by a PE firm compared to a publicly or privately held company. By studying the results in Table 11 one can see that significant differences between PE-backed and non-PE-backed companies exists in terms of *Turnover growth*. The results are further supported in Table 14 Regression (1), where the variable *Private equity* is positive and significant at the 5% level. This is not in line with Cressy et al. (2007) findings as they only find the *Private equity* variable to be significant and positive in the regression for operating profitability (*EBIT/Assets*) and not *Turnover growth*. However, the more recent study by Meuleman et al. (2009a) report similar results as they show that PE-backed companies have greater *Turnover growth* than non-PE-backed companies three years post-buyout. The authors argue that the results support the superiority of the PE-organizational form, as part of the growth can be attributed to its value adding process.

Cressy et al. (2007) find the *Private equity* variable to be positive and significant at the 1% level when studying operating profitability measured as *EBIT/Assets*. The present paper

shows similar findings as the t-test presented in Table 11 suggests that there are significant differences between the two groups in terms of operating profitability. Furthermore, the results presented in Table 14 and Regression (3) support the Jensen hypothesis as the *Private equity* variable is positive and significant at the 10% level. However, the greater strength of our findings in terms of *Turnover growth*, compared with *EBIT/Assets*, suggests that PE firms are better at improving growth than using resource-based strategic management to improve efficiency and profitability. Following the line of argumentation by Gompers et al. (2016), this is not surprising as PE investors emphasize more on growth than cost reductions and divestments. These arguments are further supported by the results in Table 14 and Regression (2) where we find no statistical significance for the *Private equity* variable as a regressor on the dependent variable *EBIT/Sales*.

Furthermore, since the *Private equity* variable is positive and significant in Regression (3), the results support the arguments made by Smith (1990) and Kaplan (1989). The authors argue that PE firms can, via better management of working capital and divestments of unproductive assets, increase operating profitability. However, the argument made by Acharya et al. (2013) suggesting that by improving margins PE firms can increase operational efficiency is not supported as the *Private equity* dummy is not significant in Regression (2) on *EBIT/Sales*. Even if we don't control for firm specific changes, the differences in significance levels between the two measurements of operating profitability suggest that PE firms are more successful at optimizing assets rather than improving margins.

6.1.2 The effect of target selection

Overall, the above-mentioned results indicate that PE firms are greater at adding value by growth rather than profitability gains. This, in turn, relates to the criticisms that PE firms are "corporate raiders" that only profit form re-selling assets, cost- and employment reduction, making the results especially interesting. On the back of these arguments, we find support for the Jensen hypothesis and the superiority of the PE organizational form, especially *Turnover growth*, and to a lesser extent operating profitability. However, studying Table 14, we also note that the variables measuring initial turnover and

profitability (*Turnover_0* and *Profitability_0*) are highly significant. This indicates that initial conditions of PCs may play an important role when predicting future performance, which raises the question concerning the importance of target selection.

Osborne et al. (2012) discuss the fact that PE firms are placing great reliance on specific characteristics, which indicates that PE investors are well aware of what traits to look for in potential targets. Although this statement does not contradict the fact that the PE organizational form delivers superior results in terms of performance, it suggests that these effects might be caused by clever target selection rather than through a superior governance structure. These claims are supported by Cressy et al. (2017) who observe a similar pattern in their study. Wilson et al. (2012) further support this line of argumentation as they too find support for the hypothesis while stating that PE firms are able to benefit, long-term, based on their detailed and skilled pre-purchase due diligence. None of the aforementioned studies have discarded the hypothesis that the superior performance stems from the PE firms´ ability to add value through tight monitoring and quality advice, but have rather raised the question.

Given that initial profitability is highly significant, our results suggest that PE firms target companies with a robust financial profile. The results support the findings of Oppler and Titman (1993) arguing that, PE firms target companies with strong cash flows, solid- and predictable revenue streams. Another potential explanation why initial profitability is important for PE firms, links back to the evidence provided by Smith and Kim (1994). The authors argue that characteristics such as profitability and financial stability make good targets as they can easier service the debt payments and interest expenses following the transaction. At the same time, the results contradict the findings by Alcalde and Espitia (2003) claiming that firms with lower profitability have a higher likelihood to receive a bid from a PE firm. Even if we don't control for the likelihood of receiving bids the results indicate that PE firms do not necessarily target firms with lower initial profitability, rather the opposite.

The results imply that initial profitability and perhaps to a lesser extent initial turnover (given its low coefficient) play a notable role in determining future operating profitability. Adding to the discussion on target selection, the results indicate that ability of picking the

right targets is potentially more important than other value adding techniques. However, looking at the coefficients for the significant variables in Table 14, we note that the values are greater for the *Private equity* variable compared to the control variables *Turnover_0* and *Profitability_0*, suggesting it has a great influence on the mean of the given dependent variable. This strengthens the argument that the PE organizational form is the driving influencer of the performance rather than the initial conditions of the PCs.

6.1.3 The effect of initial capital structure and macro effects

Furthermore, looking at the other control variables, *Gearing_0* has no systematic effect on neither *Turnover growth*, *EBIT/Sales* nor *EBIT/Assets*. These results are in line with the findings of Cressy et al. (2007) and Nikoskelainen and Wright (2007), suggesting that there is no relationship between initial gearing level of target companies and post-buyout performance. The motivation behind using initial gearing as a control variable is to control for the effects caused by changed management incentives which may remain. The results suggest that the effect of gearing on post-buyout performance cannot be attributed to incentive effects. It is merely a result of financial engineering as the choice of dependent variable, *EBIT/Assets,* nets out these effects. As for potential macro effects, the control variable *Bubble* is significant at the 5% level in Regression (3) in Table 14. This would suggest that part of the variance in *EBIT/Assets* can be explained by the financial situation during 2009-2011. However, given that *Bubble* seems to have no effect on the other measurements in any of the other regressions, we are unable to determine the actual importance of the financial situation during 2009-2011 on the dependent variables.

Extending the discussion on gearing level and target selection, the results presented in Table 6, shows that the median gearing level for PE-backed companies is no different from their respective peer. This supports the arguments made by Buzilă (2016) claiming that, along with increased competition, PE firms cannot rely on financial engineering and the use of debt in the value creation process. Furthermore, the results also negate the idea that good targets are companies that have extensive room to take on leverage. The results suggest that other criteria such as initial turnover and profitability are more important than initial capital structure.

Summarizing the discussion above and the results related to the Jensen hypothesis, we find support for Hypotheses 1a and 1c. This indicates that PE firms are able to add more value to their PCs compared to a matched sample of privately held companies, adjusted for industry. The significant differences between the two groups are highlighted by the t-tests presented in Table 11. Furthermore, while the aforementioned test only tells whether there are differences across groups, the OLS regression explains what causes the variance. The *Private equity* variable is highly significant and positive for *Turnover growth* and less significant for operating profitability measured as *EBIT/Assets*. Adding to the discussion of target selection, the results also suggest that initial profitability and turnover play an important role in post-buyout performance. However, the values are greater for the *Private equity* variable, compared to the control variables. This indicates that while PE firms may be skilled in picking the winners, they still add value as the *Private equity* variable is positive and significant. No systematic effect of initial gearing is found. While the discussion above analyzes the results connected to Hypotheses 1a-c the following section will cover the analysis of the findings related to the advantage to specialization hypotheses.

6.2 Specialization effect

This section is devoted to analyzing the results connected to Hypothesis 2a-c and 3a-c. Interestingly, neither regression produce the expected results, which partly contradict Cressy et al. (2007) and Le Nadant et al. (2018) as they find proof supporting the specialization effect by industry. However, there are potentially several motives why we are unable to observe any specialization effect in our sample, all connecting to the literature arguing against the specialization effect presented in Table 1. This body of literature (see e.g. Acharya et al., 2009; Aigner et al., 2008; Berg & Gottschalg, 2005; Kaplan & Strömberg, 2009) claims that specialization is either a disadvantage or that the not so-specialized PE firms are able to deploy the same measures as the specialized PE firms. The literature still argues that the PE organizational form is superior in terms of adding value, which was covered in the previous section, but there is no difference within the organizational form.

6.2.1 The effect of knowledge sharing

Hochberg et al. (2007), supporting the specialization effect, argue that specialization will facilitate an industry-specific network, allowing PCs to access superior knowledge and advice connected to the given industry. Similar projections are made by both Cressy et al. (2007) and Barney (1991), as they claim that industry specialized PE firms will be able to leverage their sector-specific knowledge, compared to generalists. This advantage is perceived as less important in the light of Kaplan and Strömberg (2009), and Berg and Gottschalg (2005) discussion on outside hiring and information sharing. PE firms are used to turning to outside experts and consultants for advice and can thus manage to reduce the information asymmetry and access similar knowledge. This line of argumentation could potentially contribute to the understanding of our results.

As we find no statistical significance for neither variable taking specialization into account, it might suggest that the not so-specialized PE firms are able to make up for the sector-specific advantage, possessed by the specialized PE firms. In line with the argumentation presented by Kaplan and Strömberg (2009), along with Berg and Gottschalg (2005), using outside hiring and networking could explain why neither subgroup is able to outperform the other. This would cause a level playing field, where neither the specialists nor the generalists are able to create a competitive advantage based on knowledge and/or network. Hence, it would cause the independent dummy variables (*PE stage specialist and PE industry specialist*) to be insignificant in Table 15 and 16. A significant difference between the subgroups is, however, observed in Table 13 but it merely tells us that a difference exists, not that it is caused by a specialization effect.

6.2.2 The effect of internal specialization

Similar to our findings, Aigner et al. (2008) are also unable to find support for the specialization effect even though they predict that specialized PE firms should outperform not so-specialized PE firms. Their analysis suggests that this phenomenon is potentially caused by the fact that PE firms are generally specialized within their firm. Arguably, different divisions and partners might be experts in e.g. different financing stages,

industries or regions. This insight could potentially explain why we are unable to identify a specialization effect in our sample.

When assessing our sample of PE firms, we note that they differ in terms of size, experience and age, illustrated in Table 6. Although these variables are not able to consequently explain the variance in the dependent variables, it speaks for the diversity among them. Arguably, large PE firms might have created internal specialist teams, focusing on specific industries or financing stages. These aspects are however not captured in our used index[17], as it only captures a given PE firm´s overall portfolio composition. A PE firm consisting of a set of different investment teams might be classified as a generalist, even though they possess similar knowledge, within their teams, as a PE firm with a cleat cut specialized focus. This links back to the arguments made regarding knowledge sharing stemming from outside hiring, consequently leveling the playing field.

6.2.3 The effect of syndicated buyouts

The occurrence of syndicate deals could potentially be another source of explanation for why we are unable to observe a specialization effect. Among the motives behind syndicate deals, Meuleman et al. (2009b) identify risk spreading, networking and window dressing. However, they also note that PE firms commonly syndicate to access and share specific knowledge and complementary skills, which in turn enables them to add value to their common PC. Although we excluded all syndicate deals where a lead investor did not possess at least 50% of the share, syndicating could potentially explain our findings.

The decision to exclude the syndicate deals was, as previously noted, motivated by the fact that a given PE firm needs at least a majority of the shares to effectively influence the decision making and strategy (Chapman & Klein, 2009). However, we were unable to control whether or not the observed buyouts were syndicates or not, due to the search criteria discussed in section *4.1.1 Sampling process*. On the back of Meuleman et al. (2009b) discussion, the observed generalists might have syndicated on their deals, while leaving one PE firm with at least 50% of the shares. In turn, this would allow them to

[17] The index of competitive advantage, see section *3.2.2 Independent dummy variables* for a detailed explanation.

complement each other and access specific knowledge, putting them in at least an equal position as the specialists. However, this will remain a theoretical explanation as we are unable to determine whether or not the generalists actually syndicated or not. Le Nadant et al. (2018) further argues that syndicate deals might decrease agency costs and conflicts between investors and investees. This suggests that generalists deploying syndicate strategies to access complementary knowledge are also able to reduce conflicts as they are primed to collaborate.

6.2.4 The effect of target selection

Similar to the results in Table 14, we also find that a number of control variables are significant when investigating the specialization effect in Table 15 and 16. To be specific, initial turnover (*Turnover_0*) proved to be significant at the 5% level when studying the effect on *Turnover growth*, for both industry and stage specialization. Further, initial profitability (*Profitability_0*) proved to be significant at the 1% level when studying the effect on *EBIT/Sales* and *EBIT/Assets*, for both industry and stage specialization. These findings suggest, yet again, that target selection might play an important role when assessing future performance. Even though target selection turned out to play a less important role when analyzing the performance differences between PE-backed buyouts and non-buyout, it might be nontrivial when turning the focus to the differences between specialized PE firms and not so-specialized PE firms.

Meuleman et al. (2009a) argue that specialized PE firms are perhaps better at picking targets within their specific industry or stage. Our findings are however unable to support this claim, as the specialization dummy variables are not significant in any of the regressions. Cressy et al. (2007) follows a similar line of argumentation but also finds that the initial conditions of the PCs seem to dominantly explain the variance in the performance measurements, by using initial profitability as stand-alone regressor.

When adopting a similar approach as Cressy et al. (2007), and assessing our sample using initial profitability as stand-alone regressor, the result shows that it accounts for 26% of

the variance in *EBIT/Sales* and 43% in the variance of *EBIT/Assets*.[18] Even though we are unable to predict whether the specialists or the generalists are superior at picking targets, these findings strongly suggest that the initial conditions, associated with PE firms´ ability to select targets, is an important factor when investigating future performance.

6.2.5 The heterogeneity among PE firms

In a more recent study, Le Nadant et al. (2018) are able to confirm the findings by Cressy et al. (2007), claiming that industry specialized PE firms are able to create superior post-buyout performance. Although these findings contradict our results, Le Nadant et al. (2018) provide a potential explanation for why our results deviate and why Cressy et al. (2007), along with us, are unable to support the advantage to specialization by stage hypothesis.

Following Castellaneta and Gottschalg (2016), Le Nadant et al. (2018) argue that PE firms differ in terms of characteristics, along with the advantage of specialization between them. All PE firms are not able to leverage and develop the same resources or capabilities needed to deploy a specialization strategy. Although Le Nadant et al. (2018) finds the industry specialization effect to be positive on average, their results strongly fluctuate between the specialized PE firms. Their results also show that the success of the specialization strategy is linked to the PCs´ initial performance. This indicates that even though a given PE firm possesses the necessary capabilities and resource, the positive effect caused by specialization might be diluted depending on the PCs economic environment. On the back of this relationship, between specialization and the target firms´ initial performance, the importance of target selection is yet again highlighted.

When addressing the results in Table 15 and 16, we also note that *PE age* and *Target age* are significant in Regression (4) and (7), on the 1- and 5% level respectively. The notation that *Target age* is significant, strengthen the argumentation for target selection. The coefficient would suggest that less mature targets are associated with increased *Turnover growth*. At the same time, the *PE age* coefficient supports the findings by Alperovych et al.

[18] Based on the results from OLS using initial profitability as stand-alone regressor, reported in Appendix E.

(2013). This indicates that experienced PE firms, in terms of age, are able to leverage their experience in the initial years following an LBO. However, we are unable to further support these claims, as *PE age* is insignificant when assessing *EBIT/Sales* and *EBIT/Asset*s.

Summarizing the above discussion, arguably there is a lot of evidence supporting the benefits associated with specialization, but in the light of our findings and argumentation these benefits are perhaps better attributed to other factors than performance. Theoretically, there might still be a case for specialization, apart from creating superior post-buyout performance. As mentioned in section *2.4.1 Specialist versus generalist – investment strategies*, Gejadze et al. (2016) argue that specialized PE firms have a competitive advantage by raising funds quicker compared to generalists. More dimensions potentially creating a case for specialization are discussed in the last chapter of the paper. Although our results are unable to support the advantage to specialization hypotheses, the results in Table 13 suggests that both generalists and specialists outperform non-buyouts in our sample. This further supports the Jensen hypothesis, given that PE firms, irrespectively of specialization, are able to improve the performance of their PCs.

Table 17
Key findings

(i.)	*The superiority of the PE organizational form* Our findings suggest that PE-backed companies are able to outperform comparable non-buyouts, confirming the Jensen hypothesis. The significant *Private equity* variable suggests that the PE organizational form, irrespectively of specialization, is a driving influencer of superior operating performance.
(ii.)	*Shift in focus from reducing agency costs to increasing growth* Consistent with Gompers et al. (2016), the greater strength of our findings in terms of *Turnover growth* suggests that PE firms emphasize more on growth than cost reductions and divestments, previously highlighted by Jensen (1989).
(iii.)	*No relative specialization effect on performance* The results suggest that no significant performance differences exist within the PE organizational form. Hence, we are unable to prove that strategic differences in terms of investment focus and strategy influence the PCs post-buyout performance.
(iv.)	*Initial conditions play and important role* Consistent with Cressy et al. (2007), our findings indicate that initial conditions play and important role when assessing future performance. This raises the question of whether ability of picking targets is more important than other value adding techniques.
(v.)	*Still a case for specialization (?)* Even though we are unable to support the advantage to specialization hypotheses, our findings still indicate that specialists outperform non-buyouts. Highlighted by Le Nadant et al. (2018), not all PE firms are able to capitalize on a specialization strategy in terms of performance, suggesting multiple avenues for future research.

Chapter 7 Conclusion

This section summarizes the most important findings, concludes the insights from the previous chapter and answers the research question.

The present paper investigates post-buyout performance of PE-backed and non-PE-backed companies on the Nordic market. As highlighted in the introduction, a majority of research within the area of PE investing bypass PE firms´ heterogeneity by investment strategy and ability to implement value creation levers. Furthermore, along with the increased competition, the growth of specialized PE firms has increased over the years on the Nordic PE market. Hence, to recognize differences among PE firms´ ability to add value to PCs, this paper takes a firm-level perspective in order to study potential specialization effects. Strategic differences by stage- and industry focus is considered. We identify 110 PE-backed transactions on the Nordic market during 2008-2015, and a matched peer group of 110 non-PE-backed companies. The control group is matched by size, geography and NACE code. Based on the identified research gap and the previous literature, the research question reads:

"Is there a difference in post-buyout performance between PE-backed companies and non-PE-backed companies, and how does PE firm specialization by industry or stage affect post-buyout performance among PE-backed companies in the Nordics?"

The research question addresses two dimensions of post-buyout performance, i) the impact of the value creation process associated with the PE organizational form[19], and ii) the impact of strategic differences between PE firms on post-buyout performance of PCs[20]. The first dimension is tested using the full sample of PE-backed companies and the matched peer group. To assess the PCs operating post-buyout performance, we use three dependent variables measuring performance: *Turnover growth*, *EBIT/Sales* and *EBIT/Assets*. The second dimension is assessed using a subsample to test for specialization effects. The PE firms are categorized as specialists or generalists using a relative specialization index adopted from the literature on technology and international

[19] Associated with "The Jensen hypothesis", our Hypotheses 1a-c.
[20] Associated with "The advantage to specialization hypotheses", our Hypotheses 2a-c and 3a-c.

trade (Archibugi & Pianta, 1994). The decision to use the index to discriminate between the two is supported by previous research (see e.g. Cressy et al., 2007; Le Nadant et al., 2018). Given that the PE firms are categorized based on relative specialization, the differences in post-buyout performance between specialists and generalists are tested using the three aforementioned performance indicators.

The empirical study finds proof of the Jensen hypothesis in terms of *Turnover growth* and operating profitability measured as *EBIT/Assets*. The associated t-tests and ANOVA/Welch ANOVA show that both specialists and generalists register greater post-buyout performance than non-buyouts. This supports the superiority of the PE-organizational form as the differences across groups are statistically significant. In line with the results from the t-tests (see Table 9), the *Private equity* dummy variable is significant in the regressions on *Turnover growth* and *EBIT/Assets* (see Table 14). This is consistent with previous research and indicates that at least some of the value created can be attributed to the governance framework used by PE firms. However, we also find a significant relationship between target selection, in terms of initial turnover and profitability, and performance. Yet, the results indicate that the PE organizational form is the driving influencer of the variance in performance.

Related to the second dimension of the research question, the ANOVA and Welch ANOVA presented in Table 10 and 11 suggest that there are statistically significant differences across the groups in terms of performance measured as *Turnover growth* and *EBIT/Assets*. Both generalists and specialists outperform non-buyouts. However, no conclusive answer is found between the differences in performance of generalists and specialists. This result is further supported by the OLS regression presented in Table 15 and 16 where we are unable to find evidence supporting the advantage to specialization hypotheses for any of the investigated performance measurements. The previous literature on specialization effect is inconclusive and there are advocators for both. Hence, our expectation that specialized PE firms have a competitive advantage that contributes to superior post-buyout performance relative to not so-specialized PE firms is not met.

Even though our research finds no support for the specialization hypotheses implied by Cressy et al. (2007), among others, arguably our research contributes to the existing body

of literature covering post-buyout performance of PE-backed companies on the Nordic PE market. Furthermore, the study also contributes to the understanding of PE firms´ heterogeneity by investment strategy and how this might affect post-buyout performance. Finally, the paper also provides evidence supporting the well documented Jensen hypothesis and the alleged superiority of the PE organizational form.

Chapter 8 Limitations & Future Research

The following section will discuss the identified limitations of the study along with exploring potential avenues for future research.

During the course of writing, we noted a few limitations that potentially might influence the external validity of our findings. First, given the insight that PE firms differ along with the potential of successfully executing a specialization strategy, a binary distinction of specialization might not be optimal. The heterogeneity among the specialists in our sample becomes evident when we further examine the used index for specialization classification. For a relatively small PE firm, in terms of investments, one investment more or less in a given industry or stage moves the needle, classifying it as a specialist or a generalist. This highlights the sensitivity of the index, and potentially some flaws even though it has been adopted in previous studies.

Second, our analysis suggested that the non-detected specialization effect might have been caused by the occurrence of syndicated deals. We were, however, unable to control for this phenomenon, given the circumstance discussed in section *4.1.1 Sampling process*. This led the analysis to remain at a theoretical level without any empirical support in this study. The inclusion of a syndicate variable could have contributed with valuable insights for the understanding of the specialization effect, and potentially explain why our results differ from part of the previous literature.

Third, we acknowledge the fact that the explanatory power of this study is in part limited given the sample size. Even though previous studies within the same field have adopted similar sample sizes, and the number of observations is believed to be sufficient, a larger sample size would further strengthen our findings and potentially display a different result. However, given the discussion provided in section *4.1.1 Sampling process*, the limited amount of publicly available accounting data on private firms restrains the sample size.

While the above-mentioned limitations might negatively affect the study, they also suggest a number of avenues for future research. The sensitivity of the specialization

index suggests that a continuous variable for assessing the relative specialization is perhaps more suitable. We therefore argue that future research should adopt a continuous variable, allowing PE firms to be more or less specialized compared to their peers. We believe that this would further contribute to the understanding on the matter while providing a better relative estimation mirroring the actual degree of specialization of PE firms. Further, we argue that future research should aim to find ways of including the opportunity of controlling for syndicate deals. This would contribute with empirical findings of whether syndicating allows generalists to access valuable information, leveling the playing field between them and specialists.

Lastly, as our analysis indicates that part of the post-buyout performance can be attributed to clever target selection, it highlights the need for further research. Our findings are supported by much of the previous research, proving that target selection plays a nontrivial role. In order to further understand the degree of which post-buyout performance can be attributed target selection or the PE organizational form, and its value creation levers, we suggest that future research is devoted to investigate this relationship. To be specific, we argue that a number of initial conditions of PCs should be further analyzed in relation to performance and the PE organizational form. Improved understanding on the matter could potentially be beneficial for the industry and the academia.

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Appendices

Appendix A

Regression (2)

$$\Delta\frac{EBIT}{Sales} * 100 = \beta_0 + \beta_1(Turnover\_0) + \beta_2(Profitability\_0) + \beta_3(Gearing\_0) + Private\ equity\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (3)

$$\Delta\frac{EBIT}{Assets} * 100 = \beta_0 + \beta_1(Turnover\_0) + \beta_2(Profitability\_0) + \beta_3(Gearing\_0) + Private\ equity\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (4)

$$\Delta Turnover\ growth = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ stage\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (5)

$$\Delta\frac{EBIT}{Sales} * 100 = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ stage\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (6)

$$\Delta\frac{EBIT}{Assets} * 100 = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ stage\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (7)

$$\Delta Turnover\ growth = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ industry\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (8)

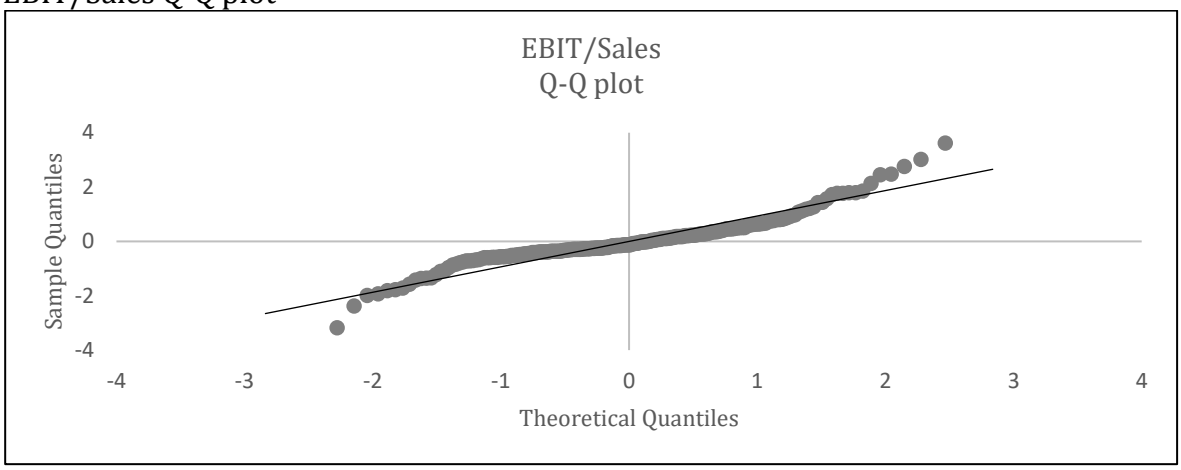
$$\Delta\frac{EBIT}{Sales} * 100 = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ industry\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

Regression (9)

$$\Delta\frac{EBIT}{Assets} * 100 = \beta_0 + \beta_1(Turnover_0) + \beta_2(Profitability_0) + \beta_3(Gearing_0) + \beta_4(PE\ size) + \beta_5(PE\ experience) + \beta_6(PE\ age) + \beta_7(Target\ age) + PE\ industry\ specialist\ (dummy) + Bubble\ (dummy) + \varepsilon_i$$

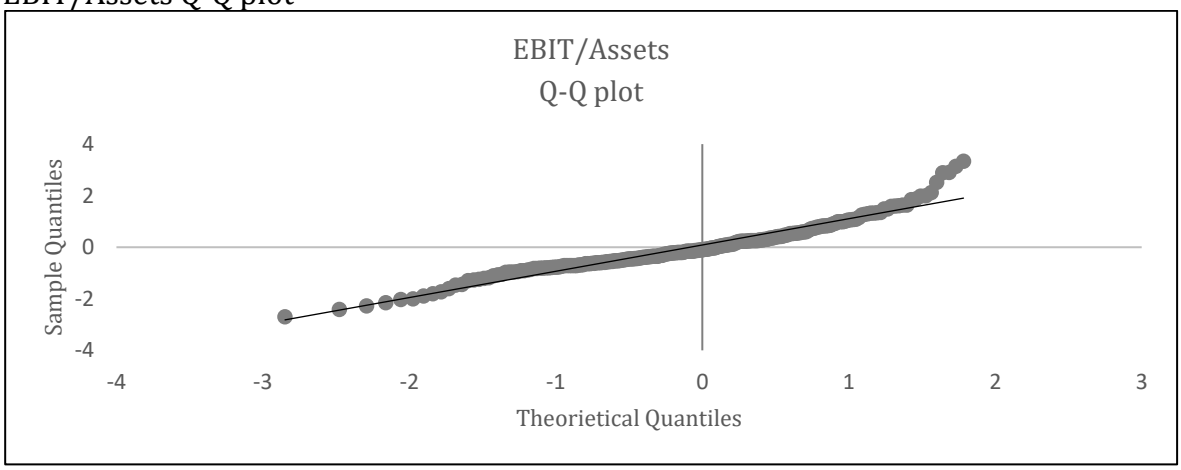
Appendix B

EBIT/Sales Q-Q plot



The figure displays a Q-Q plot of the distribution of the variable *EBIT/Sales* based on the full sample over the entire period (2008-2015).

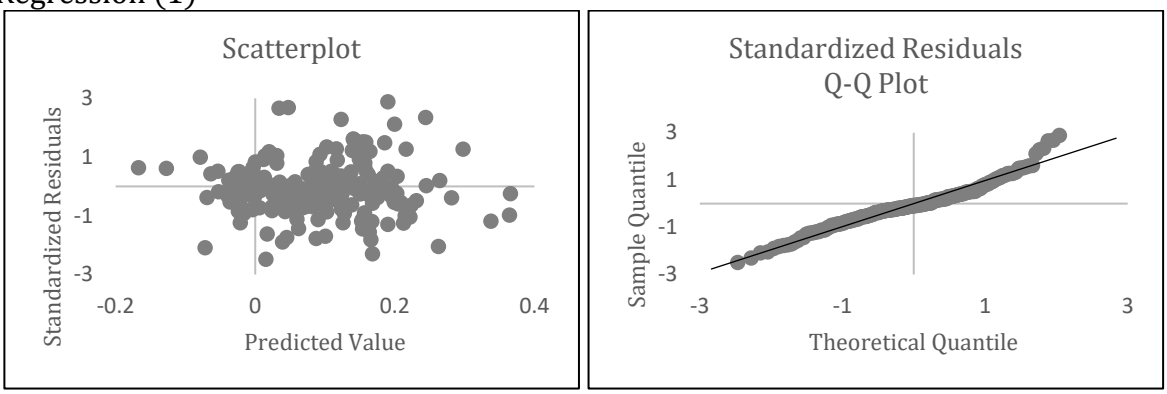
EBIT/Assets Q-Q plot



The figure displays a Q-Q plot of the distribution of the variable *EBIT/Assets* based on the full sample over the entire period (2008-2015).

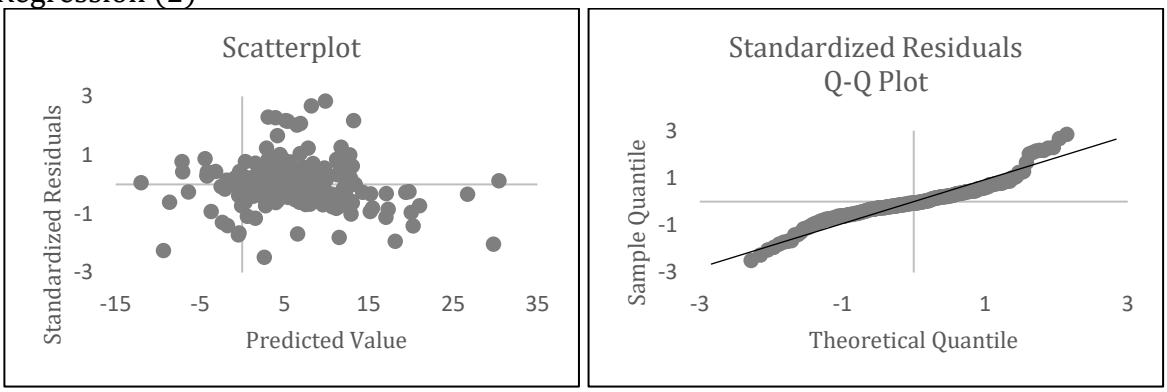
Appendix C

Regression (1)



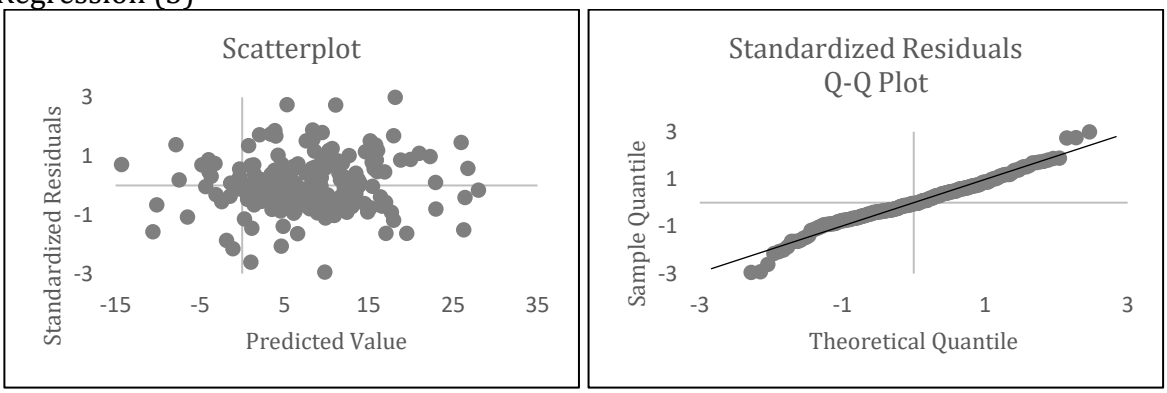
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 1. These were used when evaluating the first three assumptions related to OLS regression.

Regression (2)



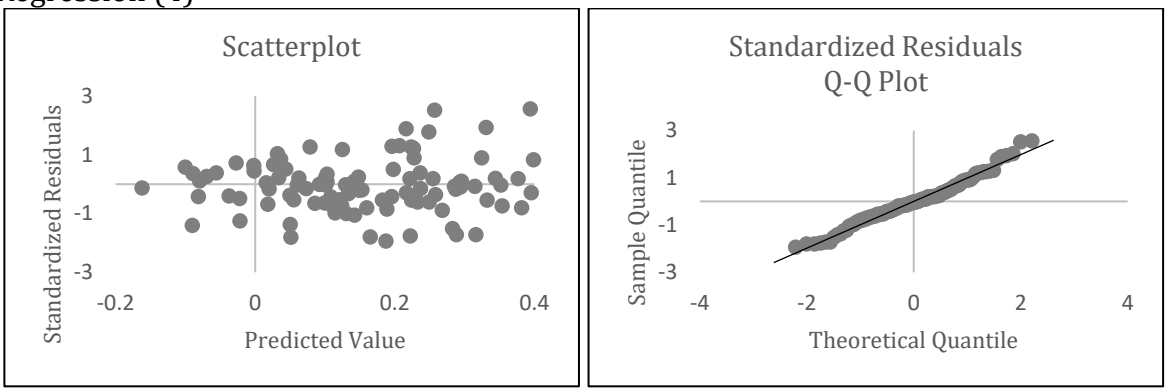
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 2. These were used when evaluating the first three assumptions related to OLS regression.

Regression (3)



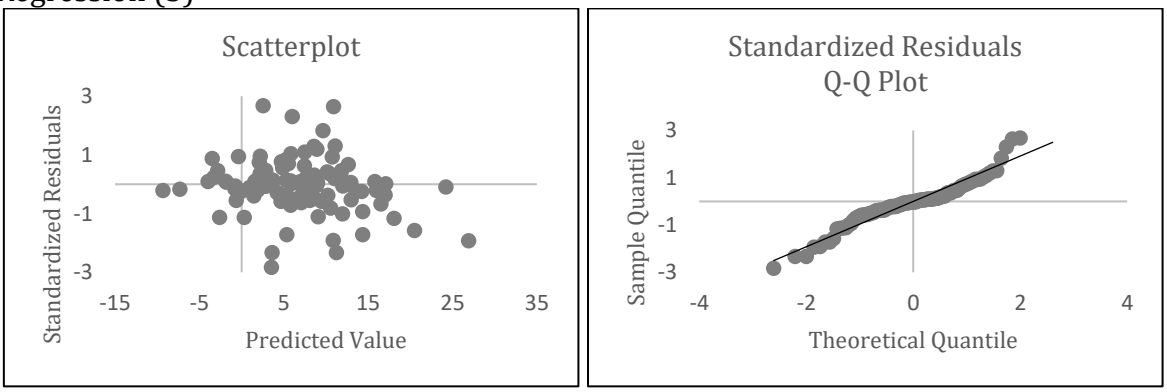
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 3. These were used when evaluating the first three assumptions related to OLS regression.

Regression (4)



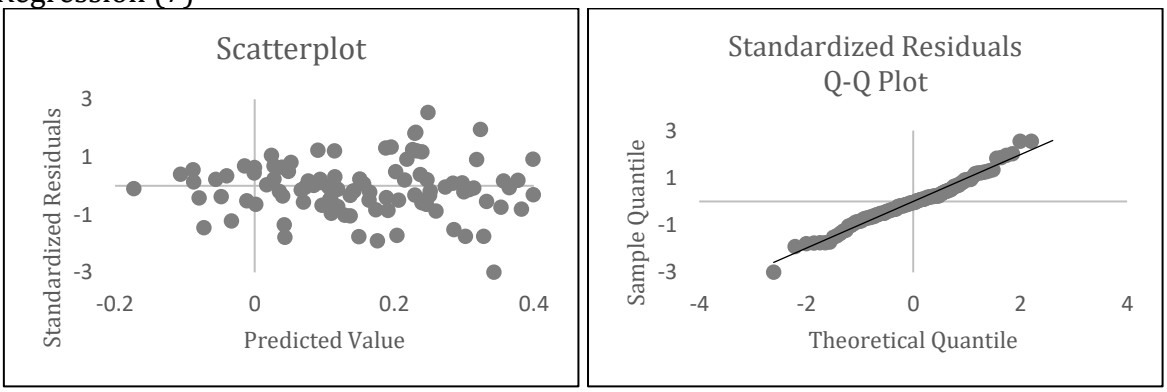
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 4. These were used when evaluating the first three assumptions related to OLS regression.

Regression (5)



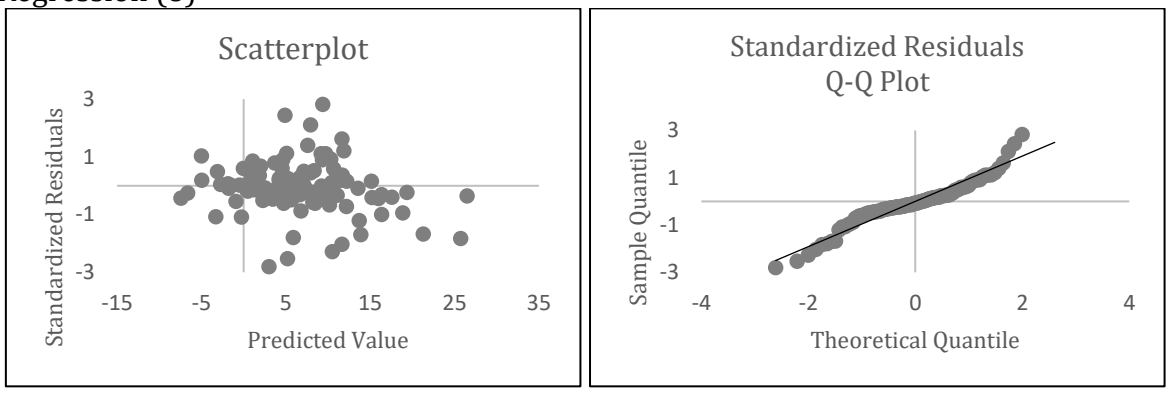
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 5. These were used when evaluating the first three assumptions related to OLS regression.

Regression (7)



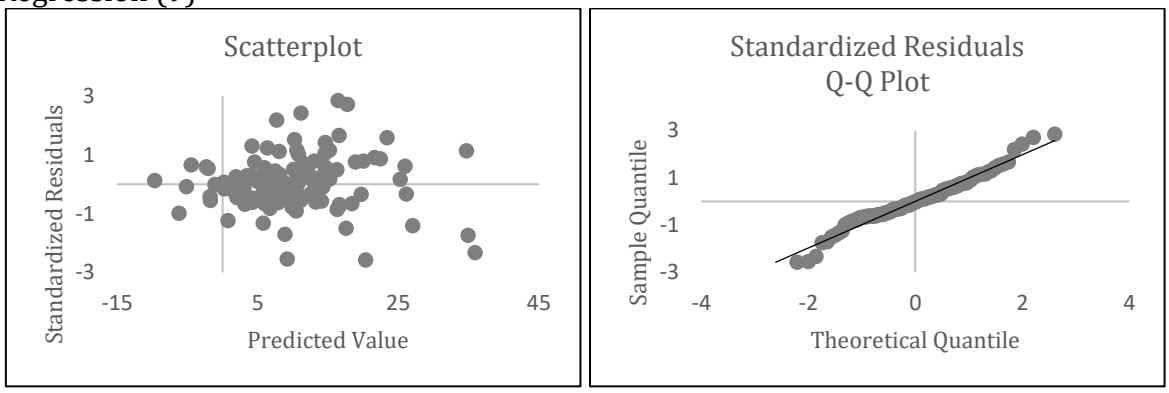
The figure illustrates a residual plot and a Q-Q plot based on data from Regression 7. These were used when evaluating the first three assumptions related to OLS regression.

Regression (8)



The figure illustrates a residual plot and a Q-Q plot based on data from Regression 8. These were used when evaluating the first three assumptions related to OLS regression.

Regression (9)



The figure illustrates a residual plot and a Q-Q plot based on data from Regression 9. These were used when evaluating the first three assumptions related to OLS regression.

Appendix D

Correlation matrix - Independent variables (full sample - PE-backed buyouts and control companies)

	Private equity	Turnover_0	Profitability_0	Gearing_0	Bubble
Private equity	1				
Turnover_0	-0.075	1			
Profitability_0	0.087	-0.051	1		
Gearing_0	0.075	0.138	-0.111	1	
Bubble	0.000	0.0167	-0.014	-0.051	1

Tabel X presents correlation between the independent variables. The sample used in the correlation matrix is the full sample of PE-backed buyouts. And control companies. Hence each variable has 220 observations. The *Private equity* variable is a dummy variable taking the value of 1 if the company is packed by a PE firm, otherwise zero. *Profitability_0*, *Gearing_0* and *Turnover_0* measures the initial profitability, debt/equity ratio and turnover growth at the buyout year. *Bubble* is a dummy variable taking the value 1 if the buyout occurring between 2009-2011, otherwise 0.

Appendix E

OLS Regression - PE-backed firms' initial profitability as stand-alone regressor on EBIT/Sales and EBIT/Assets

PE-backed buyouts	Dependent variable (10) EBIT/Sales		Dependent variable (11) EBIT/Assets	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	3.285***	(1.111)	4.819***	(0.841)
Profitability_0	0.324***	(0.053)	0.453***	(0.064)
Adjusted R-squared	0.251		0.425	
F statistic	37.605***		81.493***	
N. obs in regression	110		110	
BP-statistic	2.5496		10.46***	

The table reports the results from the OLS regression for PE-backed companies using initial profitability as stand-alone regressor. Coefficients and its associated standard errors are presented for every variable. Adjusted R-square, F-statistic, number of observations and BP-statistic is also provided. The dependent variables are *EBIT/Sales* and *EBIT/Assets*. Independent variable is initial profitability of the acquired PCs.